Data collection and user engagement in eHealth applications focused on canine health

-

Bachelor Thesis

ALEXANDRA PINTILIE - S2331586

Creative Technology, BSc Program

Faculty of Electrical Engineering, Mathematics and Computer Sciences

University of Twente

Supervisor: Dr. Duc le Viet, University of Twente
Critical observer: Paul Havinga, University of Twente
Client: Dr. F.M. Serra Bragança, University of Utrecht, Veterinary Medicine, Department Clinical Sciences
DATE: 03/02/2023

Abstract

The University of Utrecht is conducting a study to develop a technology-based system to diagnose lameness in dogs. The system is designed to be user-friendly, with a mobile application that allows dog owners to actively participate in the data collection process. The collected data will be analysed using machine learning algorithms to improve the accuracy and efficiency of the lameness diagnosis. The conceptual framework for the system is based on qualitative research and is the result of two iterations where stakeholders were interviewed.

The data collection methods used in the application are both active and passive, with active engagement from the dog owners and passive data collection through participatory sensing. This creates a comprehensive view of the dog's lifestyle and is key information in the diagnosis and treatment of lameness. The study also includes guidelines for the experiment, which will be used in the user testing phase of the system.

The goal of the study is to assess the effectiveness of the app in monitoring recovery and the ability of the machine learning algorithms to accurately assess improvement based on the collected data. The success of the study will provide a more efficient and accurate solution for the diagnosis of lameness in dogs and will greatly improve the veterinary field.

Acknowledgments

I would like to express my sincerest gratitude to my supervising professors, Dr. Duc le Viet and Dr. Filipe Serra Bragança, for providing me with the opportunity to work on this project and for their invaluable support and guidance throughout its duration. I am honoured to have had the privilege of working with such knowledgeable and supportive individuals.

I also extend my sincere thanks to Michelle Teunissen for her tireless efforts in finding participants for the user evaluations and for her continued support and advice throughout the project. I am deeply grateful to all the participants who took the time to contribute to this project and share their valuable opinions. Your participation and support are greatly appreciated.

Table of contents

Table of figures

Chapter 1: Introduction

Humans are social creatures, and our sense of community is the one that helped us develop over the eons and build civilizations. Not only do we seek companionship in other people, but we also extend these feelings towards other species. One of the oldest, most prevalent examples of our need for companionship is the domestication of wolves, which happened approximately 14,000 years ago [1]. Human and dog have been together, evolved together and this tight relationship is described by the nickname the animal has been offered for the millennia of loyalty: “man’s best friend”. Invested dog owners are more inclined to put time and effort into their pets and are painfully aware of the dog’s limited lifespan. The desire to make the most out of their time together while making sure their dog has a happy life and preventing health issues is clearly visible, and this demand has shaped the veterinarian practice.

While modern medicine has been enjoying the development brought in by technology, and preventive care is more accessible to the common person with the help of eHealth gadgets (i.e., BMI smartwatches), the veterinarian practice finds itself falling behind [2]. Worth noting is also the increased involvement of the dog owners in the process of diagnosing and managing health conditions, involvement that is due to eHealth development. The dog owner became an active actor in the dog’s health, and not just a passive person following the doctor’s advice [3]. Therefore, the possibility of preventive care for dogs via technology must be explored. Modern dog owners are accustomed to such devices and may even be using them themselves, so introducing an extra device that will benefit their beloved canine friends seems like a simple idea that could revolutionize vet care. One marking element of the human-dog relationship is the care they have for each other; the man’s best friend is renowned for their loyalty, and people have proven again and again they would do anything to ensure their companions are safe and healthy. One of the common health issues found in dogs is lameness. Currently, lameness in small animals (e.g., dogs, cats) is extremely difficult to diagnose upon visual examination alone, and the clinical evaluation necessary is time consuming [4]. Left unchecked, it can lead to serious orthopaedic issues, which affect the dog’s mobility, mood, and wellbeing. It is a serious ailment that often reaches advanced stages which require intensive and intrusive treatment [4].

1.1 Problem context analysis

To respond to this technological gap in the care for small animals, University of Utrecht, in a collaboration with University of Twente, is developing a product that can identify early-stage lameness in dogs. The product is using a combination of sensors, mobile eHealth applications and machine learning to detect subtle cues and signal hind lameness. The sensor used is an Inertia Measurement Unit (IMU) that is placed in the dog's collar, which collects data about the dog's position in space, posture, and orthopaedic health. The data from the sensor is sent to an app the dog owner has on their phone, but also to the veterinarian. This data is further analysed through machine learning techniques, and it is meant to identify lameness. The goal of the product is to create a database with the normal gait, so that signs of lameness can be easily identified. Additionally, the database will collect the abnormal gait too, so the product can be used as a health monitoring device; this may be its most common use.
The smart collar is accompanied by a mobile application that is supposed to be used by the dog owner. This app is an eHealth application, so it must be easy to use and attractive to the user. The data collected via the sensor and the app is then analysed by an AI agent that can identify lameness based on the provided data and send the conclusion both to the dog owner and the veterinarian. It is a complex system, that combines multiple fields of expertise in order to create a novel product which could potentially improve the diagnosis process of lameness in dogs, and hopefully other small animals.

This study, however, is focused solely on enhancing the data collection process of the mobile application. Gait analysis systems usually have more than one single sensor, unlike this product, so the problem of not collecting sufficient data for the AI model to reach a correct conclusion arises. Therefore, there is a need to collect complementary data through the mobile app. So, the app can be used by dog owners to input data about their pets, such as the animal's behaviour and habits, and to gather video evidence that can be later used by the AI agent and the veterinarians to facilitate the diagnosis process. The app's ability to provide complementary data becomes vital for the success of the project.
Moreover, the dog owners' involvement is a key factor in the success of the application and system. A common issue met in eHealth applications is the lack of adherence in long term to the app [5]. For the system to prove useful, the end user must adopt the app as part of their routine. Thus, maintaining the animal caregiver engaged with the app is another goal which must be achieved. In other words, the project is aimed at designing the interactive component of a mobile app meant for monitoring canine well-being and to investigate the patient

component to improve the quality of life for dogs.

An important mention is that the result of this study is a conceptual framework which details the data collection streams and the methods to ensure user engagement. Conceptual frameworks are based on theoretical research and qualitative data [6], and it is meant to integrate stakeholder needs in the data collection flow. This will be implemented in the application. The system is highly complex and requires expertise on multiple fields, so at the current stage the application does not exist. This task has been divided and attributed to two students, each with their own goal. The one working on this study, Alexandra Pintilie, will create a conceptual framework for optimising the data collection and to enrich the user engagement aspect. Whereas the other student, Monique den Waal, oversees developing the graphic user interface (GUI). As both students work on the application, they have been allowed to conduct together focus groups. A certain level of overlap between their work is expected, due to the common factor of their research (i.e., eHealth applications).

1.2 Stakeholders

Previously, multiple participants have been mentioned to be involved with this system, veterinarians, gait analysis researchers and dog owners. While the complete list of stakeholders should also include the software developers, the technicians, engineers and all the other stakeholders involved in the other parts of the system, for the current paper the three previously mentioned will suffice. While they are non-human stakeholders, the dogs must be considered as stakeholders, as the project directly affects their wellbeing [7].

1.3 Research questions

Based on the nature of the problem and the chosen direction of the project, conceptual framework, a few questions arise. Firstly, a conceptual framework is a structured approach to understanding and explaining a complex phenomenon or concept. It is a network of interrelated concepts and ideas that provide a comprehensive understanding of the topic being studied. The framework is often comprised of ontological, epistemological, and methodological assumptions that help to define the boundaries of the concept and provide a basis for future research [6], [8], [9].

To create a conceptual framework, firstly the needed concepts have to be identified. Due to the

nature of the study, veterinarian concepts, and technologies related to lameness and IMUs are a few. Background research is conducted, to identify said concepts and provide the theoretical information needed. To guide this research, three research questions have been formulated, with supportive sub-questions.

RQ 1: *How can participatory sensing be integrated in the application so that it supplies sufficient additional data for lameness to be identified and monitored?*

RQ 2: *What incentives can be used and implemented so that the user will be motivated to use the app and help further train the AI agent?*

a. What app features should be implemented to ensure adherence?

RQ 3: *What are feedback loops in the context of an eHealth application for veterinarian care?*

a. What features should the feedback loop have to keep the user engaged?

This study is organized as follows: an introduction to the problem and identification of the main research questions, followed by state-of-the-art research. Chapter 3 is focused on Methods and Techniques that have been studied and how they can be applied in the current project. Chapter 4 contains the ideation process, and a first concept is proposed, which will be later tested and improved. Chapter 5 Specification has two main goals: (1) to test the initial idea, and (2) to improve the concept, and iterate it based on the findings of focus groups and additional research. Chapter 6 Realization contains the final concept, along with the justifications of design choices. Afterward, it is necessary to evaluate the final concept, which can be found in Chapter 7. Following up, Chapter 8 Discussion analyses the focus groups, draws preliminary conclusions on them that are used during the design process, brings up the limitation of the solutions and other difficulties and noteworthy aspects. Lastly, Chapter 9 concludes this study.

Chapter 2: Background Research

The background research is conducted to find answers to the research questions and accumulates the necessary knowledge to further design a solution. Additionally, in this chapter has a state-of-the-art analysis section; as eHealth in veterinarian care, with focus on lameness, is weakly developed, any similar studies would be of help in designing such a tool.

2.1 Research questions

RQ 1: How can participatory sensing be integrated in the application so that it supplies sufficient additional data for lameness to be identified and monitored?

Participatory sensing is making use of the mobile devices people own (i.e., smartphones) to create a participatory sensor network of various data that can accessed both by the dog owners and veterinarians and facilitate the diagnosis process [10]. Smartphones have the possibility to record audio, video, location, time stamps, and this variety in the data collection improves the data quality. Participatory sensing is providing valuable insight because it collects data in real time as the user's activity, and it can provide additional information about behaviours and environment [10], [11]. By extending the data collection process to the app, and implicitly the smartphone, a larger variety of data could be collected without needing complex smart systems.

a. How could a context aware framework improve the accuracy of the system?

A context aware framework can be defined as a system that "uses context to provide/collect relevant information and/or services to the user" [11]. It is a set of methods, techniques and algorithms that allow the system to perceive, understand and interpret the context in which it is operating. The user's goal determines the relevancy of the information in the context. Context itself is defined as "any information that can be used to characterize the situation of an entity" [11]. The entity can be anything which is deemed relevant to the interaction 'user – application', including themselves.

The system already is context aware according to this definition. The IMU is collecting raw data, and it is connected to the smartphone of the user, through which the user must label some of this data. Combined with participatory sensing, which would add a new layer to the data

collection, by collecting geo-data, a context aware framework seems suitable to the nature of the system. However, the context aware framework does not depend solely on the app and smartphone, but it can be implemented in the IMU itself. The IMU can already differentiate between the dog's positions and type of activity, thus it is collecting contextual data regarding the dog's behaviour. If the app or the machine learning could interpret this data, to be able to differentiate between standing, sitting, jumping, running, walking, trajectory and speed, then it would be highly useful. This would be in addition to the IMU measurements about the dog's locomotor symmetries.

RQ 2: What incentives can be used and implemented so that the user will be motivated to use the app and help further train the AI agent?

The first RQ is investigating how additional data can be collected with a minimal participation on the end user's side. However, no matter how well developed this is, the user's engagement is always needed. So, another core question is how the end users (dog owners) can be convinced to interact with the app. Among the predicted actions they would have to take, data labelling, charging the sensor, attaching it, taking video proof of activity are just a few. However, these are all mundane task that users may find little inclination to do.
Firstly, incentives are rewards or motivating objects that encourage users to actively participate and contribute data to a study, experiment or system [12]. These incentives can be in the form of monetary compensation, access to exclusive information, recognition or reputation, or personal satisfaction from contributing to the improvement of health outcomes [13]. The goal of these incentives is to increase the participation rate and improve the quality of data collected in a participatory sensing system for eHealth purposes.
In the domain of eHealth, the design of persuasive applications that ensure user engagement is well developed. Even if the app is meant for canine welfare, the end user is still a human, thus those design principals still apply. Behavioural changing techniques (BCTs) may prove successful in keeping the user interested in the app. The BCT Taxonomy (v1) is a hierarchical structure of 93 behaviour change techniques (BCTs) that is based on the similarities in their aims, methods, and underlying psychological processes [14]. This framework helps categorize and compare the BCTs used in various programs and interventions and provides insight into the mechanisms of behaviour change. It is a valuable resource for those in fields such as health, education, and environment to design and evaluate behaviour change interventions. Within the context of this research, the BCTs can be used to design the user-application

interactions, so that those are encouraging the user's motivation.
Even more, participatory sensing itself is a topic upon which user motivation and engagement have been studied, so a few incentives have been identified.

Moreover, to gain a better understanding on how to answer this research question, one sub-questions has been formulated. The purpose of the app, and the system, is to ensure the wellbeing of one's beloved pet. However, eHealth apps are known to have low adherence levels [5], so it can be expected that the user will abandon the app without additional incentives. Some eHealth apps, especially focused on mental health, make use of gamification as an incentive method. In this particular case, during the pilot phases of the product and app, monetary incentives or free access to the system could be used.

a. What app features should be implemented to ensure adherence?
Adherence in eHealth applications refers to the extent to which the users utilize the application and follow with the recommended health behaviours. Adherence is an important factor in determining the success of an eHealth application, because low usage rates lead to limited improvement over time [5].
Applications with multiple desired features, that the users find useful, have a higher rate of adherence, as they meet the user needs. However, functionality is not the only thing users want. In the eHealth domain, there are a lot of apps competing for users; thus, the ones that inspire trustworthiness have a higher chance of long-term adherence [3]. In the case given, there are little comparable apps for canine wellbeing. The lack of competition can be compensated by having the system recommended by specialists and the facilitation of interacting with the veterinarian. Adherent eHealth applications are accessible, easy to use, and they can educate the user about the health of their dog [5]. If the app can become a communication tool with the veterinarian, as well as an education source on the animal's condition, the adherence may increase. Research shows that adherent applications have notification systems [5], which make it easier for the user to manage their health; it proves that the application can take over the managerial aspect of managing one's health, which the users appreciate.

RQ 3: What are feedback loops in the context of an eHealth application for veterinarian care?

Feedback loops in the context of this project are of two types: machine learning related and medical practice related.

Firstly, the app asks the human user to label data that the sensor is collecting, so that the machine learning can train. This part of the Active Machine Learning process, namely "features and labels"; Figure 1 depicts the general flow of the ML algorithms [15]. In this study, raw data would be collected from the IMU and from the smartphone (because of the participatory sensing the smartphone would become a data stream). The machine learning model would have to analyse both data streams, and the end user would have to validate them per request. Before the application is available for user testing, the research team at University of Utrecht is working on creating a database of sound and lame dogs, so the machine learning can be trained based on that baseline data. However, it is safe to assume that data collected from a dog owner and their pet would vary greatly from that baseline, so the machine learning will need to adapt and improve itself. User input is crucial in this process.

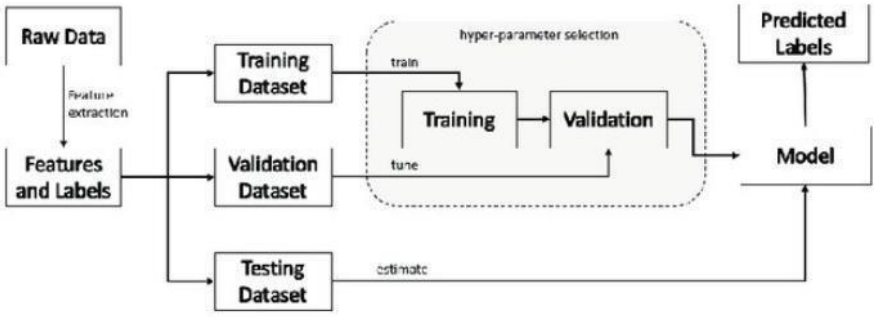

Figure 1: general workflow diagram of Machine Learning algorithms [15]

In digital medical practices, a different feedback system has been defined, based on two feedback loops [16]. Firstly, the patient would be contacted and receive feedback on their lifestyle and behaviour. The contact person is not a medical specialist, but an intermediary person that checks on the patient. This provides personalised attention and relieves the medical professional from certain tasks. If the first feedback loop did not prove sufficient and the patient struggles to follow the treatment scheme, or their condition worsens, a secondary loop involves the medical specialist. For future reference, the latter definition is used to define the feedback loops: the dog owner is firstly notified about any abnormal behaviour of the dog, as they are the primary caretaker of the animal. If the situation demands it, the specialist will also

be notified. This dual care system seems to work best when the patient is incapacitated or needs a lot of support [16], [17], criteria which would apply to human patients. A dog is a non-human patient, and they cannot care for their own condition, which makes the situations comparable and the method has high chances to be effective. This feedback loop also implies that the dog owner would have to learn more about their dog's condition, and how to manage it.

a. What features should the feedback loop have to keep the user engaged?

The user has a vital role in the ML process, and the feedback loop them engaged with the app, by continuously sending raw data that needs annotation. Unfortunately, this feedback loop should tag the user constantly; the feedback loop should be activated at certain vital moments, so it prevents user burn out. User burn out can be caused by an excessive stream of notifications, and it is characterised by the user being frustrated with the notifications the eHealth application sends [17]. This may aggravate the user so much that it lowers the adherence levels, the user could ignore the notifications, and, in the end, they may stop using the application. Particularly important is also the way the feedback loop is interacting with the user. Thus, the features of the feedback loop must be carefully designed. Literature [5], [27] support the use of notifications and reminders as methods to attract the user.
The feedback loop between user and specialist also needs to be designs. A communication channel through the application may prove useful.

2.2 State-of-the-art

While the project started by University of Utrecht is novel when it comes to its application in small animal diagnosis of lameness, there is similar research that should be considered, evaluated and used in the development of this project. Firstly, there are systems developed to diagnose lameness in horses; there any multiple of such systems, among which one was created at University of Utrecht, namely EquiMoves. These horse-based systems will be briefly analysed, as they are designed to be used only in a professional setting, and their interaction is only involving the experts (veterinarian). However, the data collection and labelling process of this software may indicate features that the app must incorporate for maximum efficiency. However, mobile apps for monitoring small animals' health are not a novel idea. There are

multiple such systems meant to be used by dog owners or veterinarians to keep track of the pets' wellbeing.

EquiMoves [18]

Partially developed by University of Utrecht, in collaboration with other research centres, EquiMoves is a novel system meant to facilitate the diagnosis of lameness in horses. It is a highly complex system, which makes use of multiple components to obtain real time horse motion variables at a high sample rate, all synchronized [16]. The system uses multiple IMUs and cameras to capture the horse's movement with increased accuracy and an Inertia Gateway, and the captured data is processed by the custom-made software for the motion processing. This data collection process is similar to the one in this project, notable being the increased numbers of IMUs, one single IMU for the dog versus the total of eight that EquiMoves can use. EquiMoves proves that collecting video data of the horse movement and synchronizing it is a method that can identify lameness with little error. The hardware details, however, prove irrelevant for the design of the user interaction and process.

The software component of EquiMoves manages the raw data processing, synchronizes the different data types and applies multiple algorithms to assess locomotor symmetry. Moreover, the software is also creating clear visualizations of the horse's position (see figures 2 and 3).

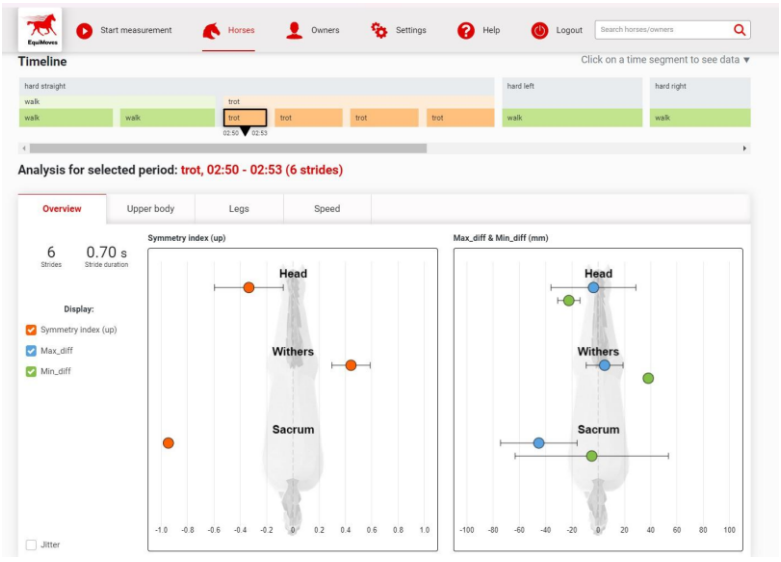

Figure 2 selection from the EquiMoves system; this is the report for the horse owner [18]

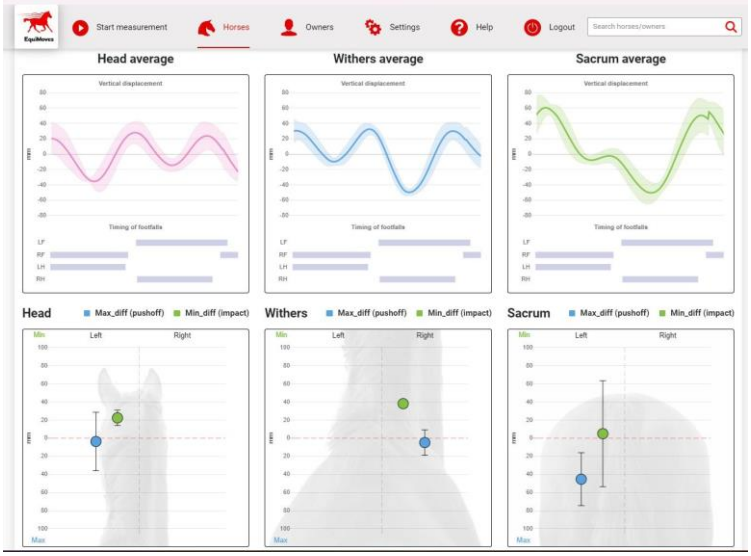

Figure 3 selection from the EquiMoves system [18]

Such visualizations and analysis of the information support the veterinarian in discovering lameness, even subtle cases. The system also allows the user to register new horses and add new readings over time, a medical history of the animal being created.

Unfortunately, the EquiMoves system is designed for specialists in equine care; a person without formal training could not use the system or understand the meaning of the visualizations. Currently the main users of this software are gait analysis researchers. The figures referenced are selections from the software, and they are representative for the report the horse owner receives, but they still need some prior knowledge to understand the meaning of the visualizations. This is understandable, considering the complexity of the system (multiple sensors, cameras, need for a large space for the horse to move), and the size of the animal. Yet, in the context of gait analysis in small animals such as dogs, making the system accessible at home and to the dog owner is a requirement for assuring a rich data collection and a long-term adherence.

A pilot study in the development of an Artificial Neural Network [19]

This study is focused on developing an Artificial Neural Network (ANN) to detect lameness in dogs. The system uses a single IMU, similar to the case of this paper, but placed in the sacral region. The Neural Network consists of a Long Short-Term Memory (LSTM), a type of recurrent neural network (RNN).

Additionally, the author creates a lo-fi prototype for a web app that is meant to become a tool for veterinarians in diagnosing hind limb lameness. The web app able to synchronize the IMU

collected data with video recordings of the dog, and to create graphs. This study, however, has prioritises the back-end development of the web app and pays little attention to the user engagement aspect. It is also designed to be a tool for specialists, and it does not involve the dog owner.

Fog-computing Smart Home Framework [20]

This is a study that focuses on animal care by monitoring pet's activity within the household, by using a Smart Vet Care system. The goal of this system is to have a continuous assessment of pets' wellbeing, to create a clear history of the animal in case of health issues and to facilitate remote healthcare from the veterinarian side. This framework has a data classification of the dog behaviour as follows: "health dataset", "environment dataset", "diet dataset" and "behaviour dataset". In Figure 4, however, the discussed framework is explained, showing that both the veterinarian and the pet care giver (i.e., dog owners) are involved.

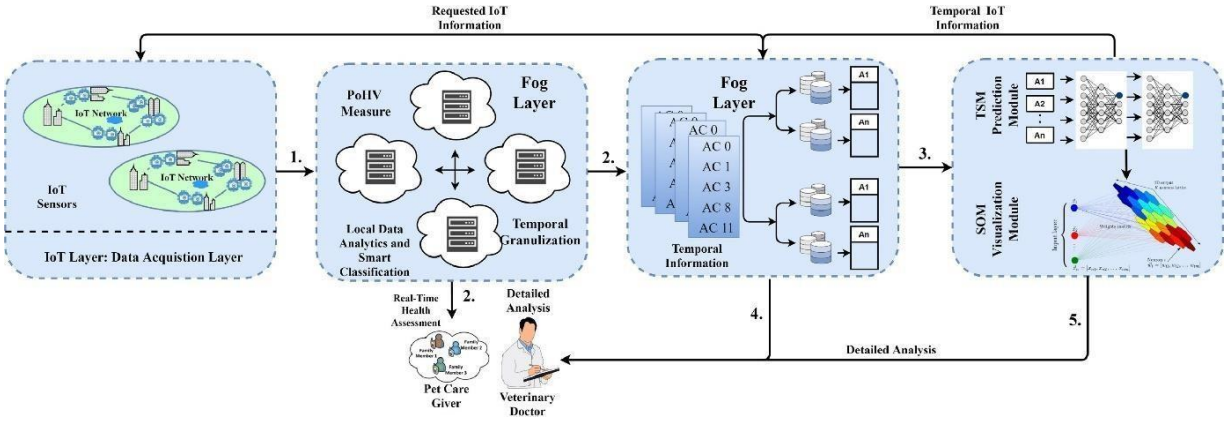

Figure 4 selection from [20] Modular Framework of Smart VetCare: Layered Overview

This is relevant, as the pet care givers are supporting the system by labelling data ("Local data analytics and smart classification); they are part of the real-time health assessment loop. Unfortunately, pet caregiver interaction is not explained in this study, the focus is on the Fog-Computing and the Deep Machine Learning methods used. This system then visualizes the assessment over the pet's health in a colour coded method, so that the owner and the veterinarian have a clear first understanding of it.

The limitations of this study are that the data collection happens only inside and it is not fully applicable to a more dynamic system, whereas for gait analysis physical activity is wanted. Thus, this paper introduces multiple concepts, such as IoMT, Fog-Cloud computing, and Deep

Machine Learning methods and algorithms. Other limitations are the number of sensors the dog would have to wear, which increases the data collection, but lowers the comfort of the animal and the acceptance rate of the devices.

Data collection and machine learning are present in all the mentioned examples. User engagement is explicitly mentioned in all of them, but its role and development just in two [18], [20]. EquiMoves and [19] have as end user experts in canine health, whereas [20] is involving the pet care giver in the data labelling process.

Chapter 3: Methods and techniques

The Creative Technology design process, as can be seen in the Figure 5, dictates the design cycle that will be followed during the graduation assignment of the students of this field. This design process has been developed by Angelika Mader and Wouter Eggink [21], and it has been the standard in the Creative Technology projects since 2019. This means that the creative process and the structure of the project must follow it, accordingly to the four phases.
The phases are (1) the ideation phase, (2) the specification phase, (3) the realization phase and lastly (4) the evaluation phase.
It is important to note that this design process used is an iterative process. This means that returning to previous phases to improve the concept based on feedback and new information is encouraged and necessary for creating a product that fits the requirements and needs of the user.

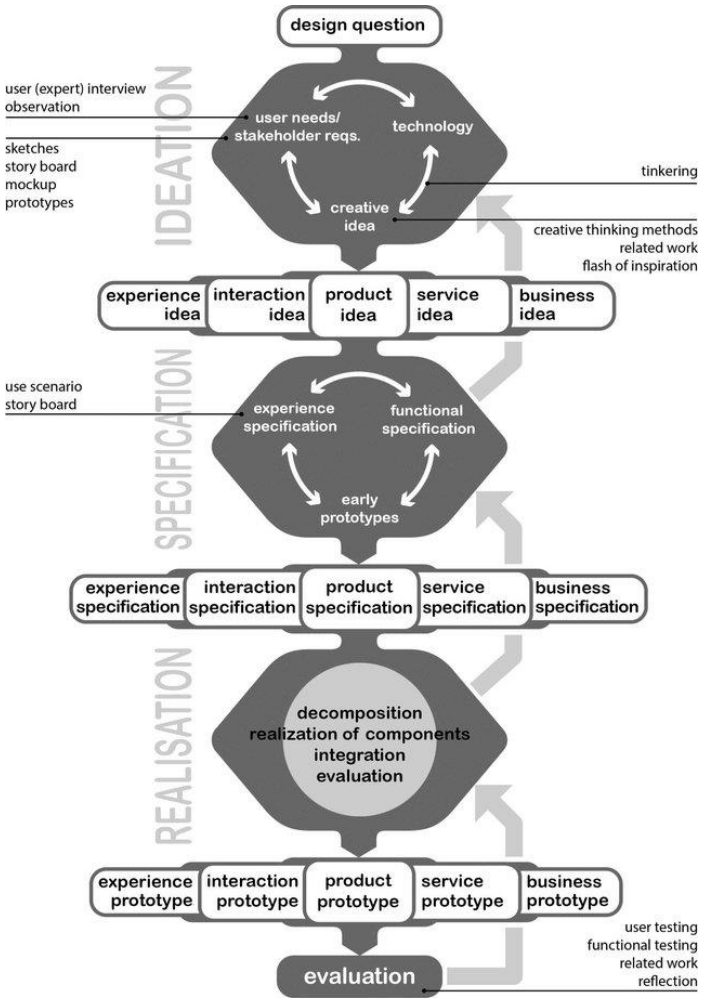

Figure 5 the Creative Technology design cycle

3.1 The ideation phase

The assignment for this thesis falls under the category of "order from a client", in this case UU and UT. This project is meant to cater to the user needs and place responsibility on stakeholders, i.e., dog owners, in order to have a smooth data collection process. As the mobile application falls under the category of eHealth apps, a few core methods and characteristics arise, such as the use of participatory sensing, notification and reminder systems, and user-friendly features.

To stimulate the creative process, a lot of time and effort has been dedicated to the background research. Thus, the ideation phase resulted in a collection of methods and ideas from related work that could be further explored. These ideas have been organized in multiples diagrams meant to explain the interaction between all the proposed frameworks and stakeholders.

3.2 The specification phase

During this phase, the experts have been consulted through focus group and their initial opinion to the first concept has been inquired. To better understand how this application may fit within a healthcare practice standpoint, the researchers have been allowed to shadow a veterinarian at the veterinarian clinic within the University of Utrecht. This is meant to offer insight on what the consultation procedure is, how the veterinarians make use of the already integrated software and how a new system could be integrated in the consultation time.
Another visit to the veterinarian clinic of University of Utrecht took place, where the researchers had the opportunity to have a focus group with two veterinarians, both specialised in orthopaedic health. The results of the conversation will be discussed later, in Chapter 8 Discussion, and the results will be implemented in Chapter 5 Specification.
In this phase the concept has been reiterated for the first time.

3.3 The realization phase

This phase will be a culmination of the previous two phases. The chosen methods, ideas and theories will be reiterated. This new conceptual framework will be tested in multiple focus groups that will be organized with veterinarians and gait analysis experts. Their input will then by analysed and integrated in the framework, as the design cycle is iterative. Additional theoretical research has been conducted to support the new insights from the focus groups.
The final solution is a conceptual framework, which covers the user interactions with the application, with a special focus on data collection and input. Diagrams are accompanying the conceptual framework, to better visualise it.

3.4 The evaluation phase

Once the final concept is created, it needs to be tested. This is explained in Chapter 7 Evaluation. Due to the nature of the final product, a conceptual framework, it is difficult to have a usability testing process. To overcome this, the final concept will be supported by more literature, and an experiment will be designed. The experiment cannot be conducted during this study because the application in which the final solution is to be implemented does not exist yet. So, the guidelines of the experiment are explained, so that it can test the solution in the most effective way.

Chapter 4: Ideation

Previously, background research has been conducted with the purpose of gathering knowledge to answer the research questions. As a result, multiple approaches and related projects have been discovered. In the current chapter, these approaches are explained, and they will be used to create an initial idea for the context aware framework. This initial idea may be broad and rough, but the goal of this phase is to explore multiple theories and see what fits best the goals of this study. Further on, the ideation phase result will be tested during a focus group with specialists.

Firstly, the system will make use of a context aware framework, which is provided partially by the IMU. Together with the implementation of participatory sensing, the system would be able to collect sufficient additional data to be able to assess whether IMU data is abnormal, or the dog's behaviour is unusual for the context. Yet, reaching such an automated self-responsive stage requires a long training process for the AI algorithm. To not extenuate the user with data labelling, using the context aware framework to try and disseminate situations and the feedback loop to ask the user to validate some data would suffice. The frequency with which the system triggers the feedback loop should be carefully considered.

One of the methods that will be used is design for experience. The app will allow the users to personalize the settings, so that the algorithm can be trained and tailored to their specific needs. To do so, the user could input certain parameters in the app about their dog, general health, and habits. Information about habits and behaviours can support the participatory sensing and the building of the context aware framework. Daily routines are part of the context of daily life, so the system should learn to expect increased activity at certain hours. Then, the algorithm would send more data annotation requests to the user when the dog is known to be active. This could also solve issues such as notification coming in when the user is not with the dog (i.e., at work), which would be ignored and possible disturb the user.

The feedback loop is going to be designed as a notification system: a pop-up notification from the app, depending on the collected raw data. Researched showed that most adherent eHealth apps have notification systems and reminder systems to keep the user on track with their health; these systems are usually meant to remind the patient to take their medicine or allow them to document their progress. Within the bounds of this project, however, both systems

may be considered. The app should notify the user to label data, but it can also have features such as reminding the owner to train their dog or give them medicine. Lameness can be a consequence of an old age afflictions or wounds, but most common it is caused by injuries, weight issues and lack of exercise in the animal [4]. Most of these issues, however, can be usually treated through a series of exercises recommended by the veterinarian. Thus, the app should consider implementing functions on a physical exercise regime, setting reminders for exercises.

Persuasive health technologies are a development caused by the growth of eHealth applications. Psychological and User Centred Design (UCD) are combined to ensure user engagement and long-term use of the applications. From the Taxonomy of Behavioural Changing Techniques, “1. Goals and planning”, “2. Feedback and monitoring”, “4. Shaping knowledge”, “8. Repetition and substitution”, and “10. Reward and threat” seem to be promising categories of BCTs that can be implemented within the app; their implementation can be achieved through features of the application. By applying persuasive health technology approaches, the data collection, user interaction and incentives may be solved by creating a more pleasant experience, and by making an appeal to the intrinsic motivation of the dog user. These BCTs can be implemented by simply designing features that would fit them; for example, the dog owner, together with the veterinarian, can set a goal for weight loss. In the application then there would be reminders to exercise, a special diet, and regular moments to weight the dog.

Lastly, a method that has proven successful in dual feedback loop eHealth apps is the possibility to receive advice from a specialist through the application. The client has already expressed their desire to have the system accessible to both the dog owner and the veterinarian, and they have been open to the suggestion of creating a chat function. So, if the dog owner does not fulfil the data labelling tasks, or they do not follow the recommended exercise regimes, the veterinarian could check up on them via the app. Consequently, if the dog owner has questions or comments, they could be directly addressed via the app. However, the extent of the communication between the specialist and the dog owner should be carefully considered, as privacy issues may arise.

Multiple concept diagram has been made to illustrate the interactions of the system (Figure 6), the data collection and the feedback loops (see Figures 6-10).

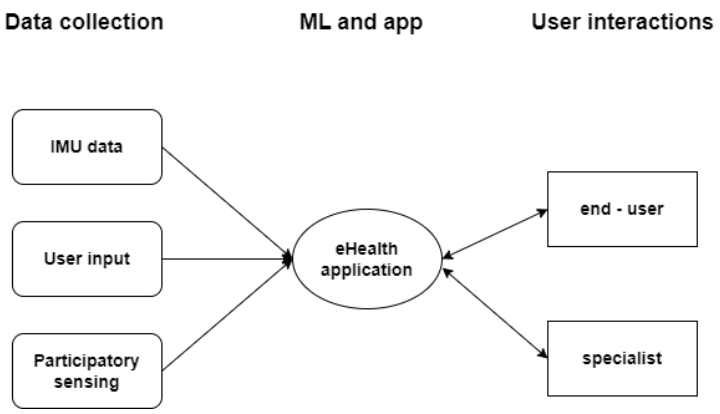

Figure 6 system interactions diagram

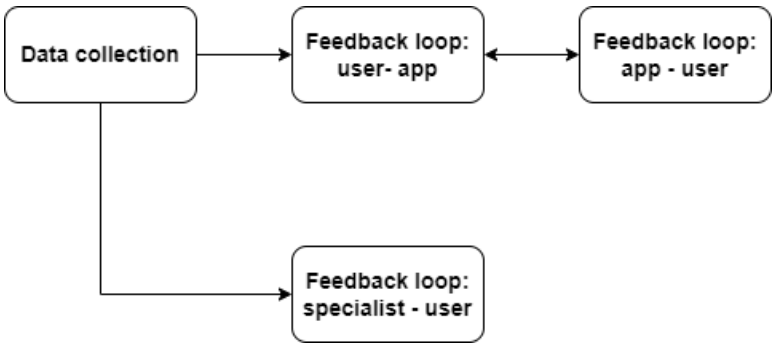

Figure 7 data collection and the resulted feedback loops

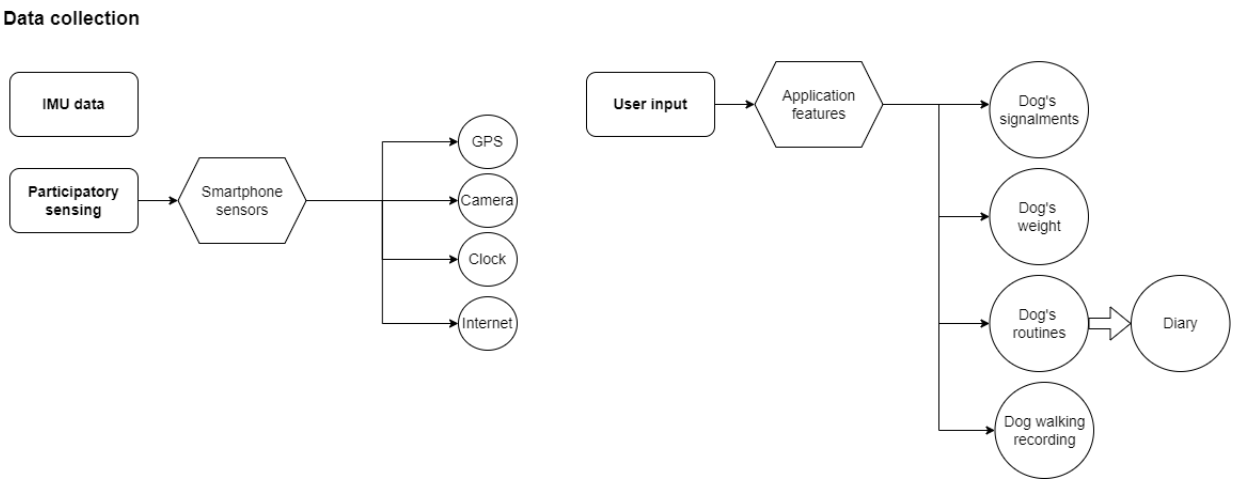

Figure 8 data collection streams

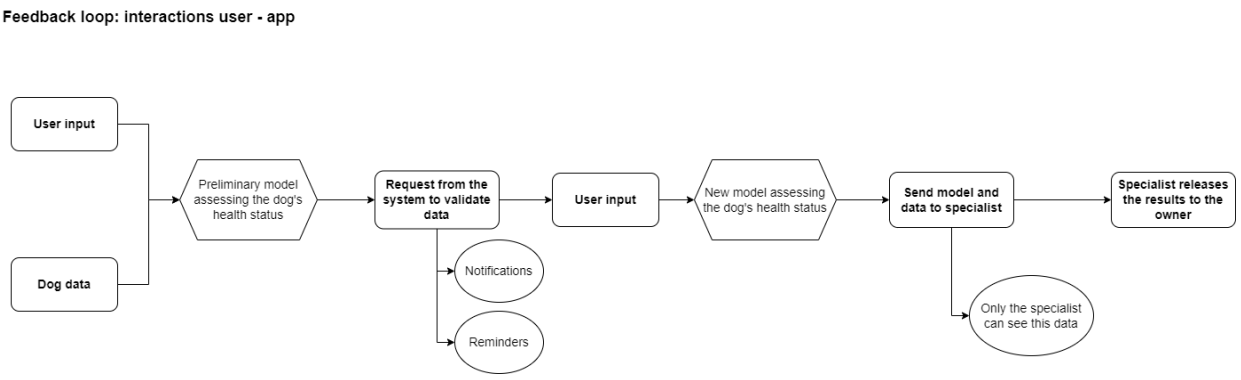

Figure 9 feedback loop app – user

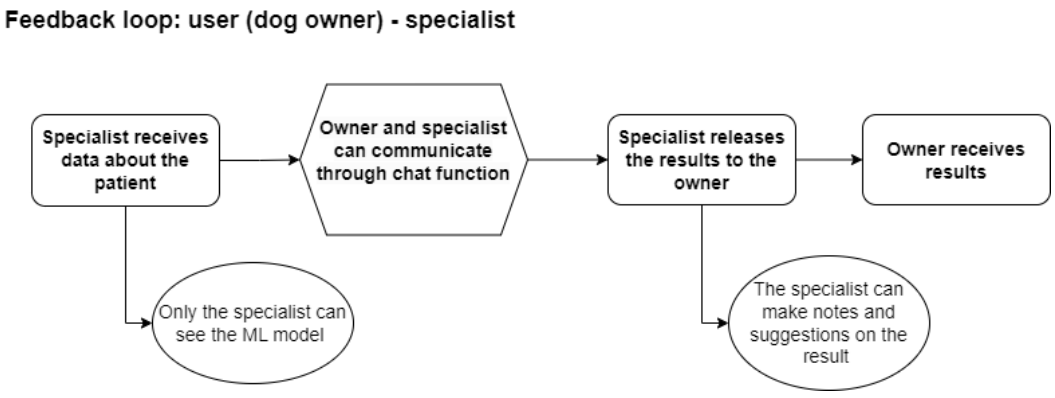

Figure 10 feedback loop user (dog owner) and specialist

Four categories of actions/event are identified:

- Data collection
- Feedback loop 1: app - user
- Machine Learning component
- Feedback loop 2: dog owner - specialist

Data collection happens via three methods: sensor, participatory sensing, and direct user input. The latter are data collection processes conducted via the app. The user will validate/annotate the raw data, so that it can further train the AI agent. The user is also providing information when setting up their dog profile, and the user will continuously provide information through diary entries. The context aware framework is supposed to coordinate the notifications to

request data annotation from the user so that the app does not become too intrusive.

Successful eHealth applications are designed to offer the user a tailored experience, while further motivating them to monitor their condition. Persuasive health technologies make use of Behavioural Changing Techniques (BCTs) to ensure user participation and motivation, and to shape the features of the applications with a clear goal. These are not meant to “trick” the user into using the systems, but to stimulate intrinsic motivation and build habits. Thus, setting a goal for health objectives according to the veterinarian’s advice (weight loss, exercise regime) could improve the user-app interaction. A goal orientated application would make use of the notification system to remind the user to do their daily task. However, an overview of progress should be clear so the data collected could be illustrated in the app for the user to see improvement. These features could work as incentives, as they may appeal) appeal to the user’s motivation. Feedback and monitoring are the key ideas for the initial concept, so that is another BTC at play in this system. Rewards can be offered, especially in the testing phases of the system, by the research team in collaboration with the veterinarian department of the University of Utrecht. Some rewards may be related to the veterinarian clinic, assuming this is where the test subjects would be recruited from.

Regarding personalization features, the following aspects should be considered: weight and diet, age, breed, size, activity level/ exercise regime and personality (anxious, energetic). All of these are relevant aspects that, if neglected, they can lead to the development of lameness [22]. Of course, the personalization features must be calibrated to the human user too. This refers to the dog owner’s routines with their pet, the time they spend together, walking routes, type of food and so on. In a sense, it would be a double personalization process: once for the dog, its gait, body and activity level, and secondarily for the dog owner. The data collection process can only be done when the dog and the owner are together.

Chapter 5: Specification

This chapter is responsible for the development of the initial concept presented beforehand. The concept is evaluated through focus groups, and it will be subjected to a first iteration. The specialists should be consulted regarding what additional data they deem useful to collect from the dog owners, so such features can be implemented in the app. As the veterinarians know best what data they need to identify lameness, their input is highly valuable in the design of the data collection methods. A visit to observe a normal clinic shift and a focus group were organized with a few veterinarians working at the Faculty of Veterinarian Medicine, University of Utrecht. The goal of the focus group is to learn more about the clinical examination of a dog for lameness, the main causes of lameness and how their experience is in collaborating with the dog owners in learning about contextual data. The experts will also be inquired about their opinion on what data should be collected about the dog's lifestyle. The veterinarians will have the opportunity to also validate the development of a chat function in the app, and how accessible they should be to the dog owner. This, however, offers a limited view of the issue, as the veterinarians interviewed are specialised in orthopaedic health; they know with certainty that their patients have some degree of lameness.
A few changes are made upon the talks with the specialists, and the new concept is detailed further.
The analysis of the focus groups can be found in Chapter 8 Discussion. In the current section, only the main conclusions will be outlined.

In modern veterinarian clinics technology is well embedded. Veterinarians have online internal systems that display the appointments, room availability, schedules, upcoming patients, and their file. In the same system, veterinarians can add notes to a patient's file after a consultation. In the case of the clinic affiliated to University of Utrecht, the system is colour coded, depending on the type of activity/care required. The veterinarians and their students are familiar with the software, and checking it is part of the procedure. When inquired whether an additional software would be accepted and found useful, the veterinarians have been positive about it. However, the veterinarians work on a tight schedule. Most appointments and check-ups they have approximately ten minutes, with even less time beforehand to recheck the patient's file for details. This means that the application should be clear, and any important data about the dog's health and lameness status must be easy to find, understandable, and summarised. If the application requires more than five minutes of the veterinarian's time, the focus group concluded that it would not be worth it.

The focus group revealed that this application may increase data a veterinarian can use to make decisions. They want to know about the lameness's starting date, how long the dog exercises in a day, if there is any change in behaviour and mood (such as refusing to go on a walk). Currently, they ask the dog owner multiple questions about the dog and its health, activity and history, but not all owners are reliable. The focus group participants mention that some dog owners write details about the dog's habits and daily activity, similar to diary logs. The veterinarians find this helpful, but the format and the details dog owner include may be too much and irrelevant. Thus, a diary log feature could be implemented in the application, as an additional data stream; the diary should be regulated, per word count. As some owners already keep diary logs, this feature may be desired, and it would need little incentives. Another idea suggested is to implement in the application a questionnaire about the dog's wellbeing. The dog owners would have to complete this questionnaire only before appointments, and the information would be sent to the veterinarians; this way, the specialist would have an outlook on the dog's situation before the consultation. Moreover, not allowing the dog owners to see the machine learning conclusion before the veterinarian can check the data reduces confusion and stress for the dog owners.

Comparable to the diary logs, some dog owners take video recordings of their animal. The interviewed veterinarians find this insightful, as it provides information on the animal's gait in a relaxed moment. However, the specialists raise concerns regarding the quality of these videos. According to them, the videos should not be longer than 20 seconds, have a horizontal orientation and have clear instructions to the dog owner on how to take them. The veterinarians need clear, shake free videos that can depict the dog's gait. Moreover, the veterinarians have a preference in the perspective. Firstly, they would prioritise a side view of the animal walking, following by either front or back view; this would depend on location of the lameness. Secondly, the moment of the recording is important. During the focus group, a few key moments have been identified: at the beginning, at the end of a walk and after a dog has been sleeping or sitting down for a long time. The walk related videos are necessary to have data for comparison and see whether the dog's lameness is progressive better or progressive worse. This is indicative for the type of wound and recovery of the animal. The recordings after the dog have not moved offer insights on the gait pattern when the muscles are stiff, as the movements and any abnormalities are more evident then.
The video recording aspect has already been considered in the Ideation phase, as it would help the machine learning model extrapolate data and reach better conclusions. Unlike the

EquiMoves, this system would only use one camera, which reduces the possibilities: these emphases the importance of taking well-made videos, and the importance recording from the right view.

One dog's weight is a crucial factor regarding their overall health and possible medical interventions. The focus group brought up some issues regarding monitoring weight within the application: while necessary, very few dogs are weighted outside of veterinarian cabinets. Even there, big sized breeds may not be weighted due to a lack of suitable scales. The suggestion of the interviewees is to introduce the body condition score within the application, along with the weight rubric. The body condition score is a visual tool which assigns numerical values (1 to 5) to physical traits, used to visually assess a dog's weight range and whether it is within normal limits [23] (see Figure 11). Within the application, the dog owners could self-rate their pets with the help of the visualizations. This would make them more conscious of their dog's state and if they are responding well to regime, or if they are on a proper weight range for surgery, for example. Veterinarians do not worry about underweight dogs, as most of their patients are overweight.

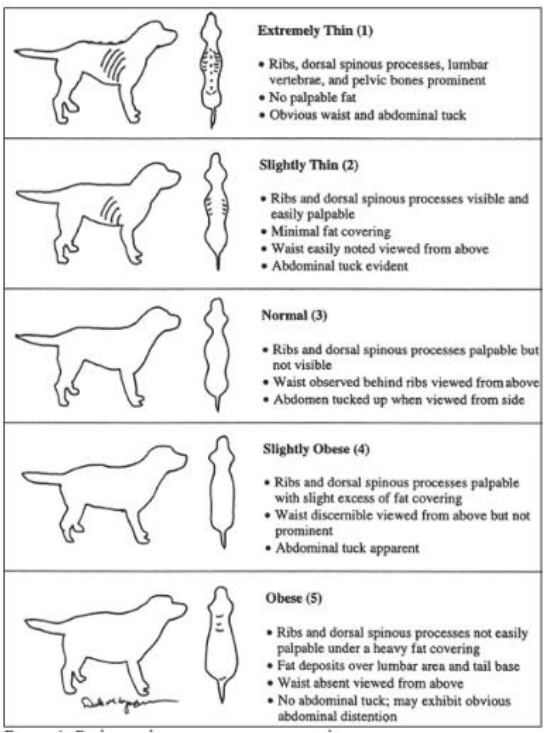

Figure 11 body condition scoring criteria in dogs [23]

The preferences of the veterinarians and the data they want to see shapes the demand for data collection. Based on the focus group, the dog owners would have to input additional data,

under the form of video recordings, diary logs and questionnaires before an appointment. All three need to be concise, but also clearly formulated so the dog owners collect valuable data. The question on how to convince the dog owners to provide this data remains. On one side, incentives and the stimulation of intrinsic motivation is one possibility but stand-alone it is not sufficient. The background research and the ideation phase strongly suggest having notification and reminder systems. These could be used to keep the user engaged with the application and guide them in providing the necessary data.
The dog owner would then provide direct data in the following situations (1) when they set up their dog's profile, (2) when they have a pre-appointment questionnaire, (3) when taking video recordings and (4) when making diary entry logs. In the first two situations, there is little repetition. The new profile set up is the first data collection step, in which the dog owner provides the signalments of the dog. The term "signalment" are a veterinarian term used to describe the species (in this case, dog), age, breed, sex, and reproductive status of the non-human patient; this information helps the veterinarian get a quick overview of the animal, as well as an idea of ailments the dog may be genetically inclined to. Moreover, the veterinarians want to know for how long the dog is active in a day, week and month. This data could be collected passively, through participatory sensing.

The veterinarians are not convinced that the system would be able to identify lameness by itself, however, they do want it to run a risk assessment and suggest the most probable affected limb and joint. They believe that this system would be a helpful tool in the monitoring of a dog's status; this monitoring phase is specifically after a diagnosis and treatment have been decided. One of the veterinarians mentioned the possibility of using this system to monitor the asymmetries in a dog after surgery, and if the dog progresses certain check-ups could be replaced by an eConsulations. The veterinarians would like to have the possibility to evaluate a dog's progress from a distance, with proper data to back up the video assessment. This would save the dog owner a trip to the clinic; it could also be a cheaper version to a physical consultation; however, this depends on the clinic's policy. It would be an incentive, however, to be able to have an eConsultation and possibly save money on the travel to the clinic and maybe on the consultation itself.
Lastly, the focus group revealed a strong aversion of the veterinarians against a chat function within the application. They already have proper communication channel with all their patients, and there is no need to add another one. Thus, this function will receive less attention, and could be eliminated in the next iterations.

Based on the information collected so far, the concept can be improved as follows. The initial concept design in the Ideation phase underwent one iteration already, and it has been adjusted accordingly. The first focus group supported the author in understanding what data the application should collect, so it can be useful to the veterinarians. It also revealed that the veterinarians would rather use this system as monitoring tool for lameness treatment rather than as a lameness identification tool. This preliminary conclusion could be biased, as the interviewees are orthopaedic specialists, whose patients have some degree of lameness.

Chapter 6: Realization

In this chapter, the last iterations are included in the concept and the research questions are answered. The final concept is perfecting the context aware framework in a theoretical approach, and implicitly prioritising the participatory sensing. The direct user involvement is clearly described and designed so that it collects the information veterinarians and gait experts find necessary. The dog owners will receive notifications and reminders through the application to input said data, with a personalised frequency. The final concept is a conceptual framework, due to the theoretical nature of the study and the prevalence of qualitative data. A conceptual framework is a network of different concepts, which support each other and together form a comprehensive image of a phenomena [6].

6.1 Focus groups and results

Previously, the concept has been refined after stakeholders have been interviewed. Yet, the preliminary results from the first focus group may be biased, as only orthopaedic veterinarians have been inquired. The final concept requires more research, and it has to address the needs of all the stakeholders. This is why two more focus groups have been conducted, with gait researchers and first line veterinarians. Plus, one more field day at the veterinarian clinic *Bosweide Dierenartsen*, in Ede—Wageningen has been organized; this offered the opportunity to interview two dog owners.

All the veterinarians and the gait analysis experts mentioned the signalments as important. The gait analysis experts raise the point of size, to affect the algorithm when determining lameness ("And so we look at absolute values in millimetres, but with dogs, if you have a Jack Russell or a Great Dane, your asymmetry values in millimetres will be very different, but relatively to the range of motion that might be more relevant values so."). According to them, size is more important as an application feature than breed, as some people may have mixed breed. The application will ask for both, but in the AI algorithm the size would be the one considered.

The veterinarians expressed reticence about the success rate of the algorithm in identifying subtle lameness, and they think it still has a long way to go before the system can identify lameness on its own. However, they have been very positive about the system as a way to monitor the recovery of a dog after lameness treatment, such as post-surgery. The veterinarians would like to use the system to assess whether the lameness is progressive better

or progressive worse, and if it causes big behavioural changes in the dog, i.e., an active dog suddenly refuses to exercise. Another advantage of using this application, besides monitoring, would be the support it would offer in eConsultations, if that is a service their clinic provides. The gait experts would like to use the system to identify lameness in its early stages, and they are curious about the possibly this would open.

All veterinarians expressed the tight schedules they work on, and the fact that the application will not be accepted by them unless it takes a small time to check and use. Around five minutes is the extra time veterinarians would allocate to this system. The first line veterinarians mentioned the possibility to allocate more time, given that the pre-questionnaires are worth reading. Yet, the expressed doubts about the pre-questionnaires, as those would inquire the same details are they do during the consultation. In the end, this feature is kept, because it allows the veterinarian to follow for consistency in the owner's answers. However, the questionnaire should be relatively short (less than 20 questions) and have a maximum word count for the answers. The goal of it is to provide quick information the veterinarian can quickly read before the appointment, along with the patient's file.
Both veterinarians and gait experts emphasize the importance of metadata, namely the information around the dog's health. Such metadata would contain the exercise levels, abnormalities in routines (e.g., day at the beach, dog care, road trip), type of ground. Details such as type of ground, e.g., pavement, sand, grass, mud, have influence on the gait of an animal, as the ground exercises a different pressure on the limb. Ideally, the metadata would help identify the time and location the lameness started, which would support the veterinarian in better understanding the nature of it. An injury resulted from a play accident in the park would have a different treatment compared to a complex issue in which lameness is just a symptom. Participatory sensing and the context aware framework are used to provide additional metadata by using the sensors of the smartphone. This way it can create an itinerary of the places the dog has been, and it keep track of usual walking routes, while gathering information from the Internet about ground type, weather and so on.

Veterinarians, both specialists and field, refuse the idea of a chat function. There are sufficient communication channels between the specialists and dog owners, another one would be redundant. The gait experts suggested either an AI chat bot, to simulate the conversation with the specialist and answer questions, or a very well formulated FAQ. Further in the study, the FAQ alternative is used. A message function is kept in the application, in which the results are released by the veterinarian for the dog owner to see and reminders from the specialist to the

owner can be sent. This way, the communication is only one way, specialist to user, and it only discusses the dog's well-being. This also offers resources to the dog owners to trouble shoot the technical issues, instead of contacting the veterinarians about such things. Although, if the user cannot troubleshoot the issues at home, the application should provide contact details to tech support. Lack of support and constantly running into issues when using the system will lower the user's interest and motivation in using it.

Veterinarians, both specialist and field, want to be able to control the reminder system. The reminder system is reserved to notify the dog owner about medication times, future appointments, and milestones in the recovery process. A suggestion that arose during the focus groups was to have the application connected to the veterinarian clinic system. After a consultation, the veterinarian or their assistant must fill in the details of the appointment in the patient file, so adding an extra step of setting up reminders should not take long. This is depending on the interface, number of reminders and their complexity. Moreover, the veterinarians and dog owners can have a conversation, and this way the dog owners would understand the necessity of reminders and doing the respective task. Ideally, understanding the situation would be motivating to the users to follow through.

Veterinarians want access to the diary logs and the video recordings the owners are making. In their experience, many dog owners make diary logs about their animals, so that would be a desired function that already proves useful. However, the diary entries should be short. Preferably, it would be a minimalist note mentioning the duration and frequency of walks, with the possibility to add notes for more details ("You can click like "I walk three times" and then you can give duration. This type of things and then like an open category where you just can fill in whatever you did extra if you want to."). Regarding the video recordings clear guidelines have been defined to ensure their quality, such as fixed duration, clear instruction on how to shoot the video, view, and live feedback about the video quality. The dog owners said they would be willing to take video's around once a month; however, the veterinarians would like to see at least a once per week video.

6.2 Results

The results of this study are related to the ability to answer to the research questions formulated in the beginning. The design process and the conceptual framework should answer to the research questions and cover the stakeholder needs discovered along the research. The

research questions have been used to conduct the research and construct the final version of the conceptual framework

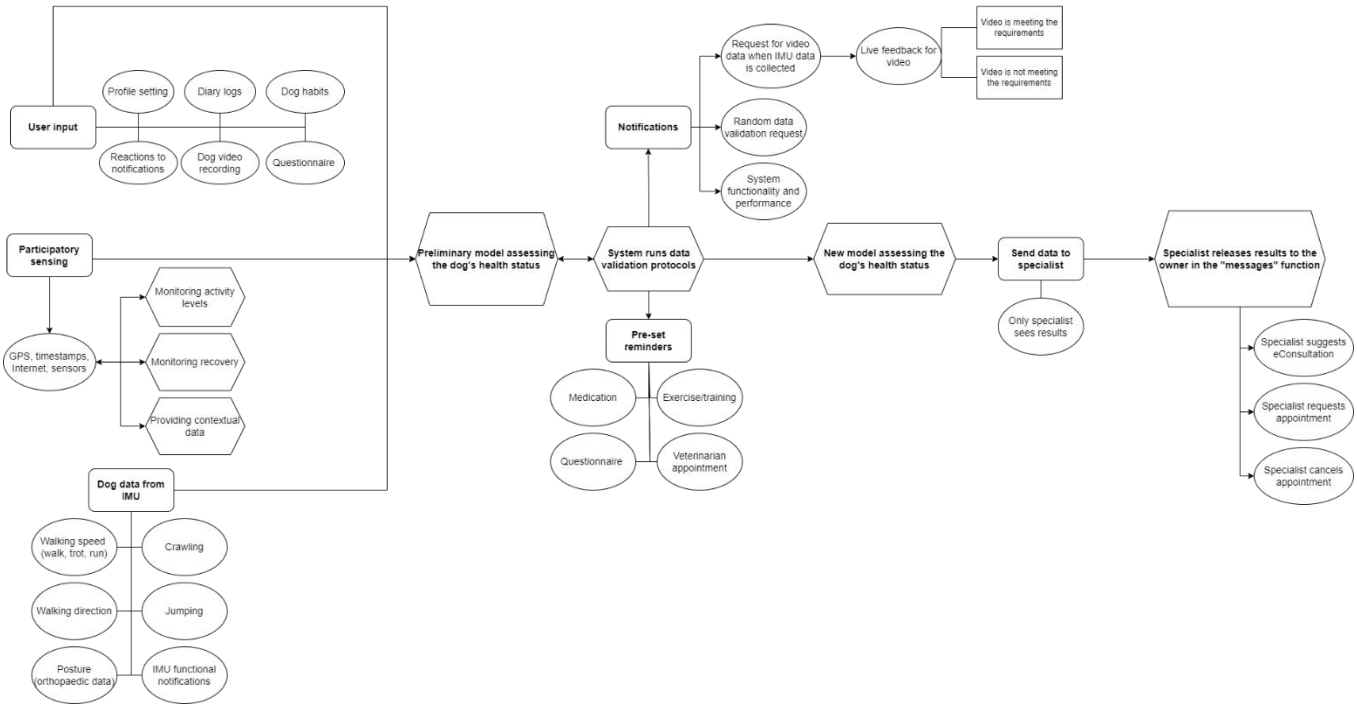

Figure 12 Diagram of the conceptual framework

RQ 1: *How can participatory sensing be integrated in the application so that it supplies sufficient additional data for lameness to be identified and monitored?*

The participatory sensing is the key component that provides metadata about the dog's life. The application has multiple functions that require user action; however, those are specific about the information required. The participatory sensing component provides information about the surroundings of the dog, and it tracks the activity levels of the animal. Using the sensors of the smartphone, the GPS, camera, Internet access, Bluetooth connection, the application would be able to collect more data. It has been previously discussed that the specialists find contextual data important, so collecting it is imperative.

Participatory sensing can also be implemented on the IMU. It is the only sensor directly on the dog, the smartphone sensors are collecting a lot of data that is in the vicinity of the animal. The IMU could be programmed to collect more than just data about the dog's posture. Thus, the IMU should also gather data on the speed of the dog, duration of activity, trajectory (walking in lines versus curves), jumps, crawling, and any other movements that would provide complex data that could trouble the machine learning model. This data should be visualized in the application, so that the owner can also keep track of the activity and progress.

Visible progress and statistics of activity are features correlated with adherence and user motivation, as they are gamification elements [24].

Implementing participatory sensing also facilitates the development of a context aware framework. By doing this, it becomes easy to time the notifications and reminders to go off when the owner is with their dog. The application would learn the usual schedule of the user, and hours at which they walk their dog, feed them, give them medication, and it would activate then. This prevents the user from receiving notifications they cannot act upon, due to not being with the dog (i.e., notifications received while they are working).

RQ 2: *What incentives can be used and implemented so that the user will be motivated to use the app and help further train the AI agent?*

Within eHealth applications, notification and reminder systems are a key feature to ensure long term adherence [5]. The users appreciate the reminders to input data or take medication, as long as those are properly timed. Based on this information and the opinions of the stakeholders, a notification system and a reminder system are designed. These are part of the user-app interaction.

The notification system is meant to have the application send notification to the user. There are two categories of notifications: functional and performance related. The *functional notifications* announce the user about things that prevent the system from functioning at full capacity. Example of such notifications are low battery of the IMU, IMU calibration request, connectivity issues with the sensor, connectivity issues to Internet and GPS, notifications about data loss and about lack of memory. All these functions are necessary, so that all the components of the system function properly
The *performance notifications* are necessary for ensuring the quality of the data collected. Low quality data would lead to unreliable results of the AI agent, which would lower the success rate of the application, the trust the user has in it, and it would not be useful to the veterinarian to monitor the lameness. A performance notification is the live feedback regarding the video taken by the owners. This is the system's reaction to user input, and it analysis the video to see if it meets the requirements, so that it can be used by the machine learning. For example, if the dog is walking too fast or too slow, a notification will ask the user to retake the video, with a suitable suggestion for improvement: "Your dog is walking too fast! Please take another video at a slower pace.".

Another performance notification example is related to data annotation. The IMU and the application collect information simultaneously. During a walk, the application receives measurements from the sensor; occasionally, if a reading seems unusual compared to previous activity, a notification should be sent. If the system suspects the dog may be jumping, for example, a request for validation is activated. “Is your dog jumping? Yes/no” is a possible notification; the user either confirms the activity, which would train the machine learning to recognize it later, or denies it, and the data would be flagged as unusual.

The veterinarians and dog owners agree together on a treatment scheme for the dog. To support the dog owner in respecting the specialist’s advice, a *reminder system* controlled by the veterinarians is designed. The veterinarians can set automatic reminders for the owners, either about future appointments, reminders to set appointments, reminder to fill in the questionnaire or reminders about tasks that are necessary for the dog’s wellbeing. The appointment related reminders will be displayed in the messages function of the application. If the dog is following a treatment scheme, or it is recovering from a procedure, the veterinarian can set reminders for medicine (e.g., give the dog painkillers at after dinner), for collecting specific data or for doing certain exercises with the dog.
The reminders can be used to tell the dog owner to take videos of their animal while walking. To be able to notice progress, the veterinarians want to have at least one recording moment per week, and two recordings per walk. While these number of recording reminders is decided by the veterinarians, the time these reminders go off are based on the application. When the context aware framework identifies a walk happening, the recording requests will be sent. This way the success rate improves. Other video requests are to capture the moments of a dog moving after they have been sitting for a long time.
The veterinarians could discuss and decide the frequency of this together with the dog owners and emphasise the importance of visual data. This would fall under the BCTs “1.4 Action planning”, “4.1 Instructions how to perform behaviour”, “5.1 Information about health consequences” [14]. Informing the user of the upcoming reminders, explaining the treatment scheme and how to respect it, the reasoning behind it are all actions that can motivate the user to act for the benefit of their dog. The goal is to stimulate the intrinsic motivation of the user, so that they would use the application without requiring monetary compensation. The design of the application, user-friendly, clear interactions, minimization of user burnout through using the context aware framework to time the notifications, are meant to improve the experience of the user.

A habit is defined as a consistent repetition of a behaviour in the presence of stable contextual cues that increases the automaticity of that behaviour [25]. According to [26], the act of forming habits can be described as reaching an "automaticity plateau", which means a behaviour becomes automatic. This point is represented as an asymptote on a curve showing the relationship between repetition and the strength of a habit, instead of a fixed time period. The number of repetitions needed to reach the plateau depends on the complexity of the task; simple tasks like drinking more water require approximately eighteen repetitions, and complex tasks like going to the gym estimated to take up to 254 repetitions [26], [27]. The BCTs also has techniques reserved for this, “8.1 Behavioural practice/rehearsal” and “8.3 Habit formation” [14]. Taking care of a dog and using a sensor-based system would fall under the category of complex tasks, so it can be expected for the users to take a long time find using the system natural. Short term and long-term adherence both have to be tested. In the case of monitoring recovery, there is a deadline to when the user can stop utilizing the system, namely when the dog is healed and not presenting any lameness. The limited period of using this system can also be used to motivate the users: it is a tool that is only needed until the dog is healthy and using it may lead to a fast recovery. However, for complex injuries or lameness detection usage this argument does not hold; in these cases, long term adherence and habit formation should be prioritized.

RQ 3: *What are feedback loops in the context of an eHealth application for veterinarian care?*

Two types of feedback loops have been identified: (1) the eHealth feedback loop and the (2) machine learning (application) feedback loop.
The first feedback loop is engaging the stakeholders, namely the dog owners and the specialist. This feedback loop recognizes the dogs as patients, whose health is monitored by the caretakers (owners) and specialists (veterinarians, gait experts). The dog owner has a major role, as primary caretake of the patient. They support the data collection process, add more information and check the quality of the data, without requesting additional support. The dog owners have intimate knowledge about the dog’s life, and with the support of the application they can organize this information. The systematization of the knowledge makes it easier for the specialist to reach proper conclusions regarding that health status of the patient. At the same time, actively involving the dog owner in the process raises awareness about the animal’s condition, empowers them and simplifies the process through the clear instructions of

the application.

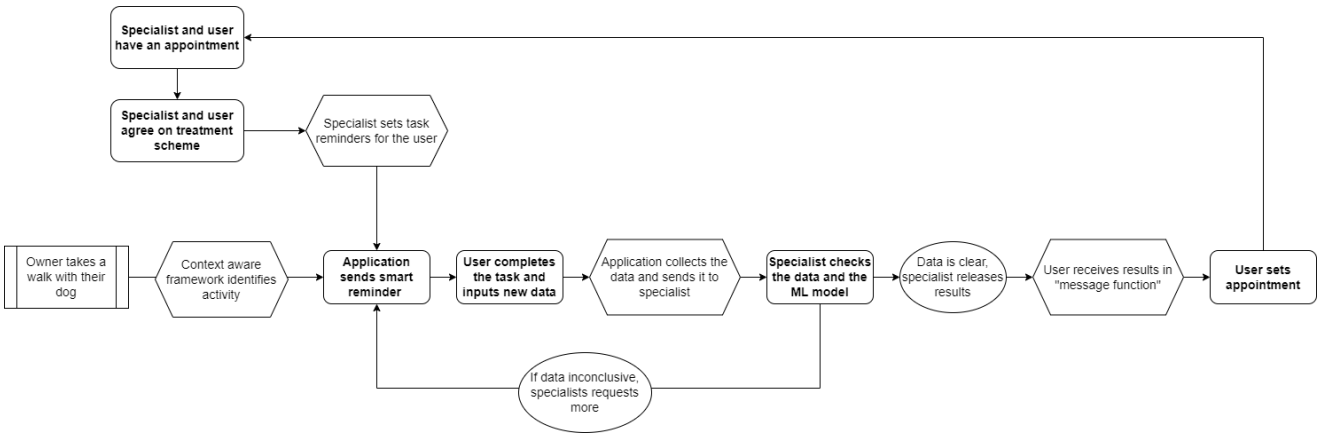

Figure 13 Feedback loop between stakeholders

The feedback loop between dog owners and specialists is characterised by the *messages* function. The communication would be unilateral, specialists being the only ones who can send in messages. The dog owners are collecting data, which the machine learning component analyses and creates a model of the dog's health. This model, together with the measurements, are sent to the specialists. The owners do not have access to this information until the specialists checks it; after the specialist verifies the outputs of the machine learning and deems them correct, they can release the results to the dog owners. The results would be displayed within the messages function of the application.

The second feedback loop is focused on the data needed for the machine learning algorithm that is part of the system. Important is not only collecting sufficient data, but also the quality of it. There already are multiple data collection streams in the conceptual framework, (1) IMU provided, (2) participatory sensing and (3) user input. However, low quality data could skew the results and lead to wrong conclusions, which would defeat the purpose of supporting veterinarians in identifying and monitoring lameness. This feedback loop is characterized by the user-app interactions, such as notifications, reminders, requests for data annotations, or request for additional information.

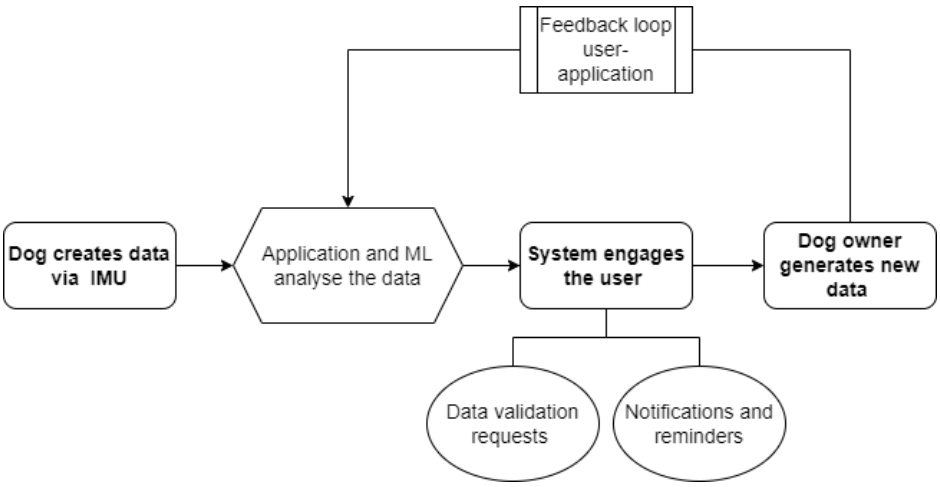

Figure 14 General feedback loop application-user

Additionally, the application must clear instructions for the dog owner to follow, in order to provide good data; this is particularly important in setting up the sensor, and in the filming component. The instructions are designed based on the specialists' opinions. The machine learning model must be trained to process a large variety of raw data.

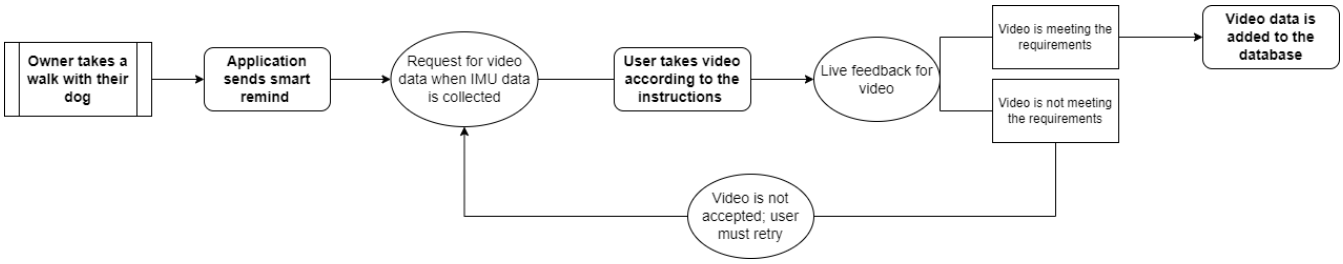

Figure 15 Diagram feedback loop app-user for video component

a. What features should the feedback loop have to keep the user engaged?

To keep the dog owner engaged with the application, a number of features have been identified. Firstly, the application integrates two methods that owners already use, and veterinarians find useful. The application firstly requires the user to introduce information about their dog, among which "dog' routine". In this category, the owners can insert habits they have with their dog; these habits are repetitive, so they can be treated as scheduled activities. The habits included in the application are usual walk time, average walk length, feeding times, walking route/ favourite park, dog care (if applicable) and training schedule (if applicable). All of these are optional. The diary function is created to support the owner in keeping up with the habits, and to note any details. The diary function has two aspects (1) *tick off* an activity and (2) *add notes*. The *tick off* function is for the owner, to confirm they did a

certain activity, e.g., tick off “breakfast” or “walk”. For the walk option, duration should be included. The *add notes* function allows the user to write a short text (approximately 100 words) about anything unusual that happened during the day. This way the application can keep track of the dog’s daily activity, and weekly summaries can be created. These are part of the self-reported metadata. These features would have daily notifications to keep the user involved and remind them to input this data. While there is little concern about the dog owners doing these activities with their dogs, there is a chance they will not input this data unless told to.

Chapter 7: Evaluation

To reiterate, the final concept is a conceptual framework that details on how to successfully implement participatory sensing in the mobile application to improve the data collection process. The participatory sensing framework is accompanied by user interactions analysis, and how engage the user with the system. Feedback loop have been defined between stakeholders and application, and between stakeholders themselves (user–specialists). The conceptual framework is built upon a qualitative data research, based on literature and stakeholder's interviews. More specialists have been interviewed, rather than dog owners, due to a need to understand what lameness is, the required data to identify it, to shape the data collection streams from the dog, end user and context. The information gathered had been used design the application features.

However, dog owner input is necessary. The effectiveness of the features cannot be assessed without user testing and presenting a theoretical model and having a walk-through session with dog owners is not sufficient. While the notification system can be added to the graphic user interface prototype, preferably in the Hi-fi prototyping phase, and tested out with user testing, this would give only partial feedback to the solution. Currently, the prototype has a clear depiction of the process of taking a video through the app, as an additional data collection stream. It also depicts the live feedback, and the case in which the app will request the user to retake the video for several reasons; in the prototype, the case scenario used is the one in which the dog is walking too fast for the data to be properly extrapolated by the machine learning algorithm.
Assessing the effectiveness of the conceptual framework is difficult. So far, the assumptions and conclusions have a qualitative nature, mostly being supported by related literature. This makes it difficult to conclude whether it would be successful in providing the additional data and engaging the user in long term. Regarding the dog owners, they should be involved in a user testing of the data collection prototype. Either designed as a prototype of the app, or a different user testing, the dog owners will interact with the concept, and they will have the opportunity to give feedback.

7.1 Experiment guideline to evaluate the conceptual framework

As the framework is focused on the implementation of participatory sensing as the main data collection method, the experiment's goal is to test whether this is successful. At the same time,

it is necessary to test the application's success in the long term, implicitly the user adherence. Thus, the main goals of the experiment are to check if the data collected is sufficient for the identification of lameness, and if the end user actually uses it.

Regarding the recruitment of testers, they could be selected from the patients visiting the veterinarian clinic of the University of Utrecht. They would already have a sense of trust regarding recommendations coming from the veterinarians [5], and there is a higher chance they would be motivated. They already proved their strong motivation to see their dog healthy by visiting a specialised clinic, which costs them time, money and resources.

However, a question arises regarding the participant selection. Of course, all the dogs involved should have some type of lameness related issue, but which of those are of interests? Considering that the system can be used to prevent and to early identify lameness, but also to monitor recovery after intervention, both these cases should be examined during the experiment phase.

Two groups of participants are defined within this experiment framework: (1) dogs who have a high chance to develop lameness in the near future, and (2) dogs who have been treated for lameness and are currently recovering. The first group may include old dogs, dogs with arthritis [28] and/or dogs with a genetic predisposition to lameness, such as Labrador Retrievers [29], [30]. The goal with this group is to assess whether the system can flag newly formed abnormal gait patterns, compared to the collected data of the same dog over months and the baseline gait of healthy dogs. It is meant to test the system's ability to identify early stages lameness in at-risk patients.

The second group should include dogs who have already been diagnosed with lameness, for whatever reason, and have undergone some type of treatment, be it surgery, exercise, medication or a combination of these. The purpose of this group is to evaluate the effectiveness of the app in tracking recovery progress, as well as to determine how the machine learning model can improve based on the data collected. It is desired to see if the data provided by the system, together with the user input, is sufficient to reduce milestone check-ups in the animal's recovery. At least, it is important to assess whether the milestone check-ups could be conducted as eConsultations, rather than a physical appointment at the clinic.

Ideally, a third group would be investigated, namely dogs who had a predisposition for lameness, developed it, received treatment, and then required monitoring. This scenario would provide deep insight into the system's ability to identify lameness, keep track of the same dog's gait pattern, and support the dog owner in the recovery procedure for their animal. The

scope of this is to see if the app can provide the data and support the dog owner to better care for their pet at the same time, for a complex situation. After all, the system is intended to be used for long term. However, finding participants for this case may be difficult, mainly due to the long-time frame such an evaluation would require.

For the experiment guidelines proposed, however, only the first two defined groups will be considered. This way a clear distinction can be proven between the effectiveness of the system in identifying and monitoring situations.
The experiment is quantitative orientated, so strengthen the validity of the results, it must be a long-term study, which a large amount of participants, and have repeated testing upon the same participants [31]. Each group must have the same number of participants, to better compare the adherence rate and motivation of the user depending on the goal. Thus, a minimum of 20 participants per group is recommended.
This experiment would happen in the "wild", outside of a controlled environment the researchers can control. This is useful to the research, as it eliminates biases, and it provides data that is accurate to the normal behaviour of the participants.
An assumption to be made is that users that utilize the system for monitoring recovery would be more motivated to use the application, as they can track the progress of the dog and see improvement. To stimulate the motivation in participants who would be part of the group with at-risk dogs, a first method is raising awareness of the situation. If the dog already has an underlying condition that may induce lameness, such as arthritis, the owners may better understand. In the case of studying breeds with a genetic predisposition to orthopaedic issues, older patients should be recruited. This is to ensure a higher chance of lameness to develop during the experiment, which would presumably be flagged by the system.

Building habits requires repetition, and the more complex the task, the more one needs to do it to become a habit [26], [27]. The proposed experiment would like to follow the participants for six months, with check-up points every two months. It is a long timeframe, sufficient to collect plenty of data about the system, user behaviour and engagement, adherence, data collection frequency. Based on the interviews, the dog owners would want to collect video data only once a month, whereas the specialists need at weekly updates. It is thus necessary to observe how often the dog owners are willing to provide video data, and if any of the current incentives prove useful in motivating them. The length of the experiment would provide at least six video recording moments.

The check-up moment every two months are meant to have preliminary evaluations. A questionnaire will be sent to the users, inquiring about their experience, likes and dislikes, and how easy they find to use the system. This would include both feedback on the application and on the sensor component. These are valuable moments in which direct user feedback can be collected, and iterations on the product can be based upon this.
Concomitantly, every two months the data collected from the participants must be analyses. The frequency to which they use the application, the rate with which they react to notifications, the quality of the data they provide, are all important aspects that must be studied. It is important to note whether users have higher engagement rate in the beginning of the experiment, due to the novelty element and first motivation spree, or if the engagement rate improves over time as a result of habit formation. Interesting it would be to notice whether the engagement rate is dependable on the goal of the study group.

To motivate people to participate in such a long study, monetary incentives are a first recommendation. For the interested users, permission to keep using the system free of charge after it becomes commercially available could also be an incentive. Additionally, the clinic at University of Utrecht, which is assumed to be the contact point with the participants, could offer discounts or other facilities upon participating in the study. For example, during the experiment, the participants could receive discounted medicine, supplements, or food for their dog. Rescheduling and cancelation fees could also be waived to motivate the people, which would give them more flexibility. The participants could also be given priority in scheduling appointments.

Chapter 8: Discussion

During the length of this study, multiple contact points with specialists took place. Observing experts during the workday at the veterinarian clinic, organizing focus groups with stakeholders, and continuously presenting the conceptual framework to them during the developing process is good practice when following the Creative Technology design cycle. In the previous chapters, these interactions have been mentioned and briefly analysed to support the design choices and changes. However, a more developed analysis of the collected data will occur in this chapter, in the Focus group results subsection.
This chapter also covers the Limitations of this study, and finally the Future work that could be accomplished.

8.1 Focus group results

All the data collection moments (observing veterinarians at work, focus groups) had been organized and facilitated by the partners from the University of Utrecht. They had arranged the meetings, location, time, and finding people interested to participate in the study. Alexandra Pintilie and Monique de Waal have led the focus groups, interviews, and observation days. The focus groups and interviews have been audio recorded; the participants have been informed about this and they had signed a consent form. The recordings have been stored on Yoda, a platform provided by University of Utrecht, and the collected data may be preserved for three years. The audio files have been transcribed using the "Transcribe" function of Microsoft Word. Due to language barrier, some parts of the audio are in Dutch, which have been later translated into English by Monique de Waal.
Due to the reduced number of participants, these interviews have no statistical significance; thus, there is a strong emphasis on the qualitative data. According to literature [32] and [33], however, around five participants is sufficient for qualitative research.

8.1.1 Observation Day at the veterinarian clinic of University of Utrecht

The first contact with the specialists implied a day of observing a veterinarian at the clinic attached to University of Utrecht. No formal interview or focus group took place during this visit, and the researchers only took notes and observed the procedures and protocols.

Firstly, the veterinarians have limited time to see a dog. Appointments are approximately ten minutes with the patient, with just a few minutes before to revisit their file. Being an university clinic, the veterinarians may have students working shifts. In that case, the students may do the first physical examination of the dog and ask the owners the first questions. The veterinarian will do both again by themselves.

The veterinarians have an online system that displays all their appointments, room availability, co-workers' schedules, and other administrative information. Within the system, they can check details about their upcoming appointment, such as the dog's medical file, previous experiences if it is a usual patient, reason for making the appointment. The appointments are also colour coded, depending on the type of activity/care required. This proves that the veterinarians already are used to having different technological systems to assist them in their profession, and that these are supporting them in their work. So, it can be assumed that the lameness system would be useful for them, and it could be implemented in the workflow, as long as it would not take too much of the veterinarians' time.

This visit offered an insight on how the consultations look like, what is the procedure, if the veterinarians already have several types of technologies integrated in their everyday work, the interaction with the dog owners and other elements. The observations and conclusions, however, are limited to the experiences of veterinarians who certainly have patients suffering from lameness, as they are orthopaedic specialists. This means that at this clinic, all of the patients have some degree of lameness.

During this visit, the researchers had the opportunity to assist at data collection using pressure plates to analyse a dog's gait. The procedure needs to be repeated ten times per side (left and right), in a total of twenty times. It may take longer due to the dog not cooperating, walking at the right pace, stopping during the walk, or turning their head around too much. These only emphases the difficulty of correctly identifying lameness and identifying the affected limb. Thus, the importance of the system developing becomes imperative.

8.1.2 Orthopaedic veterinarians focus group

The second data collection moment consisted of a focus group with two orthopaedic veterinarians who work for the veterinarian clinic at University of Utrecht. One of them has been present from start to finish (Veterinarian 1), whereas the second participant only had a reduced availability (Veterinarian 2). The main conclusions and findings are summaries below.

When a dog comes in for an appointment, the veterinarians always do a complete orthopaedic examination. During it, veterinarians ask questions about general lifestyle, nutrition, living conditions to the owners. The contextual information is important, because sometimes the root cause of an affection is something unrelated. Veterinarian 1 brings up the possibility of a dog to have a general illness, and the lameness to be a side effect of it. When asked how makes a dog owner reliable and trustworthy with the information they provide, the veterinarians answered that it depends on the owner. Some owners are more trustworthy than others; one indicative could be if the owners give the same answers to the students and to the veterinarian when inquired about the dog's life and wellbeing ("If they are consistent, I think in their story, because I mean here students usually do the first questions and then we as the specialists come in and ask a lot of the same questions again. If they tell the same story twice, it's quite reliable.").

According to the veterinarians, they make a distinction between movement lameness and load lameness. So, if the dog puts weight on the affected limb, this will distort their gait patter. More often, dogs try to put more of their body weight on their healthy limbs, to avoid the pain. This too affects the gait, and it is a clear sign of lameness, even though it is not indicative for the affected limb.

Veterinarian 1 said they already have asked owners to take videos of their dogs at home. That way, they can see the dog in a relaxed mood, when they do not try to hide their lameness. Dogs become anxious at the veterinarian, and they try to hide their pain. Veterinarian 2 also likes it when the owners take videos of their dog being lame, however he emphases the low quality of these videos and the difficulty to see anything useful due to poor filming skills. Both Veterinarian 1 and Veterinarian 2 want to see short videos, around 20 seconds, horizontal perspective. Preferred perspective for the videos is first side view, and then front or back view, depending on the leg that has lameness, based on the owner's opinion. Veterinarians are also interested in videos depicting the dog after it just slept or sat down for a long period of time. Stiffness after sitting emphases the lameness and it is easier to identify then. The veterinarians find it insightful to see videos of the dog's gait at the beginning of a walk and at the end of it. This way they can compare and look for any sign of lameness, see whether it is progressive better or progressive worse, and how long does the dog exercises
Veterinarian 1 mentioned that it can be difficult for the owners to have a clear chronology of the events, but some owners have the habit of keeping diaries of their dog's activity and unusual events. Veterinarian 1 and Veterinarian 2 find these diary entries useful, with the

mention of only containing useful information, and not to be too long. A feasible way to avoid unnecessary details is to have clear questions the owners should have to answer in the diaries, similar to the intake questions they must answer when they arrive at the appointment.

When asked about what they would like to know about the dog's private life, the following came up: how long a dog exercises a day, pattern over the day if there is lameness, when the lameness started presenting, and if it is progressive better or progressive worse. Exercise level is important, and the veterinarians would like to be able to compare it with the same dog's history. The veterinarians would like the application to track the dog and its activity, to be able to get a better insight in their lives and normal behaviour. However, they are worried there will be no baseline normal behaviour for the dog, as the owner will probably not have access to this system until they first take their dog to a consultation. So, the veterinarians believe it could be more useful in monitoring recovery. This would be ideal after accidents and after surgery, to track the recovery too ("OK, yeah, I think it would be interesting to know if a dog walks for like 4 hours a day or only like 10 minutes."; "Yeah, no, and it certainly helps them if we want to compare it to maybe after treatment. ").
Veterinarian 1 believes that if the app proves successful, in the monitoring case it could eliminate certain check-up visits at milestones ("If you could have like access to videos 2 weeks after surgery with an analysis and you see like this symmetry index improving. Yeah, then maybe owners don't have to come in.").

Veterinarians mention that weight is a major element that needs to be considered. Not only overweight animals have a higher risk to develop joint pain, if the dog is not in the healthy weight range for its age and breed, the veterinarians will refuse to perform any surgery. Veterinarian 1 suggest implementing the body condition score in the application, along with the weight of the animal. Dogs usually do not get weighted except for at the veterinarian. It also depends on the breed of the dog; big breeds require special scales.

The veterinarians want the application to be simple to use, and not to have too much overwhelming information. They estimate that it should not take more than five minutes to use the application. They would rather have the conclusions of the machine learning model ("Yeah, or a percentage share percentage? Maybe the over the limb set for most likely 90%. The problem is on the right, 70% on the left forelimb, 10% hind limbs, something like that. 'cause I think those have. That is how they work these programs. So, risk assessment. ").
Veterinarian 1 expresses interest in using the application to get insight about new patients. If a

new patient is having an appointment made, the clinic should send them the link to the application and ask them to already collect some initial data with it. This way the veterinarian would know more about a new dog they have to examine.

Veterinarians do not agree with an additional chat function in the application. The patients would already be in the clinics system and be able to contact them through those channels. Introducing another chat channel may be confusion and it puts more effort on the veterinarians, as they are legally required to keep track and answer on all the communication channels.

These two first moments and the insights gathered during them have been used in further specifying the initial concept resulted from the Ideation phase.
Two more meetings with stakeholders took place after the prototype concept was refined. Another focus group, this time gathering insight from the gait analysis researchers. Lastly, a visit to a general veterinarian clinic in Ede-Wageningen occurred. This facilitated gathering information on how first line veterinarian, who do not specialise in orthopaedic health, conduct their consultations, their approaches towards clients and suspicion of lameness in their patients. This visit culminated with a focus group with the present veterinarians, and it also offered the opportunity to have two interviews with two dog owners.

8.1.3 Gait analysis researchers focus group

The first question dedicated to the gait analysis researchers inquired whether they are familiar with the EquiMoves system. As EquiMoves has been developed by the team at University of Utrecht, it is important to see if the interviewees have experience with it. These previous experiences may lead to biased opinions, but it also means that the interviewees are familiar with eHealth applications for animals, and data collection with sensors, video, and machine learning for animals. Moreover, all three of the researchers in the focus group are experts in horse gait; they have limited knowledge in dog gait and behaviour. However, they are not examining horses; they assist with the measurements taken through the EquiMoves and they are able to analyse the computed results and understand the asymmetries presented by the software.

The gait experts mention the differences in gait between horses and dogs, especially the fact that dogs are more “gait fluid” than horses. Also, they emphasis the behavioural differences

between dogs and horses, as one is a predator and the other one is a prey species. This distinction affects how the animal behaves when hurt and in pain, so the experts believe this psychological difference could affect the gait patterns and the way measurements should be conducted in dogs. The gait experts mention that is necessary to conduct sound and lame dog testing (pain and/or discomfort induction study), to collect data about canine gate, before being able to make assumptions about the similarities between equine and canine gait. They believe that a canine lameness identification system needs a well-trained machine learning component to be successful. They mention that due to lameness, dogs would rather canter than trot, because canter is a gait pattern that has more limbs touching the ground at the same time. So, the application should also analyse the quality of the gait, and regarding to the video, it should give live feedback about this. Ideally in simpler terms, such as "your dog is walking too fast/slow"

The gait experts approve of the idea to synchronize the videoclip with the IMU based visualizations of the gait. They also suggest having a "check-up list" or quality assurance loop for the dog owners, to make sure the sensor is properly in place. Otherwise, the collected data would have a high variance that would disturb the results. The gait researcher think that the application should notify the user if the collected data is showing too much variation. The gait experts say that the application should have functions related to the connectivity IMU – smartphone, battery levels and calibration. They find it imperative to have live feedback for the video, connectivity (i.e., lost network), excessive data loss (sample loss).

In addition to that, the researchers believe that properly attaching the sensor would improve they data quality. They even suggested creating tailored collars for the dogs, special and to be used only when taking measurements. The reasoning behind this suggestion is the wide variety of collars that dog owners use, the fact that those are loose, and the risk of the IMU not having a stable position. Additionally, on the usual collar, the owners usually attach the leash when on a walk, which pulls the collar in different directions too. Thus, if the system provides a tailor made, well sized collar for the dog, which would only be put on when measurements are taken, this issue would be eliminated, and the data would already be more dependable.

They are worried that the application may become data heavy, which is going to increase the response time for it. This may be frustrating for the users ("So you also, as an owner, you don't want to spend a lot of time figuring it out now, and especially because apps can be complicated and this is like a data heavy app, so you want it to be as easy as possible and you want them to make zero room for mistakes, as in they just can't make them because everything is organized for you"). According to the gait experts, IMU sampling 50Hz may be sufficient,

which would also allow for longer data recording and saving. They would like to the app to be automated as much as possible.

The gait experts are interested in the whole metadata, not only the readings provided by the IMU. They would like to know whether there is any difference in the surface a dog walks on (e.g., pavement, grass, sand) as this would affect the limb pressure on the ground. Also, important when analysing gait data is to know if the animal was moving in straight lines or had a curved trajectory. They would like to see data about the dog's walking at constant speed, which would be provided by the video recordings. However, they also have an interest to see the asymmetries at acceleration and deceleration. Also, they expressed interested in diary logs, as an alternative method to collect metadata ("And maybe like a diary function where you can keep track of how what you did with the animal, because maybe one dog is just a couch dog and it sleeps all the time, but the other dog could do agility training with. Yeah, that might be very interesting to know if you want to do research with this data.", "You can click like I walk three times and then you can give duration. This type of things and then like an open category where you just can fill in whatever you did extra if you want to.").

The gait experts confirm the need for signalments in the application, and they too mention the breed predisposition to locomotor and orthopaedic issues. They believe that the machine learning algorithm should be trained to make a distinction between small and big dogs, and at further development stages, to have specific data per breed. The size of the dog is important, as the small deviation could lead to skewed results. If the sound dogs on which the database has been built upon and the machine learning model has been trained had been big sized dogs, the conclusions drawn on their asymmetries will lead to worse lameness on smaller dogs, due to the scaling down. A few millimetres variation would have different implications based on a dog's size ("And so we look at absolute values in millimetres, but with dogs, if you have a Jack Russell or a Great Dane, your asymmetry values in millimetres will be very different, but relatively to the range of motion that might be more relevant values so."). Apart from size, weight is a crucial factor; they agree with the design choice of including weight and body condition score in the application.

They believe that the dog owners should receive little from the conclusions the AI drawn from the data. They think that dog owners may become too worried if they have access to preliminary data and visualizations. They agree that only the veterinarian should be able to release results to the owners.

In order to have been able to notice progress in a dog, the researchers compare old and new measurements. They would like the application to have a comparison function; however, it should compare not only the gait, but also the contextual data as group type, length of exercise session, type of direction and speed ("For instance, here the animals come back after 6 to 8 weeks for controller and then like sometimes you think oh now I just look at the measurement today and it looks good. But if it automatically compares to the previous one, just saying hey, this is different"; "if it's on the collar that you don't have that much variance or whatever on the measurements, or if it was on the same type of type of ground or in the same type of direction and speed").

The gait experts also believe that the chat function would be counterproductive; they would rather see in the application a well formulated FAQ (frequently asked questions) list, to help the owner solve any app related issues. The consensus among the interviewees is that the issues that the dog owners may encounter could be either medical or technical, and if they cannot solve them with an FAQ, they should be redirected to call either the veterinarian or the tech support ("so before being able to chat with the vet they have to enter to have these pre-existing questions or problems, and then it's pinpointing them towards the actual person to contact. So is that the support system or the vets have an issue with the analysis."). The idea to have a chat AI bot to assist the dog owners in solving issues with the application and measurements has been discussed, however it is beyond the scope of this study. It is, however, important to mention as potential future work

8.1.4 Focus group with first line veterinarians

Lastly, the researchers of this study had one more possibility to visit a veterinarian clinic. Unlike the visit at the University of Utrecht clinic, this veterinarian practice is a general one. Thus, the patients there have more health complains, not solely lameness. Coincidentally, on the day of the visit, the not one of the canine patients had lameness affections. However, this offered the opportunity to notice how a general consultation takes place, and whether dog owners themselves are familiar with lameness. During this visit one last focus group has been conducted with the first line veterinarians, and two dog owners agreed to short interviews, after their consultation time ended.

The physical examination procedure is similar. If a dog is brought in for a different issue, but the veterinarian suspects lameness, then the veterinarian will prioritize the main issue. They do

suggest the dog owner to return after the main issue is fixed, to have a separate consultation on the lameness. In their experience, most animals have small lameness that is identified when they are brought in for the yearly check-up and vaccination. They do not forward the patient to a specialist unless it is a severe affection, such as broken bones after an accident. For lameness resulted from “rough playing”, they can treat it themselves. Mostly, the referencing to a specialized veterinarian is done when the dog needs a procedure that cannot be done at the clinic.

Just like the specialized veterinarians, the first line veterinarians rely on the information provided by the dog owners. However, they also struggle with unreliable owners, who either do not have the information, do not remember, or share too much and unrelated facts. Regarding the dog’s lifestyle, the veterinarians want to know whether the dog is active or not, the weight of the dog (especially if they are overweight). They use at the clinic both the body condition score and the scale, the first for a visual assessment and the second for a clear number to be put in the dog’s record.
The veterinarians would like to have a clear overview of the dog’s daily activity, and they entertain the idea of the application to collect this data. They would like to know if a dog has outliners in their activity, such as a day at the beach, in case lameness starts presenting afterwards. They want to know for how long a day exercises in a day.

Speaker 6 mentions that for older animals, they ask the owner if the dog is stiffer after laying down (“for like arthrosis it can be if they lie down for a longer time they get.”) or if it has a history of lameness.

The first line veterinarians like the application, and they find it useful for older dogs, who have more complex issues and its harder to identify a single affected joint (“but especially like the dogs from 10 years or older sometimes it's a bit vague, sometimes it's not even the same joint.”). They also like the possibility of using this application to gather data for aggressive dogs; for young dogs they are not very concerned, as they say young dogs recover fast.
The veterinarians find the video recording helpful, and they agree with the time limit and the perspective suggested previously by the orthopaedic veterinarians. The clear instruction in the video makes them feel confident they could examine quality data.

The veterinarians agree with the owners not being able to see the results before those are released. They want to have the opportunity to examine the data and be sure that the machine

learning model is accurate. Once again, the specialists reject the chat function idea, due to the legal obligations to keep track of all channels of communication, and the additional pressure it would put on the veterinarians.

Unlike the specialized veterinarians, they are not convinced about the pre-questionnaire implemented in the application. They are asking the same questions to the owners at the clinic, so checking the answers in the application and then asking the same questions is not time efficient. The length of the questionnaire is another crucial factor, they do not believe it should be longer than 20 questions, and the answers should have a word count limit. Moreover, they want to make sure that the questions are well formulated, so that the owners would only refer to lameness related details, and no other affections. They suggest implement questions about medication, with a focus on pain medication, as those can hide lameness symptoms.

This clinic sends reminders to dog owners regarding appointments and consultations; they cannot confirm if other clinics use this, but they would like to be able to set reminders for the dog owners.

8.1.5 Interview dog owner 1

The first interviewee is aware of what limping is, as she saw once her dog limping before, after accidentally stepping on its toes. She took it to the veterinarian and had a fast recovery, assisted by pain medication. During the examination, the veterinarian has been clear about the issue, and she properly understood it, namely the tendon was hurt from the pressure.
This interviewee has little experience tracking her own habits; she only tracks her step count, but even then, she is not always carrying her phone with herself. She would be willing to take videos with her dog, but not daily. The preferred interval would be monthly. Although, with just a monthly video recording, she thinks the application would be nice to use on a dog from early years until they grow old. She is worried that injuries obtained before adulthood may lead to issues later in the dog. Moreover, she is familiar with certain orthopaedic issues. Her dog is a Labrador, and she knows this breed has a higher risk of developing hip displacement issues. Because of this, she specifically looked for a breeder with dogs that do not have that condition, but she is aware that it can still develop in her dog.
The interview was cut short by the dog becoming restless.

8.1.6 Interview dog owner 2

This dog owner is not familiar with the concept of lameness, does not know what it is and how it can affect her dog. Her dog also never had such issues before. She is enthusiastic about a mobile application for her dog, and thinks people in general would like it; she likes the prototype. Regarding data collection, she is willing to take videos, although she did not provide a frequency of doing so. The interviewee likes the idea of reminders, as she mentions she forgets certain appointments.
Part of this interview took place in Dutch, which limited the possibility of this study's researcher to ask in depth questions.

8.2 Limitations

The primarily limitation of this study is its theoretical nature. As the goal is to design the interaction system of the application in such a way it will engage the end user and motivate them to provide data. Currently, the development of the application is in its initial stages, and the research team is collecting data from sound dogs to train the machine learning model to identify dog gait patterns. Because of this, the framework for interactions cannot be implemented in the application, not in its prototype, and no usability testing can be done. The focus groups were helpful in refining the concept and identifying stakeholder needs, but there was no product testing. To partially overcome this limitation, the interviewees have been questions about their opinion regarding the chosen methods, and a few scenarios have been presented to them. They were walked through the concept, and their feedback has been noted. Moreover, an experiment to test the framework was constructed; this would ideally be used once the application and the system reach the final phases of user testing, as it is a long-term experiment.

Secondly, participatory sensing has a few limitations. The app would have to function in the background of the user's smartphone, which may drain the battery level faster. This would be a disadvantage for two reasons: it affects the data collection, and it may discourage the users from using the app [5], [6]. Additionally, the users may not give all the necessary permissions to the application to use all the functions it needs. Restricted access to smartphone sensors would affect the efficiency of the machine learning model, as it would receive less data than anticipated.
Participatory sensing also requires investment in servers; it is unknown to the writer of this

study the budget of the project, or the ambitions to extend. Participatory sensing alone collects a high volume of data, which would preferably be stored in Cloud [34]. Local servers or SD memory cards would be less convenient to implement [35]. Veterinarian clinic customers cannot be assumed to live close by. However, central servers are still needed. This issue is closely related to the scalability of the system, although it may be a more urgent issue when the system would be commercially available.

Even more, participatory sensing raises multiple issues regarding user privacy, consent regarding data collection and security [10], [36] . Depending on the security protocols of the app, and the servers which collect all the data, the user may have their everyday walking routes, geolocation and even video recordings endangered. It also needs to be decided for how long data should be stored, and what protocols should be used, as it is sensitive data not only about the user, but also medical history of the animal. Unfortunately, the aspect of privacy and security protocols will not be closely followed within this project.

Accessibility is another limitation, as the app may be hard to use by certain dog owners; studies have shown that elderly have difficulties in using eHealth technologies, especially mobile applications [5]. Affordability of the set up (collar with IMU and app) is also an issue that needs to be discussed, as the cost of such a system may be too high. There is also the risk that this system would only be accessible to dog owners that have smartphones compatible with the app; this issue should be further explored during the development stages of the project. Despite creating an app compatible to most existing smartphones, this would still not be accessible to dog owners that do not have such a device.

The application, which all its function and data collection process, may become “data heavy”. This means that it may take too much space, memory wise, on the user’s smartphone. It also may take long processing the data, so the app would be slow. For example, in the case of offering live feedback to the user after taking a dog video, this may take too long. if that is the case, the user may avoid taking videos, due to the long waiting time, only to receive negative feedback and have to record their dog again. If the user finds this incommoding, a core part of the data collection will be missing. The app being data heavy may also lead to it not saving certain changes or new information, either inputted by the end-user, or collected from the IMU sensor.

Ideally, videos would be taken with a high frequency, and the application would be used daily, or at least weekly. Each walk, the owner would take two videos of their dog, one at the beginning and one at the end. Yet, one of the dog owners interviewed said they would take videos on a monthly basis, and even the veterinarians agreed that one a week is more realistic

frequency. A limitation arises from the user's side; they may be willing to provide data, but less than necessary.

8.3 Future work

Besides the evaluation of the conceptual framework, there are more improvements and ideas that could be implemented at a later stage.

A valuable suggestion to improve the quality of the collected data is to provide the users with collars. Instead of giving them the sensor and allowing them to attach it to the normal collar the dog is wearing, the better alternative would be to give them a tailor-made collar, which would fit well the dog. This would reduce the incorrect measurements caused by IMU displacement, and it would overall provide better data to the system. Higher quality data would also accelerate the machine learning component, and proper results would be obtained much faster. Even more, for more sensor security, a walking harness could be provided with the sensor. This has the disadvantage that not all dogs are used to those, and may find them uncomfortable, which would defeat the purpose of it.

To be able to maximise the success of the system, dog gait patterns need to be further researched. Gait measurements on sound dogs need to be conducted, as well as studies with pain/ discomfort induction, to validate if gait patterns have the same meaning and interpretation as horses. Gait researchers showed reservation towards that conclusion, as dogs and horses have different psychologies, one is prey and the other one is a predator. Previous research shows that dogs have mixed behaviours of prey and predator, which affects their gait pattern [37]. This proves the fluid nature of their gait, which only emphases the need for more research into the matter.

It would also be insightful to research what type of dog owners find the application useful. Do factors such as demographics, familiarity with technology and experience in being a dog owner count in the success of the application? The results of such a study could help the veterinarians recommend the system to patients that would actually use it, by better defining the target end-users.

Gamification is a relatively successful component in eHealth applications. It refers to the use

of game design elements, such as points, rewards, and challenges, to engage users and motivate them to participate in non-game activities, such as health-related behaviours [38]. In the context of eHealth, gamification is the integration of game mechanics into health-related applications and services to increase user engagement and motivate healthy behaviours [38]. This can include features such as progress tracking, rewards for healthy behaviours, and friendly competition with other users. However, the success of this method in older participants is reduced. Studies [39] and [40] show that older adults are less receptive by gamification elements; however, the studies are preliminary, and both recommend longer testing time. Currently, the application does not have restrictions for the target group, as long as they have a dog with lameness, they are virtually possible end users. Because of this, the older users may have issues with the application if gamification elements are introduced, which would lower the adherence rate. The matter must be carefully studied.

Chapter 9 Conclusion

This study contributes to the field of veterinary orientated eHealth by presenting a conceptual framework for a system aimed at monitoring and evaluating the life and activity of dogs for the purpose of diagnosing and treating lameness. The system is composed of a machine learning model, sensors (IMU and smartphone), and mobile application. The study is specifically studying how the data collection can be enhanced through the application, and how to motivate the end-user to utilise it. The framework offers a comprehensive approach that covers all aspects of the system, including the interactions between the user, the application, the data collection processes, and the feedback loops between stakeholders.

The research approach taken in this study is theoretical and qualitative, and involved two iterations of stakeholder interviews to ensure that all relevant perspectives were considered. Additionally, observation days to gather information on how veterinarian consultations happen were conducted. The results of this study provide a solid foundation for future research and development in this area.

Although the proposed framework cannot be tested at this stage, the study provides an evaluation procedure that will help assess its effectiveness in the long-term. This procedure considers important factors such as the long-term adherence to the application, the level of user engagement over time, and the sufficiency of data collection for the machine learning algorithm.

The solution presented in this study uses participatory sensing to create a context-aware framework that provides a comprehensive view of the dog's life and activity. This is a critical factor in understanding and treating lameness, as it helps to identify the underlying cause of the condition and monitor the progress of recovery. The system is primarily intended for monitoring the recovery of dogs after medical intervention, such as post-surgery or rehabilitation for conditions like arthritis.

In conclusion, this study provides a valuable contribution to the fields of veterinarian and eHealth by creating a conceptual framework for a complex system that aims to monitor and evaluate the life and activity of dogs for the purpose of diagnosing and treating lameness. The results of this study serve as a foundation for future research and development in this area and have the potential to make a positive impact on the health and well-being of dogs.

APPENDIX A FOCUS GROUP QUESTIONS VETERINARIANS

General questions

1. What are the usual questions you ask the dog owner when they bring a dog presenting lameness?
2. When visually evaluating a dog for lameness, what are key factors that tell you what causes the dog to limp?
3. Do you ask for additional information if during a clinical evaluation for a different issue you discover lameness?
4. How often do you find the information about the dog's health, habits and possible accident history given by the dog owner reliable?
5. Do you trust some dog owners more than others?
6. What makes a dog owner trustworthy with the information they provide about the dog's lifestyle/wellbeing?
7. What kind of information would you like to have access to about the dog's private life?
8. Would daily habits tracking, such as walking times and activity recording in those time be helpful?
9. If dog owners would use an application to monitor their dog's gait (and activity) (over time), what would be your expectations from this application?
10. What are the most important parameters you would want to see in the visualisations to facilitate lameness diagnosis?
11. What functionalities should the app include? -> what should the application be able to do?
12. Weight issues lead often to lameness. Do you think the app should also have weight related features, such as monitoring weight, diet, exercise regime?

Questions, after interacting with the app (think out loud)

1. Would you consider the design appealing?
2. How did you find the navigation system of the app?
3. What kind of graph or visualization would you use for analysing gait? Why?
4. What kind of graph or visualization would you consider as most useful? Why?

5. Do you think any veterinarian is able to interpret the results of a gait analysis if we use this format?
6. Should the app assist the dog owner in following your professional advice by having features in which exercises and reminders can be implemented?
7. After seeing the application, would you like to answer an earlier question we asked differently?
8. Based on the short interaction you had with the prototype, what changes/ additions/ advice would you have to improve the application?

APPENDIX B FOCUS GROUP QUESTIONS GAIT EXPERTS

General questions

1. Is it correct that you are familiar with the application EquiMoves?
2. What do you think is different in examining a dog for lameness compared to a horse?
3. What are important key factors when evaluating a horse for lameness?
4. Which of the important key factors could possibly be used in dogs? Why?
5. Are there key factors that are important for dogs, (and not for horses)?
6. What functionalities should the application have?
7. What functionalities should the app have to enhance the data collection process?
8. What are important parameters that show lameness and hence may not lack from the app and/or visualizations?
9. What kind of graph or visualization would you use for analysing gait? Why?
10. What kind of graph or visualization would you consider as most useful? Why?
11. Do you think any veterinarian is able to interpret the results of a gait analysis if we use this format?

Questions, after interacting with the app (think out loud)

1. Would you consider the design appealing?
2. How did you find the navigation system of the app?
3. What kind of graph or visualization would you use for analysing gait? Why?
4. What kind of graph or visualization would you consider as most useful? Why?
5. Do you think any veterinarian is able to interpret the results of a gait analysis if we use this format?
6. Should the app assist the dog owner in following your professional advice by having features in which exercises and reminders can be implemented?
7. After seeing the application, would you like to answer an earlier question we asked differently?
8. Based on the short interaction you had with the prototype, what changes/ additions/ advice would you have to improve the application?

APPENDIX C INTERVIEW QUESTIONS DOG OWNERS

1. Have you ever seen your dog limping? If so, did you know what caused the limping? What did you do about it?
2. Are you aware that your dog's walking pattern is important for monitoring his wellbeing?
3. If you went to your vet with your limping dog, were you able to understand the veterinarian's diagnosis and the reasoning behind it?
4. Did the veterinarian show you the limping of the dog and explained the cause of it to you?
5. Do you use health monitoring devices and/or mobile applications for yourself?
6. Would you use an application to monitor your dog's gait? What would be your expectations from this application?
7. If you could monitor your dog with this application, how would you like to see your dog's gait?

Questions for after they interact with the app

1. How did you like the design of the app?
2. Would you consider the design appealing?
3. How did you find the navigation system of the app?
4. Where the buttons/illustrations clear enough?
5. What kind of graph or visualization would you consider as most useful? Why?
6. Should the app have features allowing you, as dog owner, to input exercises and reminders to do them, such that you have a better control in managing your dog's condition?
7. Based on the short interaction you had with the prototype, what changes/ additions/ advice would you have to improve the application?

APPENDIC D TRANSCRIPT SPECIALIZED VETERINARIAN FOCUS GROUP

Speaker 1, Speaker 2, Speaker 3, Speaker 4, Speaker 5

Transcript

00:00:01 Speaker 2
De eerste vraag is dan, euh, wat zijn de gebruikelijke vragen die je stelt als iemand binnenkomt op de poli
[the first question then is, euh, what are the common questions which are asked if someone comes at the clinic?]
00:00:08 Speaker 1
In pricipe is dat een gestandaardiseerd systeem van vragen, we hebben ook een boek daarover wat studenten leren. Miscchien is het interessant om dat te hebben
[in principle, that's a standardised system of questions. We also have a book about what students need to learn. Maybe it might be interesting to have that?]
00:00:24 Speaker 2
Dat kan wel interessant zijn, ja
[sure, that could be interesting]
00:00:28 Speaker 1 (Michelle)
Dat heb ik toegestuurd
[i've already sent it by email]
00:00:31 Speaker 1
We vragen over het probleem van het dier, en bij een ortopeditsch probleem gaat het dus over kreupelheid,
[so we ask questions about the problem of the animal, and concerning an orthopeadic problem, it's about lameness,]
00:00:37 Speaker 1
en dan vragen we naar de aard van het probleem, de duur
[and then we ask about the nature of the problem, the duration]
00:00:43 Speaker 1
Hoe het verloop is geweest van de tijd en of er al een behandeling is ingesteld
[how it has been overtime and whether or not there has already been some treatment]
00:00:47 Speaker 1
En of onderzoek is uitgevoerd
[and, if some research is done]
00:00:49 Speaker 1
Verder hebben we vragen over de algemene achtergrond van het dier
[furthermore, we ask questions about the general background of the animal]
00:00:54 Speaker 1
Leefstijl, leefomstandigheden, voeding, algemeen functioneren
[lifestyle, living conditions, nutrition, general fuction / general health]
00:00:57 Speaker 1
en andere ziektegeschiedenis en combinatie
[and other medical history and combinations of things]
00:01:00 Speaker 2
Dus ook de basisdingen zijn eigenlijk belangrijk
[so, also the basic stuff is actually important]
00:01:04 Speaker 1
Ja ja eigenlijk wel want sommige aandoeningen kunnen natuurlijk een oorsprong hebben in iets heel anders
[Yes yes actually yes because some disorders can of course have an origin in something completely different]
00:01:08 Speaker 1
Het kan zijn dat een dier een algemene ziekte heeft waardoor hij ook kreupel loopt bijvoorbeeld
For example, it may be that an animal has a general illness that also makes it lame
00:01:14 Speaker 2
Yeah yeah, yeah.
Ik denk dat ze er is, ze vraagt welke ingang
[I think she's here, she asks which entrance]
1:20 michelle:
Zal ik even naar beneden lopen anders?
[shall I walk downstairs?]
(chat about public transport, irrelevant)
00:02:00 Speaker 2
Onze volgende vraag was al gebaseerd op het onderzoek zelf, euh op het moment dat er een hond al de clinic binnenkomt, euh, met klachten voor mankheid, wat zijn de belangrijke factoren, waar kijk je naar als je een hond bijvoorbeeld voor je uit laat lopen en gaat kijken...
[Our next question was already based on the research itself, euh at the time when a dog already enters the clinic, euh, with complaints of limping, what are the important factors, what do you look at when you have a dog, for example, walk in front of you and start looking...]
00:02:24 Speaker 1
Ja, euhm, bij monsteren kijken, euh, proberen we te zien welke poot kreupel is
[Yes, um, in “monsteren” we look, um, try to see which leg is lame
00:02:33 Speaker 3
Hello, I'm Alexandra.
00:02:35 Speaker 2
Hi, I'm Sarah.
00:02:35
Yeah, this student.
00:02:36 Speaker 3
Sorry, bike problems.
00:02:38 Speaker 1
No problem.
00:02:39 Speaker 2
So we're at the second question.
00:02:42 Speaker 2
Currently I'm recording and we filled out the form.
00:02:45 Speaker 3
Lovely thank you.
00:02:48 Speaker 1
So shall we switch to English then yes, yes.
00:02:52 Speaker 1
So we so we look if we can identify which leg of the dog is the lame leg.
00:03:01 Speaker 1
And also.
00:03:04 Speaker 1
Uh, here we make a distinction between, uh, yeah.
00:03:09 Speaker 1
Movement, lameness or.
00:03:13 Speaker 4
Belastingskreupelheid [load lameness]
00:03:14 Speaker 1
Guys so if they put weight on it so yeah if they are sort of lame at the moment they put weights or lame at the moment they moved.
00:03:23 Speaker 1
OK, that's yeah, quite difficult.
00:03:24 Speaker 2
That's interesting, didn't hear that before, thanks.
00:03:29 Speaker 2
So are there any specific signs in which you can see the dog?
00:03:36 Speaker 2
Lame, besides the weight.
00:03:40 Speaker 1
Yeah, So what we call the.
00:03:43 Speaker 1
The dog falls on the healthy limb.
00:03:48 Speaker 1
So if you see a lame.
00:03:49 Speaker 1
Dog because they try to.
00:03:54 Speaker 1
Decrease the weight they put on the lame leg.
00:03:56 Speaker 1

They sort of put more weight on the healthy leg and so they make a falling movement on that.
00:04:02 Speaker 1
Yeah, normal leg.
00:04:04 Speaker 2
So that's the most used trick.
00:04:05 Speaker 2
The most obvious.
00:04:07 Speaker 1
Yeah, usually that seems obvious, yes.
00:04:09 Speaker 2
OK, yeah.
00:04:12 Speaker 2
So if you find during an evaluation of a dog a different issue than the owner came in with, what do you do?
00:04:21 Speaker 1
Well, we always.
00:04:22 Speaker 1
Examine the complete the whole animal so we never focus only on one limp.
00:04:27 Speaker 1
We always perform a complete orthopedic examination of all limbs.
00:04:32 Speaker 1
But it's quite often that owners see something else than we do.
00:04:39 Speaker 1
So you can do several things you can.
00:04:41 Speaker 1
Sometimes dogs have more than one problem of.
00:04:44 Speaker 1
Course we watch together.
00:04:46 Speaker 1
With the owner and.
00:04:47 Speaker 1
Ask, “is this what you mean?”
00:04:48 Speaker 1
Or “do you see something else at home” or we ask them to make video clips?
00:04:54 Speaker 1
If they see something because sometimes the dogs don't limp when they are here, but they do it when they are.
00:05:00 Speaker 1
At home and then.
00:05:02 Speaker 1
That's easy with their phones.
00:05:04 Speaker 1
Now they can make a small video and send.
00:05:06 Speaker 1
It to us.
00:05:08 Speaker 5
OK.
00:05:10 Speaker 2
Would you like to continue with your?
00:05:12 Speaker 2
Yes this one.
00:05:13 Speaker 3
OK, how often do you find the information about the dogs?
00:05:17 Speaker 3
Have their habits and possible accidents is given by the dog owner reliable?
00:05:22 Speaker 3
You already mentioned your request video sometimes, but just the oral and memory does it.
00:05:28 Speaker 3
Is it reliable?
00:05:29 Speaker 3
Is it trustworthy?
00:05:33 Speaker 1
It depends a lot on the owner.
00:05:35 Speaker 1
Yeah, I think some some.
00:05:37 Speaker 1
People are more.
00:05:39 Speaker 1
Reliable than others and it also depends on how long the problem is already there.
00:05:44 Speaker 1
Because if a dog has been lame for months, it's for a lot of owners.
00:05:48 Speaker 1
Quite difficult to.
00:05:50 Speaker 1
especially the chronically/chronology of it
00:05:54 Speaker 1
You have these owners that keep like complete diaries of their dog
00:05:59 Speaker 3
Yeah, so you have them in.
00:05:59 Speaker 2
Quite extending maybe yeah.
00:06:02 Speaker 3
OK, 'cause that takes us to the next question, which is what makes the dog owner trustworthy with the information they provide.
00:06:08 Speaker 3
'cause you just said you have different types of dog owners.
00:06:11 Speaker 3
So what helps you build trust in your patient?
00:06:14 Speaker 1
Well, if
00:06:15 Speaker 1
They are.
00:06:16 Speaker 1
If they are consistent, I think in their story, because I mean here students usually do the first questions and.
00:06:24 Speaker 1
Then we as the specialists come in and ask a lot of the same questions again.
00:06:30 Speaker 1
If we tell the same story twice, it's quite reliable, of course.
00:06:32 Speaker 3
OK, and if they say different details to the students versus they would say to you what do you do now?
00:06:40 Speaker 3
What do you?
00:06:40 Speaker 3
Actually believe in.
00:06:41 Speaker 3
The end.
00:06:43 Speaker 1
Well, you sort of take it all into account and try to sort of match it with the findings you have yourself.
00:06:50
Weird background noise, not conversation
00:06:55 Speaker 3
And what kind of information would you like to have access to from the dog's private life?
00:06:59 Speaker 3
You mentioned video recordings and diaries that the dog owner should take.
00:07:03 Speaker 3
If you could have it automated in an app, what would?
00:07:05 Speaker 3
You like to actually see.
00:07:07 Speaker 3
What would be helpful for you?
00:07:12 Speaker 1
I think information about how much a dog is.
00:07:16 Speaker 1
Exercising during the day.
00:07:17 Speaker 1
So how?
00:07:23 Speaker 4
Right?
[bjorn is there]
00:07:25 Speaker 2
goedemorgen. [goodmorning]
00:07:27
Hello morning.
00:07:31 Speaker 5 =>Alexandra
English please yes.
00:07:32 Speaker 3
No problem.
00:07:32 Speaker 2
I do speak Dutch, so if you want to say something in Dutch, it's OK.
00:07:35 Speaker 2
I can translate it.
00:07:36 Speaker 2
I can try to translate it 'cause my English is not that good.
00:07:40 Speaker 2
We've got some consent forms over here which.
00:07:44 Speaker 2
Would be nice if you could fill it out.
00:07:47 Speaker 2
It also states already a little bit of an introduction of our project.
00:07:52 Speaker 2
But I can also tell you work on an application which should.
00:07:58 Speaker 2

Show the analysis of the gait of a dog.
00:08:01 Speaker 2
And we are mostly interested in.
00:08:04 Speaker 2
What part of the application would be interesting for you and how should we create it?
00:08:14 Speaker 5
Or are you going to ask me questions first?
00:08:17 Speaker 2
Uh, I think it depends on the time we've left.
00:08:21 Speaker 2
And are you very time bound today?
00:08:23 Speaker 5
Yes, I'm I have to leave at.
00:08:28 Speaker 5
In 11 minutes.
00:08:31 Speaker 2
OK
00:08:31 Speaker 2
OK, well maybe it's.
00:08:34 Speaker 2
Nice if you could fill it in afterwards, but I should tell you that.
00:08:39 Speaker 2
We are recording currently on.
00:08:40 Speaker 3
My phone.
00:08:41 Speaker 5
No problem.
00:08:42 Speaker 2
And if you have any questions, my e-mail address is on the second page so you can send me an e-mail.
00:08:50 Speaker 5
Sure, yes.
00:08:53 Speaker 2
Uhm, so we've already asked some questions about the first things when you come in with a dog, what is happening?
00:09:01 Speaker 2
Which are all sorts.
00:09:03 Speaker 2
So I think we should just continue our interview.
00:09:07 Speaker 2
Sure you can.
00:09:10 Speaker 2
Answer both.
00:09:14 Speaker 1
I'm not so timebound anymore because my surgery is cancelled.
00:09:20 Speaker 2
OK, so then.
00:09:20 Speaker 5
What do you know?
00:09:22 Speaker 1
Danger force.
00:09:22 Speaker 5
Personal selling.
00:09:27 Speaker 5
I see.
00:09:30 Speaker 3
OK, then can we continue with the same question maybe?
00:09:35 Speaker 3
OK, then the question was like what kind of information would you like to have access to?
00:09:42 Speaker 3
About the dog's private life?
00:09:44 Speaker 3
So, what she already mentioned, like diaries of the doc that the.
00:09:48 Speaker 3
The owner should take, but we also discussed the fact that some owners are not really reliable in the information they gave.
00:09:54 Speaker 3
So we're thinking in the application if we could collect anything, what would be the most important to collect so you could have?
00:10:00 Speaker 3
All the information together.
00:10:04 Speaker 5
Well since there.
00:10:05 Speaker 5
We are dealing with dogs that are lame.
00:10:09 Speaker 5
We want to know.
00:10:11 Speaker 5
I assume you've discussed already the Signalment, breed, age, etc.
00:10:17 Speaker 5
Yeah, all that information that is usually what comes to us before them.
00:10:21 Speaker 5
We want to know from the owner.
00:10:24 Speaker 5
"What is the problem?"
00:10:26 Speaker 5
It's a very general question, but then we go and focus on lameness.
00:10:32 Speaker 5
"When did lameness start?"
00:10:36 Speaker 5
What was the cause?
00:10:39 Speaker 5
Some owners can
00:10:40 Speaker 5
Specifically tell us
00:10:41 Speaker 5
Some cannot.
00:10:43 Speaker 5
It doesn't matter, but we.
00:10:44 Speaker 5
Want them to think about that.
00:10:46 Speaker 5
How long?
00:10:47 Speaker 5
Is it present? [the lamess]
00:10:50 Speaker 5
How did it develop?
00:10:54 Speaker 5
Is it's, we call this progressive better or progressive worse?
00:11:00 Speaker 5
What is the?
00:11:01 Speaker 5
Time pattern over the day.
00:11:04 Speaker 2
Would a diary sort of style help?
00:11:08 Speaker 2
A diary.
00:11:10 Speaker 5
Yes, for sure some owners have that when they have problems remembering things, they write everything on it.
00:11:12
OK.
00:11:18 Speaker 2
But I can also imagine maybe you have if there's a whole diary, it might be way too much, and to extend it.
00:11:27 Speaker 2
And other things we could leave out, you would say.
00:11:32 Speaker 5
Well, that's why we ask these specific questions to directly focus about the information that is relevant for us.
00:11:38
OK.
00:11:41 Speaker 5
So apart from that we also talk with the owner and we get an assessment.
00:11:46 Speaker 5
I call it a psychological assessment.
00:11:50
OK.
00:11:52 Speaker 5
No, but I mean this is part of.
00:11:54 Speaker 5
Of dealing.
00:11:55 Speaker 5
With owners of dogs.
00:11:57 Speaker 5
Because there's.
00:11:58 Speaker 5
A huge variety.
00:12:00 Speaker 5
And we want to have the essential information.
00:12:04 Speaker 5
And sometimes that's quite difficult.
00:12:07 Speaker 5
Because of the type of owner that is in front of you.
00:12:11 Speaker 5
Some go.
00:12:13 Speaker 5
Everywhere with their story, and then we train the students to focus them again to the problem.
00:12:19 Speaker 5
Sometimes that's not possible because they keep on going.
00:12:24 Speaker 2
Yeah everywhere.
00:12:25 Speaker 5
So yeah, that's so.
00:12:28 Speaker 5

This is partly solved by a questionnaire.
00:12:30 Speaker 5
You can do that, but.
00:12:33 Speaker 5
And we have.
00:12:34 Speaker 5
Now we have for instance for other another category of dogs.
00:12:41 Speaker 5
where we do screening
00:12:43 Speaker 5
Of the dogs for health, we have just a short questionnaire.
00:12:48 Speaker 5
With questions.
00:12:49 Speaker 4
Would you like to see?
00:12:50 Speaker 4
That in the app itself, or would you like to see only?
00:12:54 Speaker 4
When you're here.
00:12:56 Speaker 1
And is the app something the owners have at home?
00:13:00 Speaker 1
And yeah.
00:13:01 Speaker 5
Yeah, yeah no, but that would be very helpful.
00:13:02 Speaker 4
I see.
00:13:03 Speaker 5
I think with just a couple questions, so is your dog lame, yes or no.
00:13:09 Speaker 5
Which hind do you think that the dog is lame?
00:13:12 Speaker 5
It's very important what the owner thinks.
00:13:15 Speaker 5
Because then we have our assessment and if they fit one-on-one.
00:13:22 Speaker 5
It's OK if they do not fit, then we have to go back to.
00:13:25 Speaker 5
The owner and ask.
00:13:29 Speaker 5
More questions, yes.
00:13:31 Speaker 5
And that can be because the owners things is not reliable on their assessment.
00:13:37 Speaker 5
Or maybe we are not reliable so but.
00:13:42 Speaker 2
It's always a check in to check if everyone agrees.
00:13:45 Speaker 5
Yeah, and the duration of lameness is fairly important.
00:13:49 Speaker 5
That's the only thing that only the owner can tell us.
00:13:52 Speaker 5
The duration. We were not there, and when it happened.
00:14:00 Speaker 3
Yeah, Sara mentioned actually exercises and sometimes she suggests the.
00:14:04 Speaker 3
The dog owners to take videos if you they would keep track of like videos of the dog for multiple time that would be helpful 'cause you can see the progression.
00:14:14 Speaker 5
No, video is very helpful.
00:14:16 Speaker 5
OK yeah but.
00:14:20 Speaker 5
When then we have to give specifics how they make the video, because if you just talk, say, can you make a video?
00:14:26 Speaker 5
Then you get.
00:14:28 Speaker 5
One hour video.
00:14:30 Speaker 5
At the last part is maybe a very significant part, so we asked them to make short videos of the most essential part.
00:14:38 Speaker 2
OK, and what might be that essential part?
00:14:41 Speaker 2
Like when a dog lame?
00:14:42 Speaker 5
When the dog's lame.
00:14:44 Speaker 2
And is there a special point of view you would like to see or?
00:14:46 Speaker 5
What we want front view, side view and hind view.
00:14:51 Speaker 2
OK.
00:14:52 Speaker 3
That's really useful.
00:14:53 Speaker 2
Yeah, yes.
00:14:55 Speaker 5
Next question, when the dog is sort of racing or sometimes the problem is when the dog is.
00:15:00 Speaker 5
Lying down and it.
00:15:02 Speaker 5
It has been sleeping and then it starts to move and then it's very lame and then afterwards it's not lame anymore so that we.
00:15:09 Speaker 5
We want that piece of video.
00:15:10 Speaker 3
Do you want it when they're a bit numb?
00:15:11 Speaker 5
Numb yeah.
00:15:14 Speaker 2
Yeah, as to know his.
00:15:15 Speaker 3
Thank you.
00:15:19 Speaker 2
So daily habits tracking might be very interesting if you have a.
00:15:26 Speaker 2
I had to know something more about dogs private life.
00:15:31 Speaker 3
Yeah, to be more specific so we don't repeat.
00:15:34 Speaker 3
We are talking about tracking the usual working time 'cause we thought all dog owners must have routines they walk.
00:15:40 Speaker 3
Their dogs probably the same hours every day and they feed them at the same hours.
00:15:44 Speaker 3
Would that type of information be useful?
00:15:48 Speaker 5
You mean a tracking device?
00:15:50 Speaker 3
Yeah yeah, the whole concept of the project is a sensor that goes on the collar which is connected to this application we are developing currently and it would have two interfaces this one for the owner on the phone and one for the veterinarian on the laptop.
00:15:51 Speaker 5
OK.
00:16:04 Speaker 3
So you could see all everything that the dog owner collected summarised.
00:16:09 Speaker 5
Could be helpful.
00:16:09 Speaker 1
OK, yeah, I think it would be interesting to know if a dog walks for like 4 hours a day or only like 10 minutes.
00:16:15 Speaker 3
So that level of exercise.
00:16:15
That sounds.
00:16:17 Speaker 5
Yeah, no, and it certainly helps them if we want to compare it to maybe after treatment.
00:16:30 Speaker 5
Yeah, but Sarah says.
00:16:31 Speaker 5
That is important.
00:16:32 Speaker 5
How much is the dog walking?
00:16:35 Speaker 5
But yeah, we like to compare them always with maybe the history.
00:16:39 Speaker 5
But that may be difficult when the dog was.
00:16:41 Speaker 5
Not lame because.
00:16:44 Speaker 5

It presents itself with lameness so.
00:16:46 Speaker 5
We don't know what is the normal.
00:16:49 Speaker 2
So if we have an application that monitors the dog's gait and maybe its activity over time.
00:16:56 Speaker 2
What should be the most important parameters you want to see in the application for?
00:17:04 Speaker 2
Let's say the visualizations or.
00:17:07 Speaker 2
Yeah, what parameters do you need to facilitate the diagnosis for lameness?
00:17:17 Speaker 5
Left right differences.
00:17:19 Speaker 5
Front hind differences.
00:17:24 Speaker 5
Yeah, if it is possible, some type of.
00:17:28 Speaker 5
Assessment of the duration of lameness or the.
00:17:33 Speaker 5
Extent of the lameness.
00:17:34 Speaker 5
So if the dog comes into the clinic, we grade lameness.
00:17:38 Speaker 5
We have a grading system from one to four.
00:17:42 Speaker 5
I'm not sure if the tracking system would.
00:17:45 Speaker 5
Be able to grade.
00:17:47 Speaker 5
We use.
00:17:49 Speaker 4
I think it works in symmetry, right?
00:17:52 Speaker 2
Yeah, yeah.
00:17:52 Speaker 4
Symmetry so well, probably more lame more asymmetry you so.
00:17:58 Speaker 4
You could probably.
00:17:59 Speaker 4
Put it green on that maybe.
00:18:01 Speaker 5
Yeah, but so, for instance, uh.
00:18:04 Speaker 5
We asymmetry is then both limbs.
00:18:08 Speaker 5
Should be different when you want to.
00:18:10 Speaker 3
Right, it's the symmetry of the head, 'cause if they have more weight on one leg, the head is moving.
00:18:10 Speaker 5
Pick it up.
00:18:15 Speaker 3
More left to right.
00:18:16 Speaker 5
OK.
00:18:17 Speaker 3
So it's kind of to extrapolate the data from that.
00:18:19 Speaker 5
OK.
00:18:21 Speaker 5
So it.
00:18:22 Speaker 5
There will be not a real difference if the dog puts the limb down on the floor or.
00:18:28 Speaker 5
If it has it.
00:18:30 Speaker 5
Back from the floor.
00:18:31 Speaker 2
I think it's, uh, drawing its information from the video of a dog, so it's working with AI, deep learning, and, well, that's actually not our part.
00:18:41 Speaker 2
Our part of that project, but our supervisor did say we can.
00:18:49 Speaker 2
Extract quite a lot of parameters out of the video.
00:18:54 Speaker 2
Also the height of the shoulders, of the hips.
00:18:58 Speaker 2
So we can track all those joints and with the help of that we might be able to create a pattern or stickman, or.
00:19:10 Speaker 1
Maybe it would also be interesting to see if the lameness gets worse during a walk.
00:19:15 Speaker 1
I don't know if.
00:19:16 Speaker 1
You can put.
00:19:17 Speaker 1
Some lameness stays, sort of constant or some are more severe, like when the dogs stand up, but improve over time.
00:19:27 Speaker 1
Or yeah, yeah.
00:19:28 Speaker 3
Gets worse through playing and exercise. That is also nice, but I think that can be tracked 'cause they're supposed to wear it during their work time and exercise, so that should be not impossible, but it's good to keep in mind so.
00:19:39 Speaker 2
Yes, sure.
00:19:40 Speaker 3
Mind as at the beginning of work versus end of a walk. Make a comparison.
00:19:43 Speaker 2
Yes, and maybe also take video in the beginning of the walk and at the end of the walk maybe see if there are different rhythms.
00:19:51 Speaker 3
Yes, OK, that's really nice.
00:19:53 Speaker 3
Thank you.
00:19:54 Speaker 2
And if you would design this application, what functionalities should the app have in your eyes?
00:20:04 Speaker 2
What should it be able to do?
00:20:08 Speaker 2
Are there certain things you would like to see or which could be very important?
00:20:16 Speaker 1
It's a difficult question.
00:20:18 Speaker 5
Well, if the application shows us pops up from the application, OK, the dog is lame on the right forelimb.
00:20:27
Would be nice.
00:20:28 Speaker 5
And if we see the dog and it's a it's one-on-one, correct.
00:20:34 Speaker 5
Then I can retire.
00:20:38 Speaker 2
So would your diagnosis maybe change if you see the application or you would still like to see the dog yourself.
00:20:46 Speaker 5
We only know that after we have been using it, so that's the challenge.
00:20:52 Speaker 2
And what if the application could suggest some treatment plans or?
00:21:00 Speaker 5
Like that's another step, I think yeah.
00:21:04 Speaker 5
I think the first aim would be to see if the device.
00:21:09 Speaker 5
If the artificial intelligence would be able to.
00:21:14 Speaker 5
Tell us where the dogs lame and maybe tell us.
00:21:18 Speaker 5
Detect lameness when I,
00:21:21 Speaker 5
The human eye cannot detect it. Since they are step ahead in horses.
00:21:26 Speaker 2
Yeah, yeah.
00:21:28 Speaker 5
Although I have my doubts there, but that's...
00:21:33 Speaker 4
So how much raw data would you like to see?
00:21:36 Speaker 4

How much raw data would you like to see? Would you like to see numbers or would you like to get like an “we think it's the right front limb, grade one out.”
00:21:43 Speaker 5
Yeah, I think that's.
00:21:44 Speaker 4
Of five as assessed by the AI.
00:21:47 Speaker 4
Order checks in the church.
00:21:47 Speaker 5
Yeah, or a percentage share percentage? Maybe the over the limb set for most likely 90%. The problem is on the right, 70% on the left forelimb, 10% hind limbs, something like that. 'cause I think those have. That is how they work these programs. So risk assessment.
00:21:56 Speaker 4
Right?
00:22:08 Speaker 5
More or less.
00:22:09 Speaker 4
Yeah, I can now show the asymmetry index rates between the left and the front, sort of like a scale, and it goes more towards left because there's more symmetry in the left limb, but that's not an interpretation, right?
00:22:20 Speaker 3
Yeah, it's fun.
00:22:23 Speaker 4
There's only the raw is more or less a raw data.
00:22:25 Speaker 3
It's very much visualization based and we are trying to do visualization, so that's why you're asking what do you actually like to see visualized.
00:22:35 Speaker 5
You can work with colors so.
00:22:38 Speaker 5
Red being more the.
00:22:40 Speaker 5
Affected side green the OK side so and.
00:22:43 Speaker 5
Everything in between.
00:22:45 Speaker 5
Like a colormap?
00:22:47 Speaker 5
Should be.
00:22:49 Speaker 2
Thats very much possible.
00:22:50 Speaker 3
Before one last question and then we show you the prototype. We read a lot and we saw that weight issues can induce lameness?
00:22:51 Speaker 5
Yeah, yeah.
00:22:58 Speaker 3
Because if the dog is overweight, it affects the orthopedic health. Would monitoring the weight of the dog within the app would also be helpful.
00:23:07 Speaker 5
Yes sure, especially when you go for treatment, yes.
00:23:11
OK.
00:23:13 Speaker 5
And then we can also check the hours, so maybe we can say at a certain.
00:23:17 Speaker 5
Weight, body weight.
00:23:18 Speaker 5
We are not going to do surgery before your dog is in the correct weight range. I think because we have problems with that.
00:23:31 Speaker 3
OK, so that's.
00:23:31 Speaker 5
They want the surgery, but they don't want to spend any time on weight loss.
00:23:37 Speaker 3
OK, that's important to know also on how you can correct it.
00:23:42 Speaker 2
I think you would really like to go. We have just a very quick view. You can maybe say what is the first things that pop in your mind just to. Maybe we can then turn over to you for some more questions about the application.
00:23:56 Speaker 2
This is the veterinarian side. Yes, it's currently on the Start Measurement tab where you can choose your list of dogs. Which are sorted by next visit. This is just from the horse's application. A little bit copied.
00:24:16 Speaker 2
I think we can go to the main where we can. See the dogs. And they are sorted by next visits, you can click on the next doc and see, well, this is for the horses base, but at the time they're standing on one foot like right left. And it's not really readable currently, but it's about how much time they're standing on the floor and how much not. Well, there are some graphs here, but we also have the live results which is intended to be the video which the owner took off the dog with the analysis results above and below. So again the stands of the stride duration and the angle of the limbs which are currently. Ticked on for the front, right and left. It's it's data from horses, so it might be a bit strange, but it it would be very nice if we can have this dog actually during the video.
00:25:20 Speaker 2
Live results of.
00:25:22 Speaker 3
And the graphs visualized and synced up with the video.
00:25:25 Speaker 2
Yes, synchronized.
00:25:30 Speaker 5
I think it looks very nice. That will may work.
00:25:34 Speaker 5
I think you were talking about angle, limb angle. So then my question would be what is the limb angle. Because we define angles around the joints. OK, is it the shoulder angle or the stifle or?
00:25:49 Speaker 3
Yeah, in our face of symmetry.
00:25:54 Speaker 2
OK, yes, that's something I would need to ask, yeah?
00:25:59 Speaker 4
'cause it would be very interesting if you could have all the joints
00:26:04 Speaker 5
Well, if you look up from the site, you can have the.
00:26:08 Speaker 5
Flexion extension of the hip.
00:26:10 Speaker 5
The Styrofoam and the tarsal.
00:26:12 Speaker 5
Joints are those are three joints and for limp shoulder elbow.
00:26:19 Speaker 2
Yes, so would it be helpful if you maybe have a function where you click on a certain joint and you can see more in depth?
00:26:27 Speaker 3
Have the angles precalculated.
00:26:33 Speaker 2
Would they break something else like a few from behind and then maybe a level of the hips?
00:26:41 Speaker 2
How much they are rotating or?
00:26:43 Speaker 5
Yeah, but for the low back for instance spine and the way.
00:26:49 Speaker 5
The dog is .
00:26:53 Speaker 5
Holding its pelvis, center spine and pelvis angle.
00:27:00 Speaker 5
So you sometimes see those views in horses where you have this.
00:27:06 Speaker 5
Yeah, the line graphs of the.
00:27:08 Speaker 5
Of the motion.
00:27:09 Speaker 5
So you don't see the horse, but.
00:27:11 Speaker 5
You see.
00:27:12 Speaker 5
The horse depicted as lines with all the.
00:27:14 Speaker 3
Just the axes, yeah?

00:27:14 Speaker 5 (Michelle)
Axes, yeah yeah that's with the mockup.
Veterinarian 2 had to leave early, goodbyes were told
00:27:35 Speaker 3
We have a bit more time to show you guys.
00:27:37 Speaker 2
Yeah, and we also do have some questions about the application, but let's first walk through.
00:27:44 Speaker 2
There are a.
00:27:45 Speaker 2
Little bit of things you can click on if you just click it.
00:27:47 Speaker 2
You can see what you can click on it.
00:27:49 Speaker 2
Will be highlighted and so basically. We start with our main screen where we just have our dogs list that is sorted by next visit. Uh, you can add a new dog, have identification things you can quickly read through. Maybe we are missing something or do you think this is not really needed or?
00:28:16 Speaker 1
The colour is not that relevant I think.
00:28:22 Speaker 2
It it might be. Actually currently it's designed for color blind people, so they also should be able to have access to the application.
00:28:39 Speaker 1
It's the weight of the dog in here because it's not in here right now, right?
00:28:42 Speaker 2
Uh, not yet.
00:28:44 Speaker 1
Yeah, I think that's
00:28:47 Speaker 4
Is what do you think about weight versus body condition score?
00:28:51 Speaker 4
Because weight doesn't say.
00:28:52 Speaker 1
Yeah, that's true.
00:28:53
If it's.
00:28:54 Speaker 1
Well, but body condition score is.
00:29:00 Speaker 1
Can be very subjective, of course, but it's also yeah.
00:29:02 Speaker 4
Yeah, so it's a difficult problem.
00:29:04 Speaker 4
So yeah, maybe with the breed and the weight.
00:29:07 Speaker 4
Anyways, you can make an estimation.
00:29:09 Speaker 4
And of course there are also pictures.
00:29:11 Speaker 1
Or you can.
00:29:12 Speaker 1
Yeah, I mean I can still.
00:29:15 Speaker 1
I mentioned it would be nice to put both of them in.
00:29:18 Speaker 1
Yeah, I think.
00:29:20 Speaker 3
What is body condition score?
00:29:21 Speaker 1
Yeah, so it's a yeah.
00:29:23 Speaker 1
Uh, it's scored from 1 to 9 where I think there yeah there are like pictures of how a dog should look so.
00:29:31 Speaker 1
It look yeah how?
00:29:33 Speaker 1
Obese the dog is so I think four or five is normal and everything above that is obese.
00:29:34 Speaker 3
OK.
00:29:37 Speaker 4
Yeah, yeah.
00:29:40 Speaker 2
Is this calculated using maybe height or?
00:29:43 Speaker 1
No, it's not calculated.
00:29:44 Speaker 4
It's visualizations.
00:29:44 Speaker 1
It's a visualization of the dog.
00:29:45 Speaker 4
Yeah, OK.
00:29:46 Speaker 1
So how?
00:29:47 Speaker 1
How well they have a waist.
00:29:50 Speaker 2
Do you think the owner should be able to score the dog themselves or?
00:29:55 Speaker 2
Do you think there might be biases?
00:29:55 Speaker 1
No, I think they're always too optimistic.
00:29:58 Speaker 2
So you'd think that would be a function for the veterinarian to implement to score the dog on every visit or something.
00:30:02 Speaker 1
Yeah, yeah, I think so.
00:30:05 Speaker 1
Yeah, yeah.
00:30:08 Speaker 1
We use it here in a clinic, but what we see is even students are always very young, sort of on the positive side. So you have these very obese dog and they say "Oh, it's a 5 out of nine" you're like "oh I was seven out of nine maybe?". So yeah, great.
00:30:27 Speaker 2
Ah you got pictures, yes.
00:30:29 Speaker 3
Yeah, someone sent to you after maybe.
00:30:29 Speaker 1
Yeah, exactly, that's what it is.
00:30:32 Speaker 2
Yeah, OK.
00:30:36 Speaker 2
So we also did implement a chat function so the veterinarian would be able to.
00:30:39 Speaker 1
OK.
00:30:42 Speaker 2
I think it's, uh, like it's on the icon [referring where to click]
00:30:45 Speaker 2
That's the hard thing about a mock up application, but it's OK.
00:30:52 Speaker 1
To chat with the owner.
00:30:53 Speaker 2
Yes, but uh, this might be very time consuming.
00:31:00 Speaker 3
but we also talked about this with our supervisor and with Filipe and he said he would rather have a chat function in the application rather than have the owners call him at random hours of the night to tell him the other dog puked or something. So we thought it may improve the privacy of the technicians a bit and by not putting the target contact of them there and just use the system.
00:31:19 Speaker 1
I don't know because I mean this would be extra, right. The dogs are still in our normal patient system.
00:31:27 Speaker 1
Yeah, I think it would be confusing to have another form of communication parallel to our normal patient registration system. I mean we are obligated by the law to keep track of all the communication. If we do that in the app, then we should have for import function or.
00:31:48 Speaker 1
I don't know and like I mentioned, owners are going to use it for all sorts of other stuff. No, I would not be that enthusiastic about it, actually.
00:31:56 Speaker 2
But it's OK.
00:31:57 Speaker 1
Yeah, I mean.
00:31:58 Speaker 2
That might be very valuable information for us.
00:32:00 Speaker 1

I think, yeah, I mean, I can imagine that for an owner it would.
00:32:04 Speaker 1
Be nice to be able to ask questions, but owners are quite demanding and yeah so.
00:32:11 Speaker 1
Yeah, I I I I will tell him.
00:32:15 Speaker 4
Did not like.
00:32:18 Speaker 2
I can imagine I can imagine.
00:32:19 Speaker 3
Then we can. Get that, get that we can just focus on those other functions.
00:32:24 Speaker 2
Let's see it so again on the icon.
00:32:26 Speaker 1
Oh OK, ah so.
00:32:29 Speaker 2
Yeah, so the plan is to have measurements inside of the application where the dog owner can take a video of the dog and directly send a truly application.
00:32:41 Speaker 1
To have it analyzed, yeah, OK.
00:32:44 Speaker 1
And then do you have like specific instructions on how they should make the video or?
00:32:50 Speaker 2
We would like to include them, yes, but then our question is, what kind of instructions do we need to tell them?
00:32:58 Speaker 1
Yeah, I don't know what kind of issue.
00:33:00 Speaker 4
I think it's also depends a little bit on what the video the AI needs, but I think it will be.
00:33:05 Speaker 1
Yeah, exactly.
00:33:08 Speaker 4
Maybe something about now first that you can try to sign with now first video from the front and then it works for it. And then maybe it would be nice if you have like a mini dog silhouette or something that you can put over the dog so you know it's the right size in the right frame. Something like that.
00:33:25 Speaker 1
Yeah, exactly a bit like if you.
00:33:28 Speaker 1
I don't know.
00:33:28 Speaker 1
Have you ever rented the snip car?
00:33:30 Speaker 1
If you, if you rent the SNAP car, you need to take pictures of the car before you can open the door and.
00:33:35 Speaker 3
Yeah Oh yeah.
00:33:37 Speaker 1
Yeah, the yeah the. On your phone it says like up up, left, left and then it makes a photo itself and you walk around the whole car so you have the whole car.
00:33:44 Speaker 4
Oh wow, yeah.
00:33:48 Speaker 1
Then it opens.
00:33:49 Speaker 2
Well, that's mainly for photos is it? It's I mean in video it might.
00:33:51 Speaker 1
Yeah, but I.
00:33:53 Speaker 2
Little harder like introduce A-frame and.
00:33:55 Speaker 1
Yeah, let's see.
00:33:55 Speaker 3
Then we don't have to do the coding.
00:33:58 Speaker 1
But I think you need to be very specific for owners to make a video because we get a lot of videos where the dog is like on the sides because they flip their phone.
00:34:06 Speaker 3
OK, so always portrait mode like this.
00:34:10 Speaker 1
Uh, yeah.
00:34:11 Speaker 2
I think horizontally might be easiest
00:34:11 Speaker 1
Well it depends. I think when you're. It depends on your interface.
00:34:18 Speaker 1
I think, what you can import but.
00:34:22 Speaker 4
As long as instructions are very very clear.
00:34:23 Speaker 4
Yeah, yeah.
00:34:25 Speaker 2
So we can actually click on Scott.
00:34:29 Speaker 2
I Think and.
00:34:31 Speaker 1
Oh yeah, oh there are.
00:34:31 Speaker 2
There's already some instructions yes, I did include already a few functions, but those are just not there; they're not based on anything so.
00:34:41 Speaker 3
Still mock-up
00:34:42 Speaker 2
It's still the mock up indeed, and I also put in little icons if you did it, or like this one is done. This one is currently working on that and this one is not done yet because you didn't do the last one.
00:34:58 Speaker 4
Yeah, cool.
00:34:59 Speaker 1
And this opens.
00:35:00 Speaker 1
Then the camera on your.
00:35:01 Speaker 2
Phone yes.
00:35:03 Speaker 2
Yes it should be able to and then afterwards you can send it to the vet for analysis. Or you could actually also take a video at the veterinarian's office, maybe do it there.
00:35:19 Speaker 2
Yeah maybe or or veterinarian itself could also make a measurement, so this this option is included in both interfaces. So well, then the results page again. I think it would be nice. Be able to compare to previous analyses. Well, I did include also a tab for medical history.
00:35:55 Speaker 2
What kind of information should be in the medical history maybe? Like again, I imagine you also have this in your own system.
00:36:05 Speaker 1
Yeah, yeah.
00:36:07 Speaker 1
It depends a bit, I think on how you want to use this app?
00:36:11 Speaker 1
I, I mean, I can imagine that you sort of want to know when a new owner makes an appointment here and they say we have a lame dog.
00:36:21 Speaker 1
We want to come and see you. We, in the confirmation of the appointment we send them sort of a link to the app and say please can you download this before you come and.
00:36:32 Speaker 1
Already make the requested video so you have sort of a start up OK.
00:36:37 Speaker 4
And maybe the questionnaire that journal stuff, yeah.
00:36:39 Speaker 1
Yes, exactly, I I don't know if you have to put a complete medical history with them.
00:36:46 Speaker 1
If the patient is sort of our patient, it would be sort of interesting. Say for example we perform surgery on the knee. Then you can add that like on December 5 we and then maybe the app can also say like OK today we are four weeks after surgery. Please record new videos or something yeah?
00:37:10 Speaker 3
But we are also working on this like a notification system. A reminder to just keep the owner

engaged with the app and be like hey you didn't take your dog on a walk. Hey maybe take a video so they can also create this database Do you think after like milestones like a surgery for example this is there a certain amount of time they should check up after the surgery?
00:37:29 Speaker 1
Well now we see them back usually after two weeks and after six weeks a bit depending on the surgery, but it's like the normal schedule.
00:37:37 Speaker 3
So they should start collecting data maybe a week before they come for the evaluation review.
00:37:43 Speaker 1
Yeah, well it depends a bit. Maybe when they make the appointment.
00:37:45 Speaker 1
But yeah, at least before they come I think it would be nice to.
00:37:49 Speaker 1
Have sort of.
00:37:51 Speaker 1
I mean dogs here never get surgery on the day they come in, I think.
00:37:57 Speaker 2
It would be a very bad case and.
00:37:59 Speaker 1
Yeah, they they come for just a consult and then we schedule a surgery so there is still time with.
00:38:11 Speaker 2
Just checking in and there's a function over here where you can add a comment or draw on a graph to make some comments yourself and then also there.
00:38:27 Speaker 2
Is an option to release the results if you hit that button, you can send the results over to the owner so the owner can also see it.
00:38:35 Speaker 2
It's the idea that previously.
00:38:38 Speaker 1
But do they get like this? Because it.
00:38:41 Speaker 1
I even don't understand.
00:38:45 Speaker 2
It's OK, no well.
00:38:46 Speaker 4
So I think it's less complicated for the owner, right?
00:38:49 Speaker 2
Yes, that's the idea. So, we would like to have the owners to wait until a veterinarian did see the analysis and maybe made some comments. Or he can maybe draw an arrow on the graph like here.
00:39:04 Speaker 2
Should she look at.
00:39:07 Speaker 2
Because we think for owners it might be quite hard to understand what the veterinarian says.
00:39:14 Speaker 1
And but I think it's also quite hard for an.
00:39:16 Speaker 1
Owner to understand this.
00:39:17 Speaker 1
Yes, OK.
00:39:19 Speaker 4
And I think there should also be like a function that if you like, see this video and you know that it's completely, that's the analysis went wrong.
00:39:26 Speaker 4
There you can just disapprove it.
00:39:27 Speaker 4
Then it's not send anymore.
00:39:29 Speaker 4
Because you don't send.
00:39:30 Speaker 4
Something back that might be not.
00:39:34 Speaker 2
Not correctly.
00:39:34 Speaker 4
If you see that something went wrong, I think especially in the beginning it will be the case, right. That's the wrong interpretation of the program. You see that if you watch new video yourself that you see like, OK, this is clearly this is the problem. And then it says, for example, something in the in the right knee and you see that the app says it's the left elbow and then you're like. No, I'm not going to send that to the owner because the owner will be very confused so.
00:39:59 Speaker 1
Yeah, but I think especially for the owner would also.
00:40:02 Speaker 1
I think if you want this app to be used by people, not that experienced in gait analysis.
00:40:11 Speaker 1
That the output should be very simple.
00:40:13 Speaker 1
I think it would be so.
00:40:13 Speaker 4
Yeah, more simple than this
00:40:14 Speaker 1
Yes, really with I think yeah, but Bjorn said like yeah, yeah, the exactly that's very likely the dog is lame on this limb, for example because I think these graphs.
00:40:18 Speaker 4
Working something about that with color scheme and.
00:40:26 Speaker 1
Well, I always skip them studying for my exam.I don't understand this.
00:40:31 Speaker 1
Let's go. But it would be.
00:40:33 Speaker 4
Would it then be nice to do have like the option to click towards more?
00:40:37 Speaker 1
Sure, I think so.
00:40:38 Speaker 1
Yeah, yeah yeah, yeah.
00:40:39 Speaker 2
Yes, so you want it relatively easy and I'm be able to magnify, to zoom in.
00:40:43 Speaker 1
Yeah yeah, yeah.
00:40:46 Speaker 2
And, well, the idea is to have like actually, the moving video of a dog here.
00:40:53 Speaker 2
And if you have synchronized this graph up so it's moving every time you put a leg down or paw on the floor, a new bar start and so in time you can see what?
00:41:06 Speaker 2
Is happening.
00:41:08 Speaker 2
Would that be easier to interpret than the just?
00:41:13 Speaker 1
I think so yeah yeah, but it also should not take too much time.
00:41:18 Speaker 2
No no.
00:41:21 Speaker 3
How, how much time would ideally actually take you?
00:41:25 Speaker 3
How much time would you like to spend using the app to actually get the relevant information?
00:41:31 Speaker 1
5 minutes.
00:41:33 Speaker 4
You should be.
00:41:33 Speaker 4
Honest, that's OK.
00:41:35 Speaker 4
Yeah, I mean, yeah.
00:41:36 Speaker 4
It see it.
00:41:38 Speaker 4
Closed again, it's OK.
00:41:39 Speaker 3
So yeah, yeah.
00:41:40 Speaker 4
That's what we want to know, because if.
00:41:42 Speaker 4
You're not, yeah.
00:41:43 Speaker 1
I think if it takes a lot more time, it's hard to motivate people to do it.
00:41:47
And that is something.
00:41:47 Speaker 1
I mean, yeah, the the workload is quite high so.
00:41:52 Speaker 1

Not all day like today, but.
00:41:55 Speaker 4
Because this will be an extension of the normal channel, of course, so it's that.
00:41:57 Speaker 1
Yeah, yeah.
00:42:01 Speaker 4
And I think a normal, for example, in first line practice an examination with everything together is like 10 minutes, so you should.
00:42:09 Speaker 4
So that's the time you have for everything, so you have to keep in mind that the use of an.
00:42:14 Speaker 4
app is should be.
00:42:16 Speaker 4
on points and because otherwise what happens is
00:42:19 Speaker 4
They don't use it
00:42:20 Speaker 1
I think it's the same for the owners.
00:42:22 Speaker 1
I mean they're not going to spend 15 minutes.
00:42:25 Speaker 4
Making videos will depends on the owner.
00:42:28 Speaker 1
Yeah, of course.
00:42:29 Speaker 1
I mean the average owner also.
00:42:31 Speaker 1
Yeah, if you.
00:42:32 Speaker 1
Want to have them committed?
00:42:33 Speaker 1
It should take should.
00:42:35 Speaker 1
Be very easy and yeah, not that time.
00:42:37 Speaker 2
How long should?
00:42:38 Speaker 2
The video be for you and for the owner to to see that there are lameness and.
00:42:45
Yeah, but not too long.
00:42:45 Speaker 1
That's a difficult question.
00:42:47 Speaker 1
Because not all dogs are lame.
00:42:49 Speaker 1
Every step of course, but if it's a obvious lameness, I think a video of 20 seconds is more than enough because. I don't know. Yeah, you have probably been watching a lot of videos as well, but I always if I wanna send you a video of one minute you think oh it's only one minute but I get bored. I have trouble watching it all the way through so. You're like, oh that's an interesting living room. You just forget to focus on the dog.
00:43:20 Speaker 1
So yeah, yes.
00:43:20 Speaker 3
Surgery 20 seconds and the other veterinarian he mentioned to take videos from all the three sides from front from side and from back. But if the owner doesn't manage, what should be the first perspective you'd like to see?
00:43:36 Speaker 1
I think I think from the side
00:43:40 Speaker 3
The prioritize side first inspection is like take a side video of your dog.
00:43:45 Speaker 4
Versus I did maybe did back and it's walking.
00:43:50 Speaker 1
Yeah, it depends a bit if.
00:43:50 Speaker 4
On the latency.
00:43:51 Speaker 1
It's a lame on the hind or frond limp I think
00:43:56 Speaker 4
But maybe you should also.
00:43:58 Speaker 4
It would be nice if you could like click the view right?
00:44:01 Speaker 4
I want to see the hind view or I want to see the front.
00:44:04 Speaker 2
Oh nice, yeah, yes that would be possible to implement, yes, so I I saw a lot of videos.
00:44:11 Speaker 2
This is just one of them where you see like the life and thing that's happening.
00:44:17 Speaker 2
Would this kind of videos be helpful or is it like it's it's too hard to
00:44:23 Speaker 2
understand, so we won't look at it or.
00:44:25 Speaker 1
I I would rather see the interpretation than have to having to watch it myself.
00:44:30 Speaker 2
OK.
00:44:33 Speaker 2
That's clear.
00:44:35 Speaker 2
So let's.
00:44:37 Speaker 2
See what kind of questions we have left because we went a little bit free on this one.
00:44:44 Speaker 2
So the design.
00:44:48 Speaker 2
It it is designed by us so we would like to know is is it appealing? Should it be different or and do you have suggestions you can talk about color you can talk about like we did different color schemes.
00:44:55 Speaker 1
I think it looks nice.
00:45:03 Speaker 2
This is just one.
00:45:05 Speaker 2
It's fine.
00:45:08 Speaker 2
And then also like the buttons are they clear? Should we use less text, more icons or won't?
00:45:16 Speaker 1
I don't know.
00:45:17 Speaker 1
I think it's good to have text as well, because an icon is always mean, multi interpretable.
00:45:25 Speaker 3
OK, so that will be clear and minimalistic.
00:45:28 Speaker 1
Now I'm going.
00:45:31 Speaker 2
But only other hand being minimalistic because others they other way otherwise yes.
00:45:34 Speaker 3
Not too much info, but just yeah, yeah no, but this.
00:45:37 Speaker 1
Looks so nice and clear.
00:45:40 Speaker 4
Do you think you could use this app for the diagnosis already? Or maybe just with monitoring therapy?
00:45:46 Speaker 1
I think it's just.
00:45:48 Speaker 1
Yeah, I mean seeing on which limp a dog is, lame is still not a diagnosis of course, and I think you still I mean. Yeah, you still need to palpate the joints too. I mean we don't never make a diagnosis based on lameness assessment.
00:46:07 Speaker 1
Of course, you just focus your.
00:46:12 Speaker 4
Examination OK, let me rephrase it. We should use it most in the diagnostic phase or maybe more for the monitor.
00:46:19 Speaker 1
I think more for the monitoring phase unless the app is able to pick up lameness that are difficult to view with the eye because we see quite a lot of dogs.
00:46:31 Speaker 4
do you maybe more…
00:46:33 Speaker 1
I think that yeah, the owners say they're lame and they walk here in the hallway and you think?
00:46:39 Speaker 1

OK, if you say so.
00:46:41 Speaker 4
Yeah, maybe in these cases then you will choose the app.
00:46:44 Speaker 1
Yeah yeah, but I think it.
00:46:46 Speaker 4
That's an extension.
00:46:46 Speaker 1
I mean it would be very helpful to evaluate your therapy. I mean in the follow up phase. To have also a bit more objective input on how it's going with the dog.
00:47:02 Speaker 1
And even I think if it works really well, the dog maybe does not have to come back for checkups and if they sense idiot.
00:47:11 Speaker 4
And I think, right, I I also liked your comments earlier that you could see like how, how much time will. Because sometimes you don't want a dog to walk to March right after treatment and the owner completely ignores your advise and then they go for a beach walk for hours.
00:47:28 Speaker 1
Yeah, yeah.
00:47:29 Speaker 4
And then you can see that just like, well, you said that you.
00:47:35 Speaker 1
Yeah, but I also think I mean. If you could have like access to videos 2 weeks after surgery with an analysis and you see like this symmetry index improving. Yeah, then maybe owners don't have to come in that often. I mean, if you you may want to make X-rays or something that you cannot do but. These things some owners come here, you do a quick check up and they leave again.
00:48:02 Speaker 1
If you yeah that would be nice I think.
00:48:04 Speaker 4
Yeah, especially if they're from Friesland or so.
00:48:06 Speaker 1
Yeah exactly yeah yeah.
00:48:08 Speaker 2
Yeah, so just to show you I would like to let you see the application of the horses and these are possibilities. Have an overview of symmetry index, for example. But also more in depth about the upper body. Here's the same graph with the stride duration. And the vertical displacement of the head. The withers and sacrum of a horse. And then there's the foot falls on the average of the vertical displacement. So there's quite an extended analysis over here. Would this be helpful to have, or would you just say I would rather see?
00:49:06 Speaker 1
I I would not know. Maybe I mean I could learn, but at the moment I don't know how to interpret this, because now you show me a graph, but I have no idea if this horse is lame.
00:49:15 Speaker 4
Which of those would be nice? It's most likely tutorial in depth to interpret these data. Like it would be optional to view this data and then, but if you want to, there's also a tutorial to learn how to do things.
00:49:25 Speaker 1
Yeah I think so yeah, yeah.
00:49:28 Speaker 2
So it might be something which you can use if you don't know how to interpret the the visual valuation or something, or if you need more in depth numbers and.
00:49:44 Speaker 2
It is not that interesting, I think currently.
00:49:46 Speaker 3
No, but the one of the symmetries. I think would be nice.
00:49:52 Speaker 2
Yes, that's just the overview, so maybe this might be helpful. You can see for instance that the head falls on the left side. In this case, but...
00:50:07 Speaker 1
And does that mean that this horse is lame on the right side or?
00:50:12 Speaker 2
Good question. Because it might be very well possible, but on the what I understood from our supervisor that there are certain patterns in this kind of evaluation which show different kinds of lameness.
00:50:31 Speaker 2
So if we know certain patterns are happening in a horse, they know exactly it should be.
00:50:38 Speaker 2
This leg or that joined or that that certain place that.
00:50:45 Speaker 4
But that's something we still have to establish then for dogs.
00:50:48 Speaker 2
Yes.
00:50:49 Speaker 1
I don't know.
00:50:50 Speaker 1
I mean there is. There are publications about these kinds of studies rising over there as well.
00:50:56 Speaker 2
It it is expected that it horse is almost the same as in dogs with the pattern, but.
00:51:05 Speaker 3
There's no pattern.
00:51:05 Speaker 2
At least that's what I think I understood.
00:51:08 Speaker 3
Yeah, but it's still training the model and all of the systems on dogs might currently have way more sensors than what we're actually going to use for the app, so we're using a lot of AI training and deploying and extrapolation from data we collect from our sensor and video, yes, but.
00:51:26 Speaker 2
If I do hear you currently, I think it's easier to show you what the system thinks is happening. Yeah, rather than the analysis itself, yeah, just.
00:51:38 Speaker 1
I think so too.
00:51:40 Speaker 2
So even this might be too complicated for veterinarians, let alone the users.
00:51:44 Speaker 4
Oh yes.
00:51:46 Speaker 2
Yeah, yes. Well, that's very helpful indeed. I mean actually, yeah, yeah.
00:51:53 Speaker 1
No, for if you want to have this app also used by normal veterinarians then it's way too complicated.
00:52:00 Speaker 1
Well and for me it's also.
00:52:01 Speaker 5
Too complicated.
00:52:03 Speaker 2
I think that's something we can work on.
00:52:05 Speaker 3
Yeah, 'cause then we're simplifying and focusing again on how to deliver information, yeah?
00:52:11 Speaker 2
Yeah, that's good. That's very good, yes. I finally have something to work on.
00:52:18 Speaker 4
For this reason, why?
00:52:20 Speaker 4
I need input from tests exactly.
00:52:22 Speaker 2
Yes, yes.
00:52:23 Speaker 2
Indeed, and.
00:52:24 Speaker 4
Because you can focus so much on the details and on the app. And then yeah, if you lose your audience then it doesn't matter when she did, yes.

00:52:34 Speaker 3
For the engineering application.
00:52:37 Speaker 2
So I think we're.
00:52:39 Speaker 4
But it would be good if you want to, especially if you are.
00:52:42 Speaker 4
Someone to use it in an research setting to keep all the data in.
00:52:45 Speaker 4
There to pop out.
00:52:46
Sure, yeah.
00:52:47 Speaker 2
Yes, yes, but more on the background and not.
00:52:50 Speaker 3
Yeah you should.
00:52:51 Speaker 2
In view.
00:52:51 Speaker 1
Probably yeah, discard them, I think but.
00:52:52 Speaker 4
Yeah no.
00:52:57 Speaker 3
Yeah, that's the question for my side, should the opposite is the dog owner and following your professional advice, if you give them like an exercise scheme more like you, tell them hey you need to lose weight by X date should the app have features which they reminder and a bit perspective talk only to actually follow through so you don't have to do it.
00:53:15 Speaker 3
But do you think the dog owner would actually?
00:53:18 Speaker 3
Follow that type of.
00:53:19 Speaker 3
Input and nudge.
00:53:21 Speaker 1
That's a difficult question to answer. For yeah, I don't know. We usually we now leave it at the dog owner. I mean we can give advise, but what they do with it? It's their business It's their dog, so you don't send reminders to no but.
00:53:38 Speaker 3
If they do it.
00:53:38 Speaker 4
It would be a very nice follow-up research right to see if the dog owners would only advise follow the treatment better than dog owners with advise and app.
00:53:48 Speaker 3
'cause the question is like in the app.
00:53:50 Speaker 3
We want to have give them the option to actually introduce. Hey they give X advice and they have to do ABC and the outputs and reminders depending on how frequent they have to do certain things to just keep up with it and it also helps with keeping the log and the diary
00:54:05 Speaker 3
I agree, yeah.
00:54:06 Speaker 3
And you also see if they actually follow your advice. And what are the results with the dog in that case, but it does force system a bit to keep interacting with the app and do stuff.
00:54:19 Speaker 1
I I think it's a different way of using the app? I mean, it could be interesting, but I think it could be interesting for the owner not so much for us I.
00:54:34 Speaker 1
Think OK, yeah.
00:54:37 Speaker 2
So maybe we should shift our focus more to the owner instead of the veterinarian.
00:54:43 Speaker 3
I think it's not program owner based questions.
00:54:43 Speaker 2
Do you?
00:54:46 Speaker 2
Maybe maybe yes, OK.
00:54:48 Speaker 1
I think at the moment you are really enrolling this.
00:54:50 Speaker 1
You're also probably interviewing owners, right?
00:54:55 Speaker 2
We will yes.
00:54:57 Speaker 2
You're actually the first one, so it is very nice to hear your honest opinion.
00:55:07 Speaker 3
After seeing the prototype but like this or any of our previous questions differently, but we asked earlier, I don't know is anything that pops up to your mind that maybe would be differently answered after you saw what we worked on so far.
00:55:23 Speaker 2
Yeah, it's or something to add or something.
00:55:29 Speaker 1
No, I don't think so.
00:55:35 Speaker 2
Maybe hard to yeah. Think about like the weight issues. Maybe if we implement them in the application you don't need to ask them or.
00:55:45 Speaker 2
I I don't.
00:55:47 Speaker 2
Know you maybe still want to.
00:55:48 Speaker 1
Yeah, we still want to ask him anyway, yeah?
00:55:52 Speaker 2
But it might be a check or.
00:55:56 Speaker 2
At least I think.
00:55:56 Speaker 1
If the dog or mix actually can wait their dog at home, this is like a normal human scaling or usually do. It's difficult to have a dog on you. I mean with small dogs, yeah, lift. So usually they weigh at the veterinarian, OK?
00:56:11 Speaker 3
That's also important to know.
00:56:13 Speaker 3
Yes, 'cause we can't do it for medium sized Ben and big dogs, it's not helpful.
00:56:19 Speaker 2
No, that's good.
00:56:20 Speaker 1
No, but a lot of owners regularly walked past their veterinarian and just weight the dog. If they're really motivated to have it lose weight and they go OK.
00:56:32 Speaker 2
It's interesting, yeah.
00:56:33 Speaker 3
So it's important data about the weight, but you don't always have it, so that's why you use the body scoring thing.
00:56:39 Speaker 4
Yeah, exactly.
00:56:40 Speaker 1
So also because I mean the weight does not always tell you if the dog is overweight, of course, because a lot of dogs are cross breeds and you have no idea how much they should weigh.
00:56:52
OK.
00:56:52 Speaker 1
So I mean a dog of 60 kilos can be very nice and lean because it's a huge dog and a dog of 20 kilos can be very overweight because it should weigh 12 so that's why we use the body condition score because it's fun.
00:57:03 Speaker 3
OK.
00:57:08 Speaker 4
I'm really sorry But I'm now I have to leave, I'm not late.
00:57:14 Speaker 3
But thank you so much for arranging everything.
00:57:17 Speaker 4
Hello yeah, so I yeah probably also have arranged.
00:57:19 Speaker 2
For printing.
00:57:23 Speaker 4
For you to go to first line, practice.

00:57:26
OK, I mean.
00:57:28 Speaker 4
It's near ede wageningen.
00:57:29 Speaker 1
Yeah, the yeah it was even in een bespreking [I was in a meeting].
00:57:31 Speaker 1
Marloes heeft dit even geregeld [marloes arranged it]
00:57:33 Speaker 2
I think so I can go by train.
00:57:34 Speaker 1
Ja dat begreep ik [yes i understood it]
00:57:35 Speaker 2
So yeah, I'm saying.
00:57:36 Speaker 1
Uh, yeah.
00:57:40 Speaker 1
Weet ik ook niet [I don't know}
00:57:43 Speaker 1
Yeah dat denk ik ook [I think so too yeah yeah.]
00:57:44 Speaker 4
Technically, right?
00:57:44 Speaker 1
Bearing with my health, many controls maximum fell here.
00:57:45 Speaker 4
Yes, I test.
00:57:46 Speaker 4
And it's not checking with the spelling.
00:57:49 Speaker 1
It will come.
00:57:50 Speaker 4
Morning Penny and then ask your questions during lunch, I know.
00:57:54 Speaker 4
You could leave P.
00:57:58 Speaker 4
But I will let you.
00:57:59 Speaker 4
Know OK, thank you cool thanks.
00:58:02 Speaker 1
Yeah, you know.
00:58:05 Speaker 2
Have I?
00:58:07 Speaker 2
I think I've got one more question.
00:58:12
He'll be like, hey.
00:58:13 Speaker 2
Yeah, yeah, I think I have one more question which.
00:58:16 Speaker 3
Just popped up.
00:58:18 Speaker 2
Because when we want to send notifications to the owners about checking in with their dog after surgery or something.
00:58:26 Speaker 2
Uhm, would veterinarian be able to.
00:58:30 Speaker 2
Maybe in the application?
00:58:34 Speaker 2
State when the notification should be like after the visit.
00:58:39 Speaker 2
You can maybe have a screen for notification after three days or six days, or just fill it.
00:58:47 Speaker 1
In and you can sort of tag
00:58:49 Speaker 1
The boxes that you want, yeah?
00:58:50 Speaker 2
Yes, yes or maybe even uh.
00:58:51 Speaker 1
Things it would be.
00:58:54 Speaker 2
Have some sort of an comments box.
00:58:58 Speaker 2
Besides that you can say like this notification or a custom notification.
00:59:03 Speaker 1
Yes exactly yeah yeah, that would be helpful.
00:59:04 Speaker 2
OK that.
00:59:06 Speaker 1
I think I and I think we could.
00:59:08 Speaker 1
We could standardize it.
00:59:09 Speaker 1
Yeah, for.
00:59:11 Speaker 1
The majority of cases so.
00:59:13 Speaker 3
Yeah, the goal is to have them standardized.
00:59:16 Speaker 3
And also combine them if we're tracking the.
00:59:18 Speaker 3
Like usual routines is like walking times to just also sends notifications or reminders to take videos then.
00:59:25 Speaker 3
So then, oh, you're supposed to take a walk in like half an hour.
00:59:29 Speaker 3
Don't forget to take your phone with you.
00:59:31 Speaker 3
Put the sensor, on and prepare like that.
00:59:34 Speaker 3
That's also part of what we're thinking with this system.
00:59:38 Speaker 2
It's just ideas yet.
00:59:41 Speaker 3
Yeah, this is low fi prototyping.
00:59:42 Speaker 3
We'll be back in a couple of weeks.
00:59:47 Speaker 2
Hopefully yes, so I think yeah.
00:59:52 Speaker 2
Where at the end then?
00:59:54 Speaker 3
Yeah, that would be all.
00:59:56 Speaker 3
Do you have any last remarks?
00:59:57 Speaker 3
Maybe you'd like to make about the system or.
01:00:00 Speaker 1
No curious to see what is that turns out too.
01:00:06 Speaker 2
Can I maybe send you an e-mail and ask for maybe a second interview sure to see the updated version.
01:00:14 Speaker 1
Yeah yeah yeah, of course, yeah.
01:00:15 Speaker 2
Yes, OK and I will use your e-mail address which you put on the form
01:00:18
But this.
01:00:20 Speaker 2
I said on the.
01:00:22 Speaker 3
That is OK.
01:00:23 Speaker 2
Yes, thanks.
01:00:24 Speaker 2
Thank you very much and I will also send you a copy of this.
01:00:27 Speaker 4
Yeah perfect yeah.
01:00:28 Speaker 2
Alright, thank you.
01:00:31 Speaker 3
You very much for your time.

APPENDIX E TRANSCRIPT GAIT EXPERTS FOCUS GROUP

Speaker 1, Speaker 2, Speaker 3, Speaker 4, Speaker 5, Speaker 6

There were also Speaker 7 and 8 due to misunderstanding on the software side; the correct speakers have been attributed.

00:00:33 Speaker 2

Am I correct if I say that you're familiar with the application?

00:00:37 Speaker 2

EquiMoves?

00:00:38 Speaker 2

Yes, all right, and that's nice to have established.

00:00:45 Speaker 2

I think you are familiar with examining horses, but not with dogs. That's correct too, right?

00:00:53 Speaker 2

Do you think there's a major difference between them?

00:00:57 Speaker 3

You go first.

00:01:00 Speaker 4

They don't have the same size, that's the thing. I think also, differences in how you can attach the sensors. The equipment you need to use to measure and the way they move, of course. I mean anatomically they're quite different, yeah?

00:01:16 Speaker 3

Yeah, neurologically also, because dogs are much more fluid in their movements.

00:01:21 Speaker 1

Yeah, gait fluid.

00:01:22 Speaker 4

So they have different ways of foot- foot patterns. These kinds of things.

00:01:26 Speaker 3

And they switch every step while horses clean cut, which makes a difference.

00:01:31 Speaker 5

Most of the times, yes.

00:01:34 Speaker 2

Don't, so you would say the horse are more complicated than the dogs are, yes?

00:01:34 Speaker 3

I am talking about horses, they are easier, much easier, in terms of gaits.

00:01:49 Speaker 5

OK, nice.

00:01:53 Speaker 2

So when you are examining a horse for lameness, what are the most important key factors?

00:02:00 Speaker 3

Shall I start So what I want to establish first is that we never examine horses for lameness because we are not vets, we only assist in measuring horses. So what we what the vets look for in lameness is asymmetry.

00:02:13 Speaker 5

OK.

00:02:18 Speaker 3

And because animals between within species between each other, they differ so much that you cannot say, OK, this is 1 pattern that is holds true for all horses, so you always have to compare within animal left and right.

00:02:32 Speaker 3

So that's why they look for asymmetry, and they look for asymmetry of the heads when you look for front limb lameness. Asymmetry of the pelvis for hind limb lameness, but you kind of know that story I think, yeah.

00:02:44 Speaker 3

Was that an answer to your question.

00:02:46 Speaker 2

Yes, I think so.

00:02:46 Speaker 3

OK.

00:02:47 Speaker 2

So asymmetry is the most looked at thing in horses.

00:02:52 Speaker 3

In my experience, yes. But maybe others want to add.

00:02:57 Speaker 4

You know in France, they always compare right and left anyway. But also look at the foot drop, so the foot movement as it goes down.

00:03:06 Speaker 3 They kind of do that here too. We just don’t measure it.

00:03:07 Speaker 5

Is it the joint angle?

00:03:11 Speaker 4

Yeah, the joint angle.

00:03:16 Speaker 3

Yeah, so padlock.

00:03:17 Speaker 3

Padlock, hyperextension and the ligaments or the tendons on the. Caudal side is the Palmer side of the leg.

00:03:26 Speaker 3

They hold up the fetlock, so if you have major ruptures in the tendons, you would expect more drop.

00:03:30 Speaker 5

OK.

00:03:33 Speaker 3

But also, on the other hand, you would expect lower drop if they want to avoid ground reaction forces on this limb.

00:03:39 Speaker 3

But it's complicated issue, but you can compare within left to right. It might tell you something.

00:03:43 Speaker 5

OK.

00:03:44 Speaker 4

Yeah, mostly you would look at the vertical displacement and see if you.

00:03:48 Speaker 2

OK, and do you think those factors are also applicable on dogs or not?

00:03:58 Speaker 3

Yeah, if you look at the physics behind it, yes.

00:04:02 Speaker 3

But if you look at how dogs behave, maybe not, because the major difference between dogs and horses is one is a predator, and one is prey. So, they just act like their behavior will be different.

00:04:15 Speaker 3

Pain behavior will be different, so I don't feel confident enough to say a dog will...

00:04:21 Speaker 3

Shall we say better? But that's me.

00:04:22 Speaker 1

OK, OK then yeah as we because.

00:04:24 Speaker 1

I agree. We don't measure. A lot of dogs, so I haven't really seen a lot of dogs, but you would assume, at least I would assume that they would show the same asymmetry, right?

00:04:36 Speaker 3

Impure trots, yes, but then yeah.

00:04:39 Speaker 1

Do they show pure trots, like that's difficult for dogs.

00:04:43 Speaker 6

Yes, OK, because then I have a question because we've been told that EquiMoves also tries to identify patterns in horses, as you already mentioned, and we are told that with deep learning machine learning this application may actually be able to also identify these patterns in dogs.

00:04:58 Speaker 6

And the assumption so far is that the patterns and horses and the patterns in dogs should be similar enough to start training the AI based on that data also, so they don't have to start from zero.

00:05:07 Speaker 4

Yeah, it's transfer then.

00:05:09 Speaker 4

Yeah, but then you have to assume that the data you collect is proper on the dogs and it's the same kind of gait.

00:05:15 Speaker 3

Yeah, and what we like, the nice thing about what we did, what has been done with horses is that we have sound horses, no pain or not enough to call them lame and you induce the lameness in one limb.

00:05:28 Speaker 3

You know where it is and then you look at the change in movement patterns.

00:05:31 Speaker 3

But this type of study, as far as I know, has not been done with dogs. And I hear some - like I teach students. I hear some students say that the dog and the horse do opposite things so, the horse lands deeper on the sound limb and they say the dogs, I don't know if this is true, but the dog lands then deeper on the lame limb.

00:05:51 Speaker 3

So then you would have an opposite pattern. You might still want to look at the same variables, but they might mean opposite things.

00:06:00 Speaker 5

OK.

00:06:00 Speaker 3

But that's I I'm not here about it.
00:06:03 Speaker 4

Just for the record.

00:06:05 Speaker 3

No, I'm not claiming anything.

00:06:15 Speaker 4

No, but I mean we lack the knowledge, so yeah, before doing AI on whatever we need some data...

00:06:21 Speaker 3

It would be nice to do like a pain induction or discomfort induction study so you know for sure that what you do is or what you are analyzing is right or not.

00:06:32 Speaker 3

Like you're measuring the same things, but do they mean the same thing?

00:06:35 Speaker 2

Yes, I think we are able to check this because I did find a study where they induce lameness in dogs.

00:06:44 Speaker 4

Does it have the kinematics, the kinetics measurements, so yeah, the ground reaction forces and pressure?

00:06:46 Speaker 2

I would have to check if that's.

00:06:50 Speaker 6

Oh, so it doesn't count?

00:06:52 Speaker 2

Yeah, no, it's not the most important.

00:06:52 Speaker 3

So it matches different things.

00:06:54 Speaker 4

Same yeah, because if you know that the dog is unloading the right fool for example, you don't know what it does with his like upper body, if you measure only the ground reaction forces.

00:07:03 Speaker 6

So I don't have the symmetry,

00:07:06 Speaker 2

But it's a nice thing to check back with the supervisors.

00:07:08 Speaker 6

Because we were there when they did the measurements for dogs for sound dogs. So we help with that one, but I don't know about pain induction studies so.

00:07:16 Speaker 4

I don't know.

00:07:16 Speaker 3

No, but I do have to say, when I bike through any park half of the dogs you see are asymmetrical in their upper body movement and like my mind goes to “oh that is pain”, because that's not efficient to move that way if you have no problems.

00:07:32 Speaker 5

OK.

00:07:32 Speaker 3

So I would say these variables are...still got it.

00:07:37 Speaker 3

To measure in dogs, and they probably say something, but what they I don't know.

00:07:41 Speaker 5

OK.

00:07:42 Speaker 2

Could be different, could be the same.

00:07:43 Speaker 3

Yeah, it could be the opposite.

00:07:45 Speaker 3

Yeah, let's say like that.

00:07:45 Speaker 3

Or it could be that they compensate in the front for the hind or like horses, horses do this too, we know that. But it might be that that pattern is over-exaggerated in a dog. I don't know like it's just speculation, yeah?

00:07:58 Speaker 2

OK.

00:07:59 Speaker 6

Good questions to bring up later.

00:08:02 Speaker 2

For sure, yes.

00:08:04 Speaker 2

Well, if you would make the application EquiMoves sort of for dogs like, to translate it for dogs, what are important

functionalities that the application should have that may not lack?

00:08:20 Speaker 2

What do you think?

00:08:28 Speaker 1

I guess that it depends on what you want to visualize and what you want to make sure we have showen.

00:08:34 Speaker 1

And I think that's, then you need to answer the questions we discussed first. Otherwise, you can't make an application if you don't know what your needs are.

00:08:42 Speaker 3

Yeah, it's the most sensitive values to lameness, those are the ones you want to portray in a clear way. But we don't know which values to require so yeah.

00:08:50 Speaker 2

No, no, not at all.

00:08:52 Speaker 2So, if you are working with the application EquiMoves, which are the things you look the most, at the visualizations or certain factors or something else?

00:09:04 Speaker 4

I am looking at the curves, but that's me.

00:09:06 Speaker 3

Yeah, I agree with you. Like what we see in the clinic often is that I tend to go to the curves as I.

00:09:11 Speaker 4

I just want to see the relations

00:09:12 Speaker 4

See the balance, yeah?

00:09:12 Speaker 3

Yeah, they [veterinarians] want to see the value, because it's easy.

00:09:14 Speaker 3

They want to see like they, as in vets, want to see the discrete values The single values that just show them left or right, front or hind, which is an oversimplification of what the movement is, but we know that these values are sensitive to lameness.

00:09:31 Speaker 3

But yeah, we researchers like to see the data behind these values. Right? Where do they come from? Is it reliable? Is it a stable pattern? How variable is it like? That's what you see in curves, not in dots.

00:09:44 Speaker 4

Or I mean you could see it in dots if you actually look at the standard deviation, but they don't.

00:09:49 Speaker 3

Well, I always tell them to do it. But then, when you look at the curves, you can see if it's only one part of the measurement or it's the whole thing or then still the standard deviation is not...

00:09:58 Speaker 4

If it's stable.

00:10:02 Speaker 3

And like the user friendliness could improve, there's lots of scrolling that I hate.

00:10:09 Speaker 5

And it's true.

00:10:09 Speaker 4

The way you compare also because you can compare only the values and I wish I could compare the curves and the curves and the values.

00:10:13 Speaker 3

Yes, same here yeah.

00:10:19 Speaker 3

And not the side way scrolling all the time. And also not clicking first means that the figure shows up first then.

00:10:25 Speaker 3

Earlier in time should be able to 1st by default. Should be always.

00:10:32 Speaker 7

That's good to know, that's good.

00:10:33 Speaker 2

To know

00:10:34 Speaker 4

There is improvements to be done.

00:10:36 Speaker 3

So, but your question is what do we want to see?

00:10:38 Speaker 6

Have functionalities wise so like functions of the app that it can do.

00:10:42 Speaker 3

What do you mean with functionality wise comparisons?

00:10:46 Speaker 6

Yeah, comparisons would be one of them.

00:10:48 Speaker 6

The visualizations that are made video taking because we want to have a video function for dog owners because they're the main end user.

00:10:55 Speaker 6

So they would have the device at home where they have the sensor they had touched on the collar and they put it on the dog when they actually go for a walk and they have this app that sends them reminders to collect extra data, extra video or two of their dog, while moving so they catch the lameness moment. Because so far in the design process we have the idea of synchronizing the view that the owner takes with the data collected by the sensor and also see it in the app.

00:11:21 Speaker 3

I think that would be very nice.

00:11:24 Speaker 3

I think it would also be good to have some sort of quality assurance pop up, like if the sensor is attached wrong it's super loose you get very high variation if you get it during the measurement. That would be awesome.

00:11:38 Speaker 1

Like a little checklist or something, make sure that the sensor is this, this, and this.

00:11:40 Speaker 3

Yeah, and maybe you don't want that for all your measurements, but.

00:11:44 Speaker 3

Like for instance, if like dogs don't have this problem, but horses do when they start to sweat, sensors get tend to get loose, or when we put, the like maybe the collar is not tight enough, so the sensor moves all the like in the directions you do not want it to move.

00:11:51 Speaker 5

OK.

00:11:58 Speaker 3

And that can influence the reliability of your measurements, and I think. Have like a quality measurement, quality assurance thing built in like immediately afterwards. It would tell you no, this was not good.

00:12:13 Speaker 5

OK.

00:12:13 Speaker 3

Please, in your next walk also put it on and do this, change this, that would be great. It's difficult but it would be great.

00:12:21 Speaker 2

I think it's nice feedback.

00:12:22 Speaker 6

Yeah, that is nice feedback.

00:12:24 Speaker 6

Just the physical part of the sensor to be there.

00:12:27 Speaker 3

Yeah, and just how the app should look, as in what I notice now is that for the important information we need to scroll and there's a load of user information like a giant logo, a giant banner.nner.

00:12:41 Speaker 3

It's like.

00:12:43 Speaker 3

Yeah, that's what you want at the bottom right, in small size. Like in the first screen you see that it's EquiMoves. We know it's like EquiMoves. Why is it there where important information could be? I find this frustrating.

00:12:56 Speaker 5

OK.

00:12:57 Speaker 3

And it's like you're like they already bought this system, right? Why would you show it like so many times?

00:13:03 Speaker 2

True, true.

00:13:05 Speaker 4

And live data would be very nice.

00:13:07 Speaker 2

Live data, yes.

00:13:08 Speaker 4

I love live data so please make it.

00:13:10 Speaker 3

But do you think vets and owners want to see that?

00:13:13 Speaker 4

I don't mind, I want it.

00:13:16 Speaker 3

Yeah, so maybe like a different interface with scientists and owners.

00:13:17 Speaker 4

Yeah, actually that like a research version of the app, a vet version of the app and...

00:13:24 Speaker 3

Like you can just log in as a different entity.

00:13:28 Speaker 4

I think that's what they wanted to do for EquiMoves at some point.

00:13:30 Speaker 3

Yeah, well we asked for it, but I think it would be very nice, especially because the owner doesn't need all the information. And it might also make them worry about their animal, right? The vets might want to have information that they can easily interpret, and if they have questions you want to go to the researcher or in-depth version where you can just see everything behind the data. But that might confuse all the other parties.

00:13:53 Speaker 4

That you can also give to beta vet testers for example, to see if it's more interesting to have this data that they didn't have in the normal vet app.

00:14:03 Speaker 6

That sounds very good.

00:14:04 Speaker 6

You need to make one more interface.

00:14:08 Speaker 2

We already have two. I will show you in a minute.

00:14:14 Speaker 2

Let's see where we pick up?

00:14:16 Speaker 6

OK, what functionalities should we app have to enhance the data collection process? So far you measure to make sure that the sensor is up in place. Do you have anything else in mind that would improve it?

00:14:26 Speaker 4

When of course the battery levels, the connection levels. If you have more than one sensor, like if they are well connected. If you need calibration, something that tells you the calibration is good.

00:14:38 Speaker 6

OK.

00:14:41 Speaker 4

Yeah, synchronization with the videos if you feel them also. Yeah, if your dog is well in the video frame, then yeah, something that tells you it's good, it's well filmed, otherwise just move.

00:14:53 Speaker 6

So clear instructions for the video.

00:14:56 Speaker 4

If you want to have video, yes. And the live feedback if something is going wrong with the sensor, like it's lost the network or I don't know...or if the SD card needs to be emptied that's also ni,ce if you have SD cards on your sensors.

00:15:12 Speaker 1

OK.

00:15:16 Speaker 4

Or if you have too much loss of information of samples.

00:15:21 Speaker 1

Or if it's not a like a reliable measurement.

00:15:24 Speaker 4

That's for processing.

00:15:24 Speaker 1

Yeah, nice trace or something.

00:15:26 Speaker 1

Yeah, to get like.

00:15:28 Speaker 2

Yeah, do it again.

00:15:28 Speaker 1

Again, yeah, and a very simple thing.

00:15:31 Speaker 3

How long you are measuring. Yeah, that would be nice to see because it could also show you make you think about "oh maybe I forgot to pause". These things are yeah clear, stop and pause buttons. That do not, yeah. If you click on it, it doesn't show the continue button underneath.

00:15:51 Speaker 4

OK, see the frustration?

00:15:52 Speaker 3

It's not like we never mentioned. Hello, this will not be new information.

00:16:01 Speaker 6

OK, but that is helpful, thank you.

00:16:05 Speaker 4

Yeah, that's a good question.

00:16:10 Speaker 3

Yeah, most automatically, yeah.

00:16:14 Speaker 6

Because the owners will have access to it on their phones so they can carry it with them all the time.

00:16:16 Speaker 3

Yeah, yeah, but if you accidentally like, sometimes the app is slow, and you type and you think oh it's slow, I'll type again or I didn't click.

00:16:24 Speaker 6

And measures again.

00:16:25 Speaker 3

And then yeah, but then it went to continue and you skip the processing. You have to go back and it's annoying.

00:16:30 Speaker 3

It's like, yeah, yeah.

00:16:35 Speaker 2

Little details that have major influence on your mood.

00:16:44 Speaker 3

So you also, as an owner, you don't want to spend a lot of time figuring it out now, and especially because apps can be complicated and this is like a data heavy app, so you want it to be as easy as possible and you want them to make zero room for mistakes, as in they just can't make them because everything is organized for you. Super great.

00:17:05 Speaker 1

Who drew his horse?

00:17:09 Speaker 2

It was already there.

00:17:14 Speaker 2

I I was thinking of throwing a dog besides it, but drawing is not my.

00:17:19 Speaker

Also not.

00:17:25 Speaker 2

Way worse, but.

00:17:27 Speaker 6

And what are important parameters that show lameness and must not lack from the app and visualizations? We already talked a bit about it, symmetry and just maybe joint angles. Is there anything else we should take into consideration?

00:17:46 Speaker 4I don't know, variation.

00:17:48 Speaker 3

Do a study with dogs and lameness induction and then know where the lameness comes from and then see whatever is most relevant. I would do a fishing expedition before I want to say something about this.

00:17:58 Speaker 6

OK.

00:17:59 Speaker 3

Asymmetries, yes, of course, the easy go to.

00:18:02 Speaker 4

Do you want to use only IMUs or you can have other things?

00:18:07 Speaker 6

One IMU and.

00:18:08 Speaker 2

And then deep learning and AI.

00:18:11 Speaker 3

Like video.

00:18:11 Speaker 2

Just like yeah where the owner takes it. Or maybe the veterinarian even takes a video of the dog and then has all those things extracted, yes.

00:18:18 Speaker 3

Yeah, the movements you guys are loading of the names of the dogs, but yeah.

00:18:27 Speaker 3

And also I would want to see stride patterns because they are so fluid in whatever they do, which might also be.

00:18:34 Speaker 4

Power strips.

00:18:34 Speaker 3

Yeah they might not want to trot if they are lame, they might want to go to canter because you have more limbs on the ground at the same time.

00:18:41 Speaker 5

OK.

00:18:42 Speaker 3

And that's right.

00:18:43 Speaker 4

So yeah, the gait, but it is very important.

00:18:46 Speaker 4

Yeah, and the quality like if it's a true like amber or true trot, these kinds of things. So the quality of the gait, I think.

00:18:53 Speaker 5

OK.

00:18:54 Speaker 4

And how many strides this is?

00:18:57 Speaker 1

For the measurement it's speed.

00:18:59 Speaker 3

Yeah, especially because I assume there will be like repeated measures of the same animal, right? So yeah.

00:19:05 Speaker 4

Goes super fast at one point and way slower on the other measurements. It's quite important, yeah?

00:19:10 Speaker 1

In in same measurement even.

00:19:11 Speaker 3

And no doubt, yeah, like and surface detection. Because if they involve.

00:19:17 Speaker 3

Passed on the soft surface but slow on a hard floor.

00:19:19 Speaker 4

I can hit.

00:19:21 Speaker 3

Might be something.

00:19:22 Speaker 4

Yeah, yeah the whole metadata of the measurements. So where it was and what type of surfaces? If it was straight lines or circles well.

00:19:33 Speaker 3

Well, you cant throw a ball in circles.

00:19:35 Speaker 3

And boomerangs, yeah, it was so interesting maybe.

00:19:38 Speaker 1

Then they'll run, not have trots.

00:19:41 Speaker 3

I don't know.

00:19:41 Speaker 3

I don't know what lameness is for different types of dogs

00:19:48 Speaker 4

Because you have this little how you call them...The little, very noisy.

00:19:52 Speaker 5

Chihuahua?

00:19:57 Speaker 4

No, Jack Russell. It's like, yeah, but maybe something but they, but they also.

00:20:00 Speaker 3

Do it just because right now they always.

00:20:02 Speaker 1

Yeah, that's because they cannot walk normally anymore.

00:20:07 Speaker 3

Yeah, but they also then just do it for....

00:20:09 Speaker 4

Yeah, the I mean the whole information.

00:20:10 Speaker 6

Yeah, we do have the breed in the beginning, or at least the size of the dog.

00:20:21 Speaker 4

Yeah, post, age.

00:20:25 Speaker 1

Body weight.

00:20:27 Speaker 3

Body conditions score.

00:20:28 Speaker 4

Yeah, if it's fat.

00:20:37 Speaker 3

Every labrador, ever. I used to have them when I grew up. They just like food a lot.

00:20:43 Speaker 2

Yeah, I can imagine.

00:20:45 Speaker 6

Now, the vets also mentioned the body score condition, because they said, yeah, nobody's weighting their dogs.

00:20:53 Speaker 4

You can see it if you use the camera yeah yeah.

00:20:55 Speaker 3

Were you just you know with people that do a house tour?

00:20:59 Speaker 1

Now, for a dog to, we do the body condition score.

00:21:02 Speaker 1

They say that if you want to feel the ribs it should feel it like this.

00:21:06 Speaker 6

OK, like the knuckles of your hand.

00:21:07 Speaker 1

Well, not the knuckles, because if it's like this. OK, it's like it's OK, and if you can't feel anything at all, it's fat, so you can't feel anything.

00:21:21 Speaker 5

People, people don't know about this.

00:21:21 Speaker 4

If you can't feel anything, there is no dog, right?

00:21:22 Speaker 1

People don't need it.

00:21:23 Speaker 1

They really have no clue if you tell them, they're like “oh, this is so clever” and you know. And it's so easy, so you can do this for your own dog and monitor it a little bit.

00:21:30 Speaker 3

But the difference between like then you need to also have skinny person because otherwise idea how it should feel.

00:21:33 Speaker 5

Yeah, but it's just to give them a bit of an idea on how it should be. Because they have no idea. Most dog owner, we are talking about, they really don’t know.

00:21:53 Speaker 5

OK.

00:21:53 Speaker 6

We have questions about visualizations...

00:21:56 Speaker 2

Yeah, I think we can skip them because we've heard most of it.

00:21:59 Speaker 6

Yeah, you want more clear data, not just positions.

00:22:02 Speaker 4

We want can have the data on the video, also following the dog.

00:22:05 Speaker 1

That would be fun.

00:22:08 Speaker 2

I've been thinking of that. Thanks for pointing it out.

00:22:13 Speaker 6

What kind of visualizations are the most useful in your opinion?

00:22:16 Speaker 3

For EquiMoves or..?

00:22:17 Speaker 6

Yeah, yeah, they could be improved to be better.

00:22:23 Speaker 3

Yeah no, yeah, I like the curves and I like both the.

00:22:28 Speaker 3

The strides split curve, so when you just get the means stride standard deviation.

00:22:33 Speaker 4

And the whole measurements.

00:22:34 Speaker 3

And the whole measurement, I think that's very important, because there you can see if what we often see is that they are most asymmetrical when they speed up and slow down.

00:22:43 Speaker 2

OK.

00:22:43 Speaker 3

So stable speeds you want to see this difference. I want to see that difference between stable speeds and variables like acceleration, and deceleration. 00:22:52 Speaker 1

I think for owners that's too much.

00:22:55 Speaker 4

For the owners, you just want a little light that tells you oh, your dog was a bit asymmetric, check with your vets or something just a little green, orange, red thing.

00:23:07 Speaker 2

Color code, it might be easiest.

00:23:10 Speaker 4

And something that's not too frightening also for them, because you don't want to...Yeah, I don't know actually, you have to study this.

00:23:16 Speaker 3

And also you want to like with dogs the...Like with horses, we often measure adults riding horses that are not super small, right? And so we look at absolute values in millimeters, but with dogs, if you have a Jack Russell or a Great Dane, your asymmetry values in millimeters will be very different, but relatively to the range of motion that might be more relevant values so.

00:23:47 Speaker 3

Research, yeah, research needs to be done, yeah, but I agree with Jean, you should make it as easy as possible for the owner. That doesn't make them like panic immediately because lameness is not the end of the world, right?

00:24:01 Speaker 2

Not really.

00:24:03 Speaker 3

No, but they can also unload, just cannot do this, so they might have different outcomes.

00:24:10 Speaker 4

And if you have videos, you can also do pain recognition, right?

00:24:15 Speaker 3

What does a dog face in pain look like?

00:24:20 Speaker 2

Maybe you need sound.

00:24:22 Speaker 4

Yeah, every time you put the.

00:24:26 Speaker 4

Right thing on the ground.

00:24:27 Speaker 2

Would dog owners react differently to you telling them that dog Is lame compared to horse owners?

00:24:32 Speaker 3

Oh, that would definitely.

00:24:34 Speaker 1

I think for horses there like. There's always like we use them for riding so there's another aspect to it, and I think dog owners put it obviously, hopefully don't ride their dog.

00:24:44 Speaker 1

It's different if you tell them that their dog is like in slight in pain, so maybe I. I wonder if that makes sense.

00:24:49 Speaker 3

Yeah, but I would say I would still go to asymmetrical or lame instead of in pain because that's a very emotional thing.

00:24:57 Speaker 3

Yeah, that's really.

00:24:59 Speaker 1

But that's probably what the owners would think you know, I don't.

00:25:03 Speaker 4

Think they would do that?

00:25:04 Speaker 3

Yeah, but even for horse I would say your horse is asymmetrical.

00:25:07 Speaker 3

I'm not a vet, I'm not going to say it's in pain, maybe it has a very crooked pelvis. You never know.

00:25:12 Speaker 1

So yeah.

00:25:15 Speaker 3

It's just difficult. The machine cannot tell if an animal is in pain yet.

00:25:21 Speaker 3

Like, we can measure movement, we can measure activities of muscles. We can measure any kind of thing, but we cannot look into the brain of an animal as in, we cannot feel what they feel.

00:25:38 Speaker 3

So I would also be very careful with saying those things or they are in pain.

00:25:40 Speaker 5

Yeah, OK. Yeah, but I think that's much more on the vet side and we're going to have some nice little message "Go check up", yeah?

00:25:51 Speaker 4

Or something also that tells, for example, if you do two walks a week with the measurement system that tells you are compared to the previous walk, your dog was more asymmetric or less asymmetric to your next checkout.

00:26:02 Speaker 3

And maybe like a diary function where you can keep track of how what you did with the animal, because maybe one dog is just a couch dog and it sleeps all the time, but the other dog could do agility training with. Yeah, that might be very interesting to know if you want to do research with this data.

00:26:21 Speaker 6

OK cool yes diary logs, nice.

00:26:24 Speaker 3

Yeah, just very easy. You can click like I walk three times and then you can give duration. This type of things and then like an open category where you just can fill in whatever you did extra if you want to.

00:26:38 Speaker 5

OK.

00:26:38 Speaker 3

Don't make it too difficult.

00:26:41 Speaker 4

I want a DoggyMoves app and buy a dog for that.

00:26:43 Speaker 3

And then give it to me because I like dogs and you have a cat.

00:26:51 Speaker 6

OK, last question and then the prototype.

00:26:52 Speaker 2

Yes, yes sure.

00:26:55 Speaker 2

So you mentioned for the veterinarian, those things you will would like to see as a researcher might be to too hard to understand, or maybe not even too hard to understand, but they don't like to see it. What do you think? What would the veterinarian be able to interpret, uh, or what do you think they would like to see just?

00:27:18 Speaker 4

Just yeah, just data points that tell them symmetry towards the right front limb. Yeah, very translated information, I would say from the data. And something, of course still the warnings and things that then the measurement was of lower quality or this kind of information. It's important if I choose only five strides where I should have been using 10 let's say.

00:27:46 Speaker 4

But yeah, that's what I think they would expect, that they would want or they could use at least.

00:27:52 Speaker 3

I think they are able to interpret all these things, right. They're not stupid people because they don't become a vet, and they are smart enough to understand all of it.

00:27:57 Speaker 5

Of course.

00:28:01 Speaker 3

But I think they are often under a lot of pressure, time pressure and just to say something about the animal to the owner. And then it's also very nice to show simple images to the owner. Like, this is what I looked at and this is what it says and this is my conclusion and so I think. So I agree, discrete values with standard deviations and then not too complicated ones, so asymmetry, perfect stride pattern, easy.

00:28:32 Speaker 4

Yeah, and also if that's a new asymmetry that pops up from the dog, like for example the dog

was good before and like I don't know, a week ago it started to be lame or it's asymmetric.

00:28:42 Speaker 3

It's an atypical pattern for this animal.

00:28:43 Speaker 4

Yeah yeah yeah.

00:28:45 Speaker 4

Yeah, so they know.

00:28:46 Speaker 4

Also it's not something that's chronic or that was there for a long time and it's yeah new, or the opposite, it is a chronic asymmetry, so yeah.

00:28:53 Speaker 3

That would actually be very nice if you do new measurements and it automatically compares to like a baseline measurement. It's like "this different a week ago", because sometimes you just don't remember what the measurements was like. For instance, here the animals come back after 6 to 8 weeks for controller and then like sometimes you think oh now I just look at the measurement today and it looks good. But if you automatic if it automatically compares to the previous one, just saying hey, this is different. That would actually be very nice.

00:29:22 Speaker 4

With the quality check that the data quality is the same as before or the yeah.

00:29:28 Speaker 2

Yeah, at least not less, yeah?

00:29:31 Speaker 4

For example, if it's on the collar that you don't have that much variance or whatever on the measurements, or if it was on the same type of type of ground or in the same type of direction and speed.

00:29:47 Speaker 3

Yeah, especially because it might be easier to measure.

00:29:49 Speaker 3

It off health at.

00:29:50 Speaker 1

The time, yeah yeah if.

00:29:51 Speaker 4

You just have one chance on the code.

00:29:52 Speaker 3

Yeah, and you do it during a normal walk.

00:29:57 Speaker 1

Unless you have a dog that's pulling all the time.

00:30:01 Speaker 3

Right, because you have to film it also and it's difficult to film from above.

00:30:09 Speaker 4

That's why we had.

00:30:09 Speaker 4

The above camera on the train. Then the dog is stable and the camera is stable and I.

00:30:16 Speaker 1

I know, but I mean you always have to go to the real field.

00:30:22 Speaker 2

We would like to show you the application.

00:30:25 Speaker 2

Yes, I think I'm going to connect it to screen, if I figure it out.

00:30:30 Speaker 3

Before so otherwise we can help you out.

00:30:33 Speaker 4

We are technical people.

00:30:43 Speaker 2

I should say...

00:30:47 Speaker 3

I want to turn off the light, yeah?

00:30:52 Speaker 4

That's the weird documents.

00:30:55 Speaker 2

It's just a mockup, its not how I would like it to be in the end, but it's nice for feedback so. Please just be truthful.

00:31:06 Speaker 3

Please don't feel offended because we're quite good at rambling about things.

00:31:11 Speaker 2

OK, because I think that's helpful. Because if you say it's perfect, I've got nothing to do this afternoon.

00:31:16 Speaker 4

Oh, it's called canine moves. I'm disappointed I want it CaniMoves.

00:31:18 Speaker 1

OK.

00:31:23 Speaker 5

We can change the name.

00:31:27 Speaker 4

Which software is this that you use?

00:31:31 Speaker 6

Figma for prototyping.

00:31:34 Speaker 2

So we've been started with a home screen. This is the home screen for the veterinarian.

00:31:41 Speaker 1

OK.

00:31:42 Speaker 2

I would need to say we've got another interface for dog owners as we said and I think it might be interesting to maybe implement the researcher interface. What you could see here is the incoming dogs for their next visit, sorted by like their next visit. You would be able to find any dog in the system just like in the EquiMoves.

00:32:05 Speaker 3

Wait, sorry I have one thing I want to add that I also really want in EquiMoves.

00:32:12 Speaker 4

You have those chip scanners as a vet and you scan the chip and it comes in automatically there. Because chip numbers are horribly long and you can make so many mistakes by typing them yourself.

00:32:21 Speaker 3

You can make so many mistakes and that's your unique identifier, so it's quite important. We just randomly fill in numbers, don't tell Filipe, it's on, but yeah.

00:32:27 Speaker 4

But he knows yes.

00:32:29 Speaker 3

Hey, you can see it's everywhere, but that would be very nice if that would be a functionality.

00:32:33 Speaker 4

Yeah, and it's an easy, easy thing too.

00:32:38 Speaker 4

You have good, I think APIs and stuff that you could just use for the app.

00:32:45 Speaker 2

No, that's OK, that's perfect.

00:32:46 Speaker 4

Then you have only the dogs that come up for the next visit or you

can have all the dogs?

00:32:53 Speaker 2

Well, it's filtered.

00:32:53 Speaker 4

OK, OK.

00:32:54 Speaker 2

It's just sorted by, and everything should be in here.

00:32:58 Speaker 4

What's the chat function for the jet function?

00:33:00 Speaker 4

We're coming to it. Let's first focus on this slide.

00:33:03 Speaker 3

Let's have her introduce that.

00:33:05 Speaker 2

That's nice.

00:33:07 Speaker 2

What I did like to add is a profile picture of your dog. Yeah, do you think of it?

00:33:12 Speaker 3

Nice, I think it's cute.

00:33:14 Speaker 4

Yeah, it's an easy way also to check that the doctor, the simple view is nice.

00:33:16 Speaker 1

Yeah, I think it's nice for the owners, not necessarily for vets.

00:33:19 Speaker 3

I do think it's super nice for the vets, I don't agree with you there because I know some doctors that do this that add a profile picture of their patient, which means you walk into your waiting room, and you walk up to them without having to shoot their name or whatever. It's way more personal way of approaching people so.

00:33:35 Speaker 4

Yeah, and you can go to the animal and say “this is Kurt right?” and it's already a friendly link 2ith the owner, so that's good.

00:33:43 Speaker 2

All right, I think I will keep the profile picture. OK, when we click on a certain dog, you might have some sort of view from the dog you can see I use horse data.

00:33:56 Speaker 4

You don't have these kind of limbs on dogs.

00:34:00 Speaker 2

I know, but it can look something like this with medical data maybe, but also the last analysis and maybe briefly analysis would like to make a button there for either previous analysis. And that's not all.

00:34:22 Speaker 3

Yeah, so the button here to go back to a comparison is nice. Instead of having to go back into the dog and then compare measurements like have a, no, make a button here to compare measurements so you don't have to go back and then select and then do things. It's just one step left.

00:34:42 Speaker 2

OK, yes. Well, I actually. No, it's well, we're gonna take a video of the for measurement, yeah? So I would like to have the video of the dog in the center and then compare it with in real time or synchronized with close right duration, and I've got the living threads over here and we can also...

00:35:14 Speaker 4

We like drawing. [proceeds to make a supportive drawing of her following explanation]

00:35:15 Speaker 2

That's OK, that's OK.

00:35:18 Speaker 4

So you want to show only one slide per one stride with the live results thing. Because I think what would be nice is to have the sort of video of your dog. And then you have the whole measurement with like the whole curve, right? And it's just highlighting in real time. So this is this chunk and it's moving with time, right?

00:35:43 Speaker 3

Yeah, where it's like a red bar that just moves with the data.

00:35:46 Speaker 4

Because then you already have the whole thing and. You don't have to feel like this is too fast if you show only one stride one strike.

00:35:51 Speaker 2

Probably. OK.

00:35:52 Speaker 4

Then it will be like robot. But if you see the whole cycle and you just highlight where doing this things like that.

00:35:57 Speaker 3

You can compare strides by stride by stride immediately, right?

00:36:01 Speaker 4

And you can pause if you want to pause and say OK, the dog was in that movement at that time. I just want to go a bit backwards and then we see it again.

00:36:01 Speaker 3

I agree.

00:36:09 Speaker 4

I think that's also nice so pause and slide like a slide it would be nice for the slider and you can just move it. And it's synchronized with the video.

00:36:17 Speaker 1

Yeah, and maybe also slow down or speed up.

00:36:19 Speaker 3

Yeah I wanted to say slow motion option.

00:36:22 Speaker 1

So that you can really, really look at.

00:36:24 Speaker 3

Slomo Fast forward, it's not very useful, no?

00:36:29 Speaker 2

Would you like to see the same for the strides or the strides can just go by?

00:36:34 Speaker 3

Yeah, I wanted to say about this.

00:36:36 Speaker 3

It's like what do you prioritize data wise, I would put whatever is most important on top I, I would like to even see the video on top and then all the data below, but then put the most important stuff the highest, right? Because that's what you're drawn to and I don't know what's most important for the dog. But yeah, that's what I would definitely try to do.

00:37:00 Speaker 2

Have a quick overview that way.

00:37:02 Speaker 3

Yeah, and and also know what to prioritize by just looking at it, because now I would think a video yes, but that's right pattern and we don't know this right pattern is at all sensitive to whatever changes in the dog. So

if you know that asymmetry, for instance is very important, then show the upper body curve on top. Like that biggest like that's what you should look at first kind of thing, but that's more like content related.

00:37:30 Speaker 2

Very helpful. Then a function which is not implemented yet in the prototype. But which I would like to implement is, for example being able to click on a certain joint and see that movement specifically, yeah.

00:37:49 Speaker 4

So you would click on the join and the curves would pop up or it would show up on the video?

00:37:56 Speaker 2

I think my idea with this was to click on the joint, have the joint magnify it in the video and then maybe put the angles or the lines on top of it.

00:38:11 Speaker 3

Yeah, maybe even to make it easier I don't know if that would be easier, easy on a video, but just make like a dog icon and then you know what joint you can select right? And then automatically do that for the video.

00:38:22 Speaker 4

Because it's going to be computer vision with...

00:38:24 Speaker 1

Yeah, it's sometimes you pause the video and the dog is like 2 limps like this, you can precisely click on the limb you want, then it might be easy to just have a clear picture of a dog where you can select the joint.

00:38:38 Speaker 4

But if you have like...

00:38:40 Speaker 1

You missed the tail joint, very important. Maybe you want to look at tail.

00:38:44 Speaker 4

I guess you have a skeleton or something on the dog and it's like this. And then if it's highlighted already, they can just click on whatever they want.

00:38:59 Speaker 3

Yeah, and the ones that you can actually look at reliably like maybe even you would say I don't have enough data for the paws, then they are just not clickable. And you can add...

00:39:08 Speaker 3

That would be nice, because then people also know one there's something wrong with the measurement or the dog was walking through grass you never know what happens, but then you cannot do that reliably So then just don't give them the option.

00:39:20 Speaker 4

Yeah, OK, and you could have this kind of check box to like have the layer of the skeleton?

00:39:25 Speaker 2

Yeah yeah.

00:39:27 Speaker 4

Might want them not to have.

00:39:29 Speaker 5

Yeah, sure.

00:39:31 Speaker 2

One thing that I didn't see in the EquiMoves –no, I did see, it was those lines overlapping for different legs.

00:39:39 Speaker 4

Yeah yeah, compare right and left.

00:39:41 Speaker 2

Is that helpful? Or would you see the graph differently?

00:39:45 Speaker 4

Yeah, they don't look at it, yeah, so.

00:39:50 Speaker 3

I want to add one thing about that before I forget is like let them only be able to click on the things that are relevant because you can find asymmetries anywhere that might be super irrelevant and you don't want people to focus on that. So just don't give them the option. I would say, my opinion. But about this, it depends, right? If you are going to take the method that Jean illustrated here, you cannot overlap the limb angles because there is a time shift. And if you want to compare, you need to make them in the same time frame. So left hind impact to left hind impact and right hind impact to right hind impact. That's the only way to compare, but if you want to show it real time like this, you want to be able to scroll through, this is not possible. So maybe you want like a yeah like a tab with I want that's a good idea, like a tab with this is your whole measurement and a tab with average, everything, yeah.

00:40:41 Speaker 4

So that's the live analysis of the data, and then you would have the like resume of the data, we have the average content stuff.

00:40:53 Speaker 3

This is going to be a huge app or what?

00:40:59 Speaker 5

It's getting there.

00:41:03 Speaker 2

It’s even the first model still.

00:41:05 Speaker 3

Yeah, but it's like, I think color wise just about how it looks I think the layout is nice like this for tablets like for phone and not so much of course because then everything will be very cramped.

00:41:16 Speaker 5

That is different.

00:41:18 Speaker 3

Yeah yeah, but color wise this is also much calmer than in EquiMoves.

00:41:23 Speaker 3

I really like that it looks more professional it looks even with the playful dog. But yeah, stick with those type of colors. I would say and this type of like spacious layout where you don't have to...

00:41:41 Speaker 4

For some words you use, I don't remember but in EquiMoves it's not called birthday, right? It's date of birth.

00:41:46 Speaker 1

Yeah, yeah.

00:41:47 Speaker 4

Which sounds a bit more professional than the yeah.

00:41:49 Speaker 3

Also birthdays every year and date of birth is what, once.

00:41:53 Speaker 4

So yeah.

00:41:54 Speaker 3

And also limb angle tracks, we know what it is. But other people probably don't.

00:41:58 Speaker 2

Yeah, yeah.

00:42:00 Speaker 3

Show the limbs that like just limbs and then you can select whatever because I do like that you can select them or not.

00:42:06 Speaker 4

Yeah, that's nice.

00:42:09 Speaker 2

Yeah, OK.

00:42:12 Speaker 3

Oh sorry, this is a nice thing in the EquiMoves app, you cannot compare things that are incomparable. So for instance here you have the you can also select the other limbs, but you should never compare a left hind to the left front, right because it's a different thing, so make them also not able to do this. So for instance, in agreement you cannot compare walk to trot directly. Or left canter to right canter directly. You can put them all in the same frames, but they don't show up in the table. Yeah, because that would not make any sense.

00:42:50 Speaker 2

Thank you.

00:42:50 Speaker 1

And maybe I would maybe not for this layout, but if you want to start a new measurement, I would make the start measurement button a different color or more like pop out.

00:42:59 Speaker 2

OK.

00:43:03 Speaker 1

So then you share that because that's probably what you're going to do in the app, mostly right start the measurement, so that's.

00:43:07 Speaker 5

Yeah, yeah.

00:43:10 Speaker 3

Yeah, the rest look more like tabs and then the start measurement should be more like a button.

00:43:13 Speaker 1

Yeah, make it a little bit different color.

00:43:16 Speaker 1

Shape or...

00:43:20 Speaker 2

And make it stand out.

00:43:21 Speaker 1

Yeah, so then they know oh, this is where I need to be.

00:43:25 Speaker 2

Would you like to go to the start measurements?

00:43:29 Speaker 4

We want the chat.

00:43:30 Speaker 2

OK. Well, because there's an interface for vets and the dog owners, we would like them to be able to chat. I think it's nice if owners can ask questions to.

00:43:49 Speaker 1

Do vets like this?

00:43:51 Speaker 2

But mostly about the results of the analysis.

00:43:55 Speaker 4

So I think that you need some protective layer, stuff that they don't ask them like oh, the sensor doesn't work anymore, what should I do? So you should have a FAQ or something, then you select the question.

00:44:06 Speaker 4

Yeah, so before being able to chat with the vet they have to enter to have these pre-existing questions or problems, and then it's pinpointing them towards the actual person to contact. So is that the support system or the vets have an issue with the analysis.

00:44:19 Speaker 3

Yeah, and the results like it's something to protect the vets from being harassed by the yeah.

00:44:24 Speaker 3

Or also like if it if it's a sensor question already, give a few solutions you can try without contacting anyone.

00:44:29 Speaker 4

Yeah, we learn like decision tree kind of things. Where you know, like if this is what the owner has an issue with, then you can send them to that page with this solution, and if it doesn't work then we can call the support system.

00:44:43 Speaker 3

Yeah, and because I agree it would be nice for me as an owner to talk to the vets, but the vets will not be very happy with most owners.

00:44:50 Speaker 1

No, because I know it is like an upcoming thing like the E consult thing, it's becoming more.

00:44:56 Speaker 3

How do you protect the vets from ridiculous questions like this?

00:44:57 Speaker 1

How do you yeah?

00:44:58 Speaker 1

But I yeah yes because owners will spam this.

00:45:03 Speaker 3

Yeah, Oh my dog, by the way, like the measurement was fine but my dog pooped and it was like this and this and this.

00:45:10 Speaker

What to do now?

00:45:11 Speaker 4

So or maybe three existing questions so they can't type. They can't fully type something, but for example, oh I have a question regarding the measurement we did last week and we take an appointment to discuss it. And kind of already existing sentences that you can send yeah and if they if their question is not in it, you need to call because that's like a higher threshold, right?

00:45:29 Speaker 7

Yeah, yeah.

00:45:30 Speaker 4

So different things, otherwise, not very.

00:45:33 Speaker 3

No, or you need a very good bot.

00:45:37 Speaker 4

Yeah, also like having your AI based on.

00:45:39 Speaker 4

What would be different?

00:45:40 Speaker 1

Or put in at the option if they really can't figure it out or they need an appointment to make like an E consult thing because that's becoming more and more.

00:45:48 Speaker 4

Yeah, that's also very nice then.

00:45:49 Speaker 1

And to make that appointment already.

00:45:49 Speaker 1

There's something.

00:45:54 Speaker 4

Also the time of the vets is not free, so yeah, you don't want to spend them an hour chatting with the people that doing anything so.

00:45:58 Speaker 3

No, and also like it could be more tech support question anyway. So yeah, then you can make an E consult with your topic where your question is.

00:46:06 Speaker 1

Yeah, because you can't say, oh, I made this measurement. Can you look at the graph? And tell me what it is.

00:46:12 Speaker 4

Please take an appointment.

00:46:14 Speaker 2

I think that's.

00:46:15 Speaker 2

By the way, nice thing to mention in the dog owner view they are not able to view the machine as the results until the veterinarian releases them.

00:46:27 Speaker 3

Nice yeah yeah yeah, that's very nice.

00:46:31 Speaker 4

And do they write like some comments about the result? Because I didn't see that in the measurement from the doctor.

00:46:37 Speaker 2

Yes, so let's see. Yeah there. There is some button here to maybe annotate on the graphs or and be able to draw an arrow look. This is what you need to look at or insert comment on a certain place like. “This shouldn't be like this.”

00:46:57 Speaker 3

Yeah, yes like you can then put the circle around and then your comments. You can say where the red circle is that's where we see this and that's yeah nice. That's very nice.

00:47:06 Speaker 4

The button is not very clear, so that's a functionality that so.

00:47:12 Speaker 3

Yeah OK, you know, yeah.

00:47:14 Speaker 4

And then when you release the results they have the graphs with the annotated things, plus with the text that says whatever.

00:47:20 Speaker 1

OK, good yes.

00:47:24 Speaker 4

OK, so that is good.

00:47:27 Speaker 3

I'm fine with that.

00:47:29 Speaker 2

So just our measurement is of course, but maybe. Well, if you couldn't start measurements right directly from the door or start the measurement and choose a dog as a new dog or choose a dog from the list. Here I got rid of the images of the dogs because I think it's maybe not that useful in theree.

00:47:51 Speaker 4

Yeah, that depends if they know how to attach the sensors, but if it's just one sensor in the collar.

00:47:57 Speaker 3 No, that she meant means the images of the like profile pictures.

00:47:59 Speaker 2

The yes, and indeed it's just one sensor on the color, so I guess when getting the sensor you should have been sort of description.

00:48:00 Speaker 1

That's OK.

00:48:11 Speaker 3

Yeah, do they get like a specific collar to measure the dogs with?

00:48:16 Speaker 2

It could be possible, but that's...

00:48:18 Speaker 5

We were not told about this

00:48:20 Speaker 3

Like yeah, you're of course not on that side, because that might be nicer because then you can just go to the vet when you get the sensor you go to the vet. The vet makes this collar on the right size and then you're already like you lose some of your measurement problems, right? Because some people walk with those weird chain type colors, you cannot attach anything to this and it will. Some people have just super loose colors. And the yeah.

00:48:47 Speaker 1

The hardess.

00:48:47 Speaker 3

Yeah, the harness, and if you have just one you give it to the owner with the sensor attached to put on it and you make the right size.

00:49:00 Speaker 4

You should also not attach the leash is there.

00:49:02 Speaker 3

Yeah, so you have your own collar for the leash and you have the collar for the measurements. Yeah, that's a good idea.

00:49:14 Speaker 2

I also put the other connected device in, but I think it's easier to get rid of those and only have the sensor which is relevant for that.

00:49:21 Speaker 6

Maybe that would be relevant for the researcher side, because when they did, the measurements for the sound dogs they actually had all those sensors and they did the full body measurement.

00:49:29 Speaker 3

Yeah, so your settings.

00:49:31 Speaker 3

You should be able to select how many sensors you use, but for the owners they only use the one sensor so you should not even have the option.

00:49:37 Speaker 3

Yeah, I'll just keep them irrelevant.

00:49:39 Speaker 1

How would that work without the like you cannot connect a gateway to your phone.

00:49:43 Speaker 4

Then you have the USB stick or it's Bluetooth. It was just something different.

00:49:47 Speaker 4

Most likely it's going to be Bluetooth, I guess. Yeah, if it's only one sensor you don't care.

00:49:51 Speaker 6

OK.

00:49:53 Speaker 3

Yeah, yeah.

00:49:55 Speaker 4

And it doesn't take ages to upload the video like 20 seconds.

00:50:01 Speaker 2

And then indeed with the measurements we need to get them some directions.

00:50:13 Speaker 2

So now I've got some random steps put in.

00:50:19 Speaker 3

Sorry, like when you now started the measurement, but you didn't select the dog like 1 blinked out like how did the why.

00:50:27 Speaker 2

Well, that's just the software I'm working on right now. I think currently that was the only thing I could do. But it might show up pop.

00:50:34 Speaker 3

OK, like you need to select a dog, yeah?

00:50:38 Speaker 3

OK, random things I notice I know this I shouldn't say anything

00:50:53 Speaker 1

This should open the camera on your phone and you should proceed.

00:50:55 Speaker 1

Can you learn if you say if you're your dog walking away from the camera for at least 10 seconds, can you implement and yet somehow that you see how long you're filming?

00:51:04 Speaker 2

Probably yes, yes.

00:51:04 Speaker 1

Brilliant, but you then?

00:51:07 Speaker 3

Yeah, and maybe also give the instruction that they need to be like on dog heights, right? You need to kneel down to measure them properly.

00:51:15 Speaker 4

You don't have to if it's properly made you don't have to.

00:51:19 Speaker 1

Make like instruction video.

00:51:21 Speaker 4

Like how to how to stand.

00:51:24 Speaker 4

Or put your camera on the tripode or something

00:51:25 Speaker 1

Well I don’t have a tripode.

00:51:26 Speaker 4

Well, I don't know but if you are a vet and you use this in your clinic.

00:51:30 Speaker 1

Even if you are a dog owner.

00:51:32 Speaker 3

Give it to them with the measurement system right.

00:51:33 Speaker 3

But yeah, something that makes sure that you have proper data.

00:51:41 Speaker 2

One of the idea is to make sure we have proper data, was to have a dog icon inside the camera view and that you have your position to position your device in the yeah like A-frame. Like just keep your dog in this frame. That would be nice.

00:51:50 Speaker 1

Nice no yeah that's nice.

00:52:00 Speaker 3

The complete dog.

00:52:03 Speaker 2

Mention anything else.

00:52:04 Speaker 4

Yeah, just make sure that it fits the vet app.

00:52:06 Speaker 4

You don't say feed your dog but the dog. All those kind of things.

00:52:14 Speaker 2

The language movie and I put a little icons over here one with the feel like this step is done.

00:52:23 Speaker 2

This step is waiting like it's it's not currently being done, it's not that. Just below.

00:52:28 Speaker 4

Yeah, maybe a bit clearer, but that's it's good.

00:52:34 Speaker 1

If you say repeat step one and two with a trotting phase. Yeah, that's well, that's not weird, but maybe most dog owners don't really know the difference between the actual trot and pace and whatever else there.

00:52:46 Speaker 3

Yeah, I think that what you try to mean is please run with your dog, right?

00:52:50 Speaker 3

Maybe something I would say like that then.

00:52:51 Speaker 1

Yeah, because they're like I don't know what they dog is doing, yeah?

00:52:55 Speaker 3

Yeah, do a slow jog because you also don't want the dog to canter. Yeah then the dog will cancer, but that's where I mean like do a slow jog with your dog, because this would be maybe confusing, like what is it? Trotting pace? Yeah.

00:53:09 Speaker 4

And then you have a little maybe video that shows them what is the ideal place in the settings.

00:53:14 Speaker 3

For the dog.

00:53:15 Speaker 4

Or yeah, when they start when they start the app. Or like a reminder.

00:53:18 Speaker 2

Maybe like some directions go a bit faster, a little bit slower.

00:53:23 Speaker 4

If you don't have this as live feedback, but I think it's going to be very computer heavy.

00:53:28 Speaker 3

Like it would be nice if the dog canters instead of trots, that you would say like, please take the video again and go a bit slower because like they can go up and down another 10 seconds.

00:53:36 Speaker 4

Yeah, is it post processing, yeah?

00:53:41 Speaker 3

Yeah, and like that would be nice.

00:53:43 Speaker 3

I would not try to do life because then people are not paying attention to what they are doing.

00:53:48 Speaker 3

Maybe, but yeah, if you get canter, the data is useless and that you might know super fast and then. Try again with yeah. Because I think the difference between trot and canter will be very difficult to tell an owner because if you tell an owner, make your dog run, they think about canter most of the time. OK, and so I would try to make the language as clear as possible. You probably will talk to many owners also like, What do you understand? what does this mean to you? Maybe not what do you understand? Because that's offensive, but what does like? If I

say this, what do you think?

00:54:26 Speaker 4

What did you picture?

00:54:27 Speaker 3

Yeah, yeah, because often we get so far ahead in our your home and that we just don't think about other people interpreted it.

00:54:28 Speaker 2

What would you do?

00:54:37 Speaker 3

We also get soi far in our research that we forget people are interpreting it in a different way. So there should be no room for interpretation, I think. I do like this though, yes.Give as much space for the video as possible as possible and as short as instruction instructions as possible, I would say. Because now for the top you have 10 seconds and for the bottom you have 10 meters. Why is there?

00:55:04 Speaker 4

Well, you never know 1 meter seconds that's the speed you should aim for.

00:55:08 Speaker 3

Yeah, but what if you have Jack Russell or in?

00:55:12 Speaker 4

I mean, it doesn't matter when your session.

00:55:13 Speaker 2

This one I would like them.

00:55:14 Speaker 3

Is not same.

00:55:14 Speaker 2

To just hold their phone and like.

00:55:19 Speaker 2

Two to three.

00:55:20 Speaker 1

Like a site?

00:55:23 Speaker 4

So yeah, just make sure that the text is consistent, yeah?

00:55:28 Speaker 3

Yeah, and it's just no room for interpretation.

00:55:30 Speaker 1

But you only asked for walking away.

00:55:32 Speaker 1

You don't ask for walking back.

00:55:35 Speaker 4

It's from left till right, no the top one.

00:55:37 Speaker 1

Yeah, but it's not 1.

00:55:38 Speaker 1

Is walking away it's not coming back.

00:55:41 Speaker 7

It's never coming roaming away.

00:55:47 Speaker 4

Yeah, that's what we mean with like good text.

00:55:49 Speaker 4

It should be clear and.

00:55:50 Speaker 4

Yeah, good instructions.

00:55:51 Speaker 4

But that's that's going to come.

00:55:52 Speaker 4

It's just the first version anyway.

00:55:54 Speaker 5

Yeah, OK.

00:55:55 Speaker 4

But I like the little like the ticks so it becomes green when that step is done and you.

00:55:59 Speaker 4

Can go to the next step.

00:56:00 Speaker 1

Like that?

00:56:02 Speaker 3

Yeah, and that maybe you have like a check in the meantime, like I don't know how fast this analysis will be, of course, but if you 10 seconds of video should not be or like 20, maybe they will not be super heavy and then you have a quality check immediately.

00:56:17 Speaker 3

Would be super awesome, but yeah.

00:56:22 Speaker 1 Right?

00:56:22 Speaker

Right?

00:56:23 Speaker 5

OK, I do have a question because this came up because we're talking about taking the video only for 10 seconds, but I I'm much more in charge of the data collection making sure that collection for the app is working and convincing the user to actually use the app.

00:56:38 Speaker 6

And The thing is like I think.

00:56:39 Speaker 6

Also make use of participatory sensing and just also use the.

00:56:43 Speaker 6

Up and to collect more data from the smartphone and justice add it.

00:56:47 Speaker 6

But I was also hoping that we can actually use the IMU to collect data for longer than just 10 minutes for more of that work.

00:56:54 Speaker 6

Do you think that's too data heavy to use only via Bluetooth?

00:56:58 Speaker 6

Because you raised those concerns and now.

00:57:01 Speaker 4

I mean, it depends on your sampling frequency.

00:57:04 Speaker 4

I think you would need at least.

00:57:07 Speaker 4

Yeah, that's a good question.

00:57:08 Speaker 4

That's what you need to do in the research part of this project research problem.

00:57:13 Speaker 4

Part of this.

00:57:13 Speaker 4

I think they measured the dogs at 200 Hertz, right? Yeah, but if you have only one sensor on the collar, which you don't do, asymmetric activity asymmetry measurements, you do activity.

00:57:24 Speaker 4

I think you can't do asymmetry with the thing.

00:57:26 Speaker 4

On the color.

00:57:27 Speaker 1

That's the aim.

00:57:27 Speaker 1

That's the aim, right?

00:57:28 Speaker 4

But good luck for them.

00:57:30 Speaker 6

They told us that we can extrapolate a lot with the video and the.

00:57:34 Speaker 3

Yeah, yeah yeah, but you confuse the data.

00:57:36 Speaker 4

Yeah, but if you have only and then you want the neck and you measure for I don't know half an hour.

00:57:41 Speaker 4

Of your running outside.

00:57:43 Speaker 3

I would also think it might be better if you just have one of those harnesses and then with like a Velcro pockets, something where you put the sensor in that that's which is what you give to the owner.

00:57:55 Speaker 3

Yeah, because.

00:57:56 Speaker 3

Color, yes, but that's the plan.

00:57:58 Speaker 3

So and that's not our decision.

00:57:58 Speaker 4

That's not for animal activity recognition.

00:58:01 Speaker 4

The color is very fine.

00:58:02 Speaker 4

It's very good if you just want to see how much they.

00:58:04 Speaker 4

Ran and how much they work and stuff.

00:58:05 Speaker 3

Yeah of course, but then also like for humans, the you put one on your belt and the Super fine.

00:58:08 Speaker 4

Yeah, yeah, but yeah, if you sample at 50 Hertz, which might be OK.

00:58:17 Speaker 4

You need even less than 50 if you want to do anymore.

00:58:22 Speaker 3

Yeah, but if you want to do any type of gates.

00:58:24 Speaker 4

I will not use.

00:58:25 Speaker 3

Like if you want to use it to the the the Singlish between front and page.

00:58:30 Speaker 3Oh yeah.

00:58:30 Speaker 4

Then 50 Hertz is fine.

00:58:32 Speaker 5

Yeah I think so, OK?

00:58:34 Speaker 3

I think so, but like longer measurements you.

00:58:37 Speaker 3

Mean the whole.

00:58:39 Speaker 6

Yeah, the whole world.

00:58:39 Speaker 5

And how do?

00:58:40 Speaker 3

You then make sure that it's synchronized with your camera when you start it.

00:58:44 Speaker 4

If you don't feel if you just.

00:58:45 Speaker 1

Can't right?

00:58:48 Speaker 1

And then the owner is.

00:58:49 Speaker 1

Like filling the dog all the time, but then.

00:58:49 Speaker 3

Yeah, yeah.

00:58:51 Speaker 3

So if the then the film would be the only one that is in your data analysis thing.

00:58:57 Speaker 3

Then you don't combine.

00:58:58 Speaker 6

The data you.

00:58:58 Speaker 6

Combine the data and just use the app to just track, uh, start work time and.

00:59:04 Speaker 3

Like what I can imagine is that you film and then you ask the owner to tap the sensor well and that needs to be on camera so you.

00:59:11 Speaker 3

Tap the sensor and then like.

00:59:12 Speaker 4

No, you don't need that.

00:59:13 Speaker 4

If if you have both the camera and the sensor link to the phone, you have a inside trick that does that.

00:59:21 Speaker 3

But what if you start the measurement?

00:59:22 Speaker 3

At home.

00:59:24 Speaker 4

With the.

00:59:25 Speaker 3

They get more, you just start the measurement with the button on the sensor.

00:59:28 Speaker 3

Like I don't know if.

00:59:29 Speaker 3

This will be a phone related thing.

00:59:30 Speaker 4

I guess it would be from the yeah.

00:59:31 Speaker 6

Yeah, I as far as I was working on my design so far, it's formulated because we're using participatory sensing and the GPS of the phone. So a couple of functions like reduce your normal good things and walking times and then start work and send a reminder.

00:59:43 Speaker 5

OK.

00:59:47 Speaker 6

Hey, you didn't do your walking time with your dog today.

00:59:51 Speaker 1

So yeah, really, more activity, right?

00:59:56 Speaker 1

If you.

00:59:56 Speaker 1

Want to track the whole?

00:59:56 Speaker 6

Also to keep track so when they they you're supposed to have activity with your animal to send the reminder.

01:00:02 Speaker 6

Hey, don't forget to.

01:00:03 Speaker 6

Put on take the video to take.

01:00:06 Speaker 6

Measurements because this is the moment, yeah, but just curious, what was your stance on that one?

01:00:13 Speaker 2

I think you can continue with that one.

01:00:13 Speaker 6

See then.

01:00:17 Speaker 2

Think so.

01:00:18 Speaker 3

Yeah, there was also.

01:00:18 Speaker 2

You want to hear something from the other.

01:00:20 Speaker 4

I want to see the settings and the.
01:00:22 Speaker 1

Profile on the phone.

01:00:23 Speaker 1

The phone?

01:00:24 Speaker 1

Yeah, something.

01:00:25 Speaker 2

The phone happened, yes.

01:00:26 Speaker 3

They wanted to show us sorry, not sorry.

01:00:29 Speaker 2

Oh euh, the settings tab and the profile tab are not there yet

01:00:30 Speaker 2

There is, oh, the profile will be like the vets profile, the clinic profile or not could be differently.

01:00:37 Speaker 1

OK.

01:00:40 Speaker 3

So many things.

01:00:43 Speaker 2

Ohh yes, I've also got the the the new dog this is.

01:00:45 Speaker 4

The what do you?

01:00:50 Speaker 2

More or less the same as in the.

01:00:53 Speaker 4

So what if you have a dog that's not chipped?

01:00:55 Speaker 4

I guess you have a dog that on that too, I know, but they still don't know it, so it's also not mandatory in France.

01:00:57 Speaker 3

It's obliged, so if you get this from your vets then you.

01:01:00 Speaker 3

You chip it.

01:01:04 Speaker 4

But you can't like you can bring your dog to the vet and still refuse the chip.

01:01:08 Speaker 4

And they're not going to do it.

01:01:10 Speaker 1

No, it's.

01:01:11

OK.

01:01:11 Speaker 3

Shipping and

01:01:12 Speaker 3

Yeah interesting.

01:01:14 Speaker 3

Well here to enforces.

01:01:17 Speaker 2

Maybe there could be some function with it's not shipped yet, and then that can get the notification we need to ship this dog.

01:01:20 Speaker 7

Yeah, yeah.

01:01:22 Speaker 1

It comes, yeah but yeah.

01:01:23 Speaker 4

It shouldn't be the case.

01:01:28 Speaker 4

So color is mandatory but.

01:01:30 Speaker 4

Not the breed.

01:01:33 Speaker 2

Well, yes, some of those just are kind of weird mixes.

01:01:37 Speaker 4

Next but then.

01:01:38 Speaker 2

Yeah, yeah, yeah yeah, yeah.

01:01:39 Speaker 3

Mixed breed would be an option, right?

01:01:42 Speaker 3

Like I think that for.

01:01:44 Speaker 3

If you want to use this data.

01:01:45 Speaker 3

For research again.

01:01:46 Speaker 3

That would be more relevant information than the caller.

01:01:48 Speaker 3

OK, yeah you would use like and it's like kruising groot klein middel [crossbreed large small and middle]

01:01:54 Speaker 3

Yeah like size would be quite important.

01:01:57 Speaker 3

Small, medium or big.

01:01:57 Speaker 4

Yeah, like and also.

01:02:01 Speaker 4

I mean you're using a camera video based app, so I think the color you.

01:02:05 Speaker 4

Can get from the app.

01:02:06 Speaker 3

No need to enter it?

01:02:07 Speaker 3

Yeah because otherwise people are like is it brown or...

01:02:13 Speaker 6

We're going to pick up the artist.

01:02:16 Speaker 3

Mixed color.

01:02:17 Speaker 4

Mixed mixed color.

01:02:20 Speaker 2

Maybe because I did it for more or less identification.

01:02:27 Speaker 2

Let's see what would officially look like some.

01:02:33 Speaker 2

Would an option be?

01:02:36 Speaker 2

What do you say?

01:02:39 Speaker 4

Yes yeah characteristics yes.

01:02:41 Speaker 3

I would yeah I I.

01:02:43 Speaker 3

Like thinking back that I would think that's more complex to complex, I would just stick with breed and then have the option mix breed and make that.

01:02:52 Speaker 1

Right, I would add if you do only mixed breed I would still add the size like small.

01:02:57 Speaker 1

Medium large because that that is more, yeah.

01:02:57 Speaker 3

Yeah, yeah yeah, no.

01:02:59 Speaker 3

Definitely like when, for instance, if you select golden retriever you it automatically says large, but if you have mixed breed you need to like you.

01:03:03 Speaker 1

You know?

01:03:06 Speaker 3

Get it pop up pop.

01:03:08 Speaker 3

Pop down that says select size.

01:03:11 Speaker 3

Yeah OK and then maybe have a like a.

01:03:14 Speaker 3

Like with withers heights like you put the small and then with this height between this and this and then big or medium or whatever because people might be confused.

01:03:24 Speaker 3

They think I have a big dog.

01:03:25 Speaker 3

It's just dog.

01:03:25 Speaker 4

Yeah, it's big point springs.

01:03:30 Speaker 3

It has a big ego.

01:03:33 Speaker 2

It it thinks it's big.

01:03:35 Speaker 3

Now like what I'm thinking now, if you want to do something with this data as a researcher, you might.

01:03:40 Speaker 3

Even if you have like hundreds of dogs measured.

01:03:43 Speaker 3

You might want to be starting comparing like what how does it go retrieving golden retriever compared to Labrador move?

01:03:50 Speaker 3

Yeah, and then you can just very easily take that and people know what type of dog they have because.

01:03:55 Speaker 1

Dog owners are like that you.

01:03:57 Speaker 3

Know yeah, so like for dogs that.

01:03:59 Speaker 3

Would be very relevant I think.

01:04:04 Speaker 2

Something I didn't show you in the other view was that we also have some sort of thing, a view for.

01:04:11 Speaker 2

If an owner has more than one dog.

01:04:13 Speaker 2

Yeah, yeah, it's.

01:04:14 Speaker 2

So they could add another dog from the.

01:04:23 Speaker 2

That that there is some sort of screen to wait until it's released.

01:04:26 Speaker 2

And yeah, yeah oh, this is just copy paste.

01:04:29 Speaker 4

Yeah, let them ask for a reminder like don't add.

01:04:33 Speaker 4

Please remind your vet.

01:04:35 Speaker 7

Don't do that.

01:04:37 Speaker 3

No, OK, now and and the title type. Things like Scott Gate. I would say go to Scott's movement or something, but that's minor. Just make it for the yeah.

01:04:49 Speaker 2

Understandable and this could be a main screen, yeah?

01:04:56 Speaker 1

So with medical history only being medical history.

01:04:59 Speaker 1

Related to the gate.

01:05:02 Speaker 1

Was and just thinking they have like all these apps are popping up now for.

01:05:07 Speaker 1

Pet owners

01:05:09 Speaker 1

They can put everything in there about their pets, dietary things, issues, appointments, reminders for appointments.

01:05:16 Speaker 1

They can basically monitor everything and put it in one app and get reminders like, oh, you need to make a new appointment for the vaccination or whatever.

01:05:25 Speaker 1

I don't know if that's relevant for this app, but maybe you can combine everything into one app if you are allowing them to do like medical history.

01:05:32 Speaker 1

Also in here or do you want to keep it completely separate like this is only gate yeah and they can do other things for another edge.

01:05:39 Speaker 4

It would be nice to have a bridge.

01:05:41 Speaker 3

Yeah, just like option to.

01:05:42 Speaker 1

Maybe, maybe in the future.

01:05:43 Speaker 3

Integrate this with.

01:05:44 Speaker 1

Because I know these apps are.

01:05:45 Speaker 1

Being developed all the time right now.

01:05:48 Speaker 1

Couple of big ones are out there and people are actually using them a lot because they like it because everything.

01:05:53 Speaker 1

Is one place.

01:05:53 Speaker 4

And if you have to pay a subscription to use the the sensor, they would be happy to also have this kind of things.

01:05:59 Speaker 4

Yeah, maybe they have to pay a little.

01:06:01 Speaker 4

A little bit more to have it if it's open, but it's.

01:06:03 Speaker 4

Nice for them to have this.

01:06:05 Speaker 6

Yeah, we heard that.

01:06:06 Speaker 6

Yeah looks nice yeah.We also heard that for medical history, the veterinarian, against already have all the medical history.

01:06:11 Speaker 6

Yeah, but if it's like a new dog to the place, it would be nice to also have access to that data.

01:06:17 Speaker 6

So we had mixed reactions to that.

01:06:17 Speaker 3

Yeah yeah and yeah, yeah, I can imagine that and and I think as a dog owner if I would be one you want different type of medical history and at least a different language.

01:06:28 Speaker 3

Yeah, it's because the the.

01:06:29 Speaker 3

Might want to know much more than you just want to know.

01:06:32 Speaker 3

My dog has this medication because of this disease and not what the blood values are and whatever things.

01:06:40 Speaker 3

Because that's overcomplicated things, yeah.

01:06:44 Speaker 3

Yeah, nice looks. Yeah nice.

APPENDIX F TRANSCRIPT FIRST LIKE VETERINARIANS FOCUS GROUP

Speaker 1, Speaker 3, Speaker 4, Speaker 6, Speaker 8,

00:00:01 Speaker 1 Monique
I'll be recording that.
00:00:03 Speaker 1
We can do that.
00:00:05 Speaker 1
Go ahead, we will start with some general questions and then afterwards we will show the application and ask you for your thoughts on it.
00:00:14 Speaker 1
Please be honest, because if you're not honest and tell us it's all looking great, you have nothing to do.
00:00:22 Speaker 1
So please tell your remarks.
00:00:25 Speaker 1
I don't care just what you want.
00:00:30 Speaker 3 alex
OK, first question is like what are the usual questions that you ask the dog owner when they bring in dog presenting lamenes like are these standardized questions?
00:00:40 Speaker 3
What do you inquire about?
00:00:44 Speaker 4 Dennis
What do we ask what the problem is?
00:00:47 Speaker 4
Stuff like that.
00:00:48 Speaker 2
OK.
00:00:51 Speaker 4
Usually have at least I have a fix.
00:00:56 Speaker 4
Line of questions like usually what is the problem?
00:01:02 Speaker 4
Ask them a different question.
00:01:05 Speaker 4
Or that he already knows, because they may.
00:01:07 Speaker 4
Appointment the next one.
00:01:09 Speaker 4
Is usually how long it's been.
00:01:12 Speaker 4
If it's.
00:01:14 Speaker 4
Getting worse or improving or yeah.
00:01:16 Speaker 6
It's progressive or acute, yeah.
00:01:24 Speaker 6
What limb the owner thinks the dog is lame, yeah?
00:01:25 Speaker 4
Oh yeah.
00:01:32 Speaker 4
Usually we ask you mean from the dog's point of view or from your point.
00:01:38 Speaker 3
That's so important, yeah?
00:01:41 Speaker 6
And if they use the limp, or if they are completely on three legs, for example, Umm, or they can still yeah walk a bit on it, yeah?
00:01:52 Speaker 1
Maybe reduce the amount of weights or yeah.
00:01:54 Speaker 4
Because sometimes they they're.
00:01:58 Speaker 4
Don't walk on the.
00:01:59 Speaker 4
Leg and then they step over the threshold here and then it's all.
00:02:02 Speaker 4
OK.
00:02:03 Speaker 4
Yeah, and then step outside.
00:02:04 Speaker 4
Again and then, then again.
00:02:06 Speaker 4
So it's bit of adrenaline there.
00:02:10 Speaker 4
Like all the eggs magically.
00:02:11 Speaker 4
Disappear and they see us and they think, oh.
00:02:19 Speaker 1
So when you've asked the questions and you're going to evaluate the dog, maybe what are the things you are looking for if you evaluate the dog, are you visually evaluating or are you feeling or?
00:02:33 Speaker 4
We start with like more.
00:02:36 Speaker 4
Start from the distance and.
00:02:38
Then like the.
00:02:39 Speaker 4
Way so then you know, usually I just.
00:02:43 Speaker 4
Work, watch how I see people driving walking.
00:02:48 Speaker 4
The dog inside, if it's already visible then.
00:02:51
It's live.
00:02:53 Speaker 4
And then standing on the ground will take.
00:02:58 Speaker 4
Just two of the things.
00:02:59 Speaker 4
I've been asking the questions you will.
00:03:02 Speaker 4
Find like the hot stuff.
00:03:05 Speaker 4
Do that and we really do want to do a.
00:03:08 Speaker 4
Good examination and at the time you do a little.
00:03:11 Speaker 4
Four legs, et cetera.
00:03:13 Speaker 6
Yeah, I always try if if the for example the dog is lame on the hind limb, I always try to examinate both of the hind limbs so I can compare between the the good leg and the bad leg.
00:03:32 Speaker 6
And also check for wounds or blood.
00:03:36 Speaker 6
If there's like something swollen or.
00:03:41 Speaker 6
Feeling warm, yeah, definitely those ones.
00:03:47 Speaker 6
If the range of motion is.
00:03:47 Speaker 8
Sure, yeah, yeah yeah, yeah.
00:03:50 Speaker 1
The range of motion.
00:04:01 Speaker 6
No, it's hard.
00:04:02 Speaker 4
Another sentence is “kan het, kraakt het, doet het pijn” [is is possible, cracks it or does it hurt?]
00:04:04 Speaker 4
It's possible to move all like that if it it creaks and cracks and.
00:04:09 Speaker 4
If it hurts.
00:04:10 Speaker 3
OK.
00:04:11 Speaker 4
So that's.
00:04:11 Speaker 4
The easy shortcut for the.
00:04:14 Speaker 4
On the examination.
00:04:16 Speaker 4
Umm, if it can't then you.
00:04:17 Speaker 4

Know OK, something's wrong, and sometimes you really feel. Usually when it's really bad you feel like, yeah.
00:04:26 Speaker 1
If if you see that something is bad to you.
00:04:33 Speaker 1
Verwijs je ze door? [do you forward them to a specialist?]
00:04:35 Speaker 6
Or not always no.
00:04:36 Speaker 4
Really not.
00:04:37 Speaker 4
It depends on the illness.
00:04:37 Speaker 1
You you can treat it yourself most of the time, OK?
00:04:40 Speaker 6
Of the yes yeah.
00:04:42 Speaker 4
Most of the time it's like an injury because they play too rough, but.
00:04:46 Speaker 4
Kind of easy stuff.
00:04:47 Speaker 4
Yeah, sometimes it's like they.
00:04:49 Speaker 4
Get hit by a car.
00:04:50 Speaker 4
And then it's all broken.
00:04:51 Speaker 4
Yeah, yeah, then we.
00:04:53 Speaker 4
We give the.
00:04:53 Speaker 4
Option to go to an orthopedic surgeon.
00:04:56 Speaker 4
Yeah, because we don't do that ourselves.
00:04:58 Speaker 6
Yeah, and the same with like the crushed ligaments.
00:05:03 Speaker 6
Yeah, yeah, in the knee kruisband [cruciate ligament]
00:05:06 Speaker 9
Oh yeah.
00:05:08 Speaker 6
Yeah, that's also if the owner is motivated.
00:05:10 Speaker 6
Yeah, we cannot do this kind of surgery.
00:05:13 Speaker 6
So when the owner is motivated and they want to have surgery, then we will send them to.
00:05:19 Speaker 9
Like the orthopedic and search.
00:05:20 Speaker 2
Especially where yeah?
00:05:23 Speaker 6
But most of the time we can.
00:05:27 Speaker 6
Fix things ourselves.
00:05:29 Speaker 4
Just couple of pills and yeah.
00:05:31 Speaker 4
Especially the young ones.
00:05:35 Speaker 3
And if a dog is brought in for a different issue, the appointment is for a different issue.
00:05:39 Speaker 3
But during the examination you notice lameness or you suspect lameness.
00:05:43 Speaker 3
How do you proceed further?
00:05:48 Speaker 4
Prioritize, Because if they're really.
00:05:49 Speaker 4
Ill I don't care that they have a lame black or or it's because it's related and if they're like the diarrhea and vomiting and they're bad because of that, they'll treat that first and then I'll say next week they check.
00:06:05 Speaker 4
And if it's.
00:06:08 Speaker 6
The main problem yeah, yeah yeah.
00:06:09 Speaker 4
Go to move to the left.
00:06:11 Speaker 6
And most of the time we filter these kind of things out during the yearly check when they come in for the vaccination and when a dog is or cats.
00:06:24 Speaker 6
But when it's an older animal.
00:06:27 Speaker 6
Then most of the time when also when I have the time.
00:06:31 Speaker 6
I asked, well, did you mention any kind of lameness or is your animal more stiff when he stands up or after the night and when the owner sees that or says yeah, well, actually I noticed that my dog is a.
00:06:46 Speaker 6
Little bit, yeah walking like an old man then you can go further.
00:06:52 Speaker 6
On that path, but it it all depends on the time and if an owner has a lot of questions by itself or not.
00:06:59 Speaker 6
Because we only have 10 minutes in this appointment.
00:07:01 Speaker 6
So yeah, when the owner asks you a lot already, then you're running out of time and yeah.
00:07:06 Speaker 1
Yeah, you mentioned certain moments when it's standing up after sleep.
00:07:11 Speaker 2
Yeah, yeah.
00:07:12 Speaker 1
Or are those key key moments?
00:07:15 Speaker 6
Or well for like artrosis it can be if they lie down for a longer time they get.
00:07:22 Speaker 4
They get stiff
00:07:24 Speaker 2
Yeah right yeah.
00:07:27 Speaker 3
And as you mentioned, the owners, we are also curious how often you find the information about the dog's health and habits and accident history that the owner is giving you reliable like.
00:07:39 Speaker 4
Or really depends on the.
00:07:41 Speaker 2
Yeah, yeah.
00:07:43 Speaker 4
Some people they are really to the point and then it's easy.
00:07:47 Speaker 4
Sometimes you have to.
00:07:48 Speaker 4
Drag it out.
00:07:49 Speaker 4
Of them, and some people, they bombard you with information that it's like oh wait, this is like 500 things at once.
00:07:59 Speaker 4
None of them.
00:08:02 Speaker 6
Or they question mark your opinion.
00:08:05 Speaker 6
They don't believe what you're saying and they already made their own opinion efficient.
00:08:12 Speaker 6
And it's you're not able to.
00:08:14 Speaker 1
They googled it themselves.
00:08:17 Speaker 6
Yeah yeah yeah, they heard it on the dog.
00:08:21 Speaker 3
Yeah yeah yeah.
00:08:23 Speaker 3
And then what?
00:08:24 Speaker 3
It characterized the dog owners trustworthy.
00:08:29 Speaker 4
Sorry, what characterized the illness.
00:08:31 Speaker 3
What what would make a dog owner trustworthy?

00:08:38 Speaker 4
Yeah, I think [unaudible].
00:08:41 Speaker 4
Yeah, that's that's that's people.
00:08:44 Speaker 4
Yeah, that's not really.
00:08:48 Speaker 4
OK, the the good thing is, sometimes you just feel it because the way they talk back to.
00:08:53 Speaker 4
You and they ask questions.
00:08:55 Speaker 4
You explained something to them and they say, Oh yeah, that's like.
00:08:58 Speaker 4
That's that to.
00:08:58 Speaker 4
Me and they said yes.
00:09:00 Speaker 4
Need and then you know, OK, I get feedback.
00:09:02 Speaker 6
Yeah, we understand each other.
00:09:02 Speaker 4
They understand what I'm saying.
00:09:04 Speaker 4
Yeah, you know what I'm trying to do with this therapy.
00:09:08 Speaker 4
And also usually I try try to give also when it's not improving what they should do with the dog or usually.
00:09:18 Speaker 4
Called again.
00:09:19 Speaker 2
OK.
00:09:21 Speaker 4
And that for yeah, that communication that's important.
00:09:28 Speaker 4
And then you get.
00:09:30 Speaker 4
Yeah, bit of a vibe.
00:09:35 Speaker 4
So yeah, sometimes you you think it's OK and then they go for a second opinion to call like somewhere else so you never know.
00:09:44 Speaker 4
But usually in that.
00:09:46
Way you know.
00:09:48 Speaker 1
It gives some good impression.
00:09:51 Speaker 4
Yeah, and especially the the the feedback so that they talk to you what they think I understand from you so you actually repeat what you just said.
00:10:02 Speaker 4
That's I think the most valuable in.
00:10:03 Speaker 4
The communication OK.
00:10:06 Speaker 3
Yeah, because at the the clinic at the university they also have student assistants and sometimes they still send the students first to ask questions here you don't really have the time to do that to double check the story.
00:10:21 Speaker 4
No, in in the.
00:10:22 Speaker 4
University clinic it's really because you have these.
00:10:25 Speaker 4
Many layers of.
00:10:26 Speaker 4
People, it's really sluggish for in like commercial clinics.
00:10:33 Speaker 4
No, that's not really possible.
00:10:36 Speaker 4
No, like not all the time, I mean.
00:10:38 Speaker 4
Sometimes today was a quiet day for them, the morning is OK to so.
00:10:49 Speaker 1
When you are evaluating a dog for lameness, what elements of the dog's habits do you need to know?
00:10:57 Speaker 1
What what things of his lifestyle do you want?
00:11:00 Speaker 1
To know
00:11:01 Speaker 6
If it's a working dog or not.
00:11:04 Speaker 4
Exercises a lot.
00:11:07 Speaker 4
Usually I asked did something happen that you know or did you hurt something?
00:11:12 Speaker 4
Because sometimes they're out in the Bush and then yeah, it's like yeah.
00:11:14 Speaker 6
They scream and they come back lame, yeah?
00:11:18 Speaker 6
That you know something acute happens.
00:11:22 Speaker 6
Yeah, like.
00:11:23 Speaker 8
Don't want to go on the walks anymore and a little more, yeah?
00:11:29 Speaker 1
When they're maybe less active.
00:11:34 Speaker 6
And that's more.
00:11:36 Speaker 6
A habit of the owner, but we also check.
00:11:38 Speaker 6
Of course, if the dog is overweight.
00:11:40 Speaker 6
Or not, yeah.
00:11:41 Speaker 1
Yeah, very important.
00:11:42 Speaker 1
Yeah heard that one before.
00:11:46 Speaker 3
And on that topic, would you prefer like?
00:11:50 Speaker 3
Keeping track of the weight or the body condition score up wise.
00:11:55 Speaker 2
Yeah they both.
00:11:57 Speaker 4
We use the body.
00:12:00 Speaker 4
There's the body condition score to determine.
00:12:02 Speaker 4
OK, he's really failed or not, and I look OK.
00:12:04 Speaker 4
What does he weigh now and then?
00:12:06 Speaker 3
And what should be the ideal weight?
00:12:08 Speaker 4
Yeah, yeah.
00:12:09 Speaker 3
Yeah, how do you calculate the ideal weight in dogs?
00:12:13 Speaker 3
It's like a BMI system.
00:12:16 Speaker 2
No, not real.
00:12:17 Speaker 4
It's more like feeling these charges, though you know, yeah, usually my favorite is to just.
00:12:18
OK.
00:12:23 Speaker 3
Yeah, the body can.
00:12:28 Speaker 4
And then.
00:12:29 Speaker 4
If the belly goes off.
00:12:32 Speaker 4
Because sometimes you also have like the fat and everything on.
00:12:34 Speaker 4
The ribs so.
00:12:35 Speaker 3
Yeah, we work hard, but this would be yeah.
00:12:36 Speaker 3
Like something like that, yeah?
00:12:39 Speaker 4
Sometimes he has these chubby dogs and they're built so usually with this tournament that it goes well, that's.
00:12:48 Speaker 4
Usually every type of dog is.
00:12:50 Speaker 4

Like the same.
00:12:51 Speaker 6
And sometimes you can use the weights they have from two years ago or a year ago.
00:12:59 Speaker 6
If you see that in.
00:13:01 Speaker 6
In one year the dog gained like 4 kilograms.
00:13:04 Speaker 6
Yeah, then something happened in this particular year.
00:13:07 Speaker 5
Yeah, OK, so would.
00:13:08 Speaker 6
Yeah, actually in.
00:13:09 Speaker 4
Black dogs the the the black in the coat.
00:13:14 Speaker 4
It really hides the.
00:13:17 Speaker 4
Sometimes if it's not, it's not that that it's like is he on.
00:13:20 Speaker 4
The scale, yet no no no.
00:13:22 Speaker 4
For this girl it's.
00:13:23 Speaker 4
Like ohh 5 kilos more.
00:13:28 Speaker 1
Would it be helpful if the application which we are designing includes something like daily habits tracking or activity tracking?
00:13:36 Speaker 8
Yeah, I think so.
00:13:37 Speaker 4
Yeah, because you you mentioned she had.
00:13:40 Speaker 4
The it's just.
00:13:43 Speaker 1
Was kind of interval like maybe daily is.
00:13:49 Speaker 3
Once a day, once a day, yeah.
00:13:52 Speaker 4
Maybe once a week is more.
00:13:55 Speaker 4
Like a minimum.
00:14:03 Speaker 2
There are photos tomorrow.
00:14:07 Speaker 8
OK.
00:14:11 Speaker 1
These conflicts, yeah.
00:14:17 Speaker 4
OK man.
00:14:20 Speaker 8
So we charge.
00:14:21 Speaker 2
8th of May.
00:14:24 Speaker 6
Here for example, if owners take their dog to the beach or to the forest one particular day and after that day see that the dog is more lame.
00:14:35 Speaker 6
Then they can think of oh, that's.
00:14:38 Speaker 6
Was this particular day we walked so much longer?
00:14:42 Speaker 6
Or more than normal.
00:14:43 Speaker 2
Yes, so you have.
00:14:45 Speaker 6
So based on that it's good to, I think to try to track it every day or every once a week.
00:14:53 Speaker 8
Yeah, so you have the paint score like the the green.
00:14:58 Speaker 8
Like did he get some pain medication?
00:15:01 Speaker 8
How many did we walk that day?
00:15:04 Speaker 8
Did we do do something different?
00:15:06 Speaker 8
So then you have per day like it was a red day, but he didn't get it pain medication and we worked a lot.
00:15:13 Speaker 2
Yeah, so yeah yeah yeah.
00:15:16 Speaker 1
Can I also take a picture of this?
00:15:18 Speaker 5
Might be helpful.
00:15:19 Speaker 9
Yeah, because it's.
00:15:20 Speaker 3
You also standardize questions.
00:15:21 Speaker 8
Question, yeah.
00:15:24 Speaker 8
So I think it would be helpful if owners got it in like an app instead of this, because yeah, it motivates way more.
00:15:24 Speaker 1
Seems that.
00:15:30 Speaker 4
Is really stupid.
00:15:33 Speaker 2
Yeah yeah, but that they don't build it, yeah yeah, yeah yeah yeah.
00:15:36 Speaker 4
And like you have.
00:15:40 Speaker 1
To continue with your application because with 10 minutes left.
00:15:44 Speaker 3
Ohh yeah, sure let's go ahead.
00:15:46 Speaker 2
Alright, let's see, yeah.
00:15:48 Speaker 4
If you still have some other questions, I'm still here from here as well.
00:15:51 Speaker 1
OK, we'll see.
00:15:54 Speaker 7
Yes, that's a great.
00:15:56 Speaker 1
Idea, But then I can see.
00:15:57 Speaker 3
It myself, do you wanna move on this side, yes.
00:15:59 Speaker 4
I can I can stand over there.
00:16:00 Speaker 4
If you want.
00:16:01 Speaker 3
No, we can switch.
00:16:01 Speaker 1
If that's easier.
00:16:03 Speaker 1
Or so maybe we'll see.
00:16:05 Speaker 5
Yeah you can.
00:16:06 Speaker 6
Yeah, take those two seats and then yeah, perfect.
00:16:08 Speaker 7
Yeah, let's see the first main crean.
00:16:18 Speaker 3
You're on Wi-Fi you.
00:16:19 Speaker 9
Can show it.
00:16:20 Speaker 9
It should be in the prototype.
00:16:22 Speaker 2
Yes, yeah, we've got a full prototype.
00:16:25 Speaker 1
Well, it's it's just the beginning.
00:16:27 Speaker 2
It's not.
00:16:27 Speaker 1
This is the main screen where you can see the upcoming visits.
00:16:31 Speaker 4
This is for this is not the app right?
00:16:33 Speaker 4
This is.
00:16:33 Speaker 1
For the, this is for the veterinarians.
00:16:36 Speaker 4
Yeah, yeah facing.
00:16:36 Speaker 1
Yes veterinarian side I can show you the dog owner side.
00:16:39 Speaker 8
This is the data we get from the apps of.
00:16:39 Speaker 1
Of the application too.
00:16:41 Speaker 8

The owners yes yeah yes yeah.
00:16:42 Speaker 4
We get this on.
00:16:43 Speaker 4
Our computer and.
00:16:44 Speaker 1
Yeah, for example, or a tablet or something in that form, a tablet would be more convenient because the ultimate goal is to take a video of a dog
00:16:47 Speaker 8
Yeah yeah, yeah.
00:16:54 Speaker 1
And then.
00:16:57 Speaker 1
Extract all the values needed for an analysis on.
00:17:01 Speaker 1
If a dog is lame or not.
00:17:04 Speaker 4
So need a camera.
00:17:06 Speaker 1
Yes, so in the end you can start the measurement loops and need to click on the icon, but that's one of the things of an application you can start on.
00:17:16 Speaker 1
Measurement if you select the dog, for example dog scott or add a new dog or.
00:17:22 Speaker 1
Yeah, then you got get some instructions on how to take the how to take the video of 15 second video.
00:17:33 Speaker 1
And then there are.
00:17:35 Speaker 1
Three steps I guess.
00:17:37 Speaker 1
Oops, that's not correct.
00:17:41 Speaker 1
It's not updated.
00:17:42 Speaker 3
Oh, it's not updated.
00:17:43 Speaker 1
Yeah, I might have only done yes this part for the.
00:17:51 Speaker 1
So this is the owner app, but it's the same same steps in this case, first from the from the side, then from the front walking towards you and then walking away from it.
00:18:03 Speaker 1
So there are different steps and it should end up in results.
00:18:10 Speaker 1
Which is for you.
00:18:11 Speaker 1
I guess the most interesting.
00:18:15 Speaker 1
The results end up the first part is just where you where, where is the lamest, the easiest interpretation, and we think it's there because of a few arguments.
00:18:30 Speaker 1
Thanks, thanks and the main question here is would this be something you could use when someone comes in with a lame dog?
00:18:48 Speaker 4
Well, I think it.
00:18:50 Speaker 4
It's it can be helpful for the more subtle lameness, especially in the the chronic ones like the young dog that's sprained.
00:18:59 Speaker 4
This recently OK.
00:19:01 Speaker 4
Well, you can do this, but you already know where it is.
00:19:04 Speaker 4
A couple of pills and it's.
00:19:05 Speaker 4
Done, but especially like the dogs from 10 years or older.
00:19:11 Speaker 4
Sometimes it's a bit vague, sometimes it's not even the same joint.
00:19:15 Speaker 4
Every time, sometimes it's.
00:19:15 Speaker 6
Or the dogs that are not treatable are not the dogs that are not treatable in here.
00:19:22 Speaker 6
The dogs are aggressive or the dogs where we cannot do clinical examination on.
00:19:22 Speaker 4
Adding yeah.
00:19:23 Speaker 4
Yeah yeah, yeah yeah yeah right yeah.
00:19:29 Speaker 1
Yes, so you can also get more in depth information.
00:19:33 Speaker 1
Those are the strides like the steps it takes.
00:19:38 Speaker 1
This is horses data, please don't.
00:19:40 Speaker 1
Like literally, that was something you can see, which you probably know is that the hat goes down on the sound limp.
00:19:51 Speaker 1
That's something you can see in this kind of graphs.
00:19:55 Speaker 1
This is in real time with the video the owners took, so you can see what is happening in the.
00:20:00 Speaker 1
Studio, but we can also go to the.
00:20:04 Speaker 1
Where you can see in the graph here on the right front leg, the head is higher up than on the left front leg, which implies that there is something happening in the right front.
00:20:17 Speaker 1
Leg, but yet this system should be able to tell you it's right.
00:20:24 Speaker 1
Don't lag, but you can see in depth what is actually happening.
00:20:27 Speaker 1
If you want it.
00:20:30 Speaker 3
The time
00:20:30 Speaker 3
For it if you have.
00:20:31 Speaker 1
That that's mostly the thing, because that's what we are thinking about.
00:20:36 Speaker 4
Yeah, but it's not not.
00:20:38 Speaker 4
I think it's not impossible because just what I told you earlier.
00:20:43 Speaker 4
If you have a patient that's having these problems, which isn't quite fixable with just a couple of pills, then this would be.
00:20:50 Speaker 4
Quite a help I think, and then we can also schedule for ourselves a bit of time in advance to to see these graphs and then usually the visit itself.
00:21:00 Speaker 2
You look at it yeah, yes.
00:21:02 Speaker 4
Is that 20 minutes instead of 10.
00:21:05 Speaker 4
So that's yeah.
00:21:07 Speaker 6
Is it difficult for the owner to make those movies because I can imagine if you walk with words, it's a little bit easier to walk in a straight line.
00:21:18 Speaker 6
Dogs are sometimes all over the place, so how difficult is it for an owner to?
00:21:24 Speaker 6
Make those videos by themselves.
00:21:27 Speaker 1
I think it should be doable.
00:21:29 Speaker 1
It also gives some instructions like maybe go a bit slower or go a bit faster so they have to write speed.
00:21:37 Speaker 8
Yeah, so if they take a video which is not good, it tells you that you need to change.

00:21:42 Speaker 3
Yeah yeah change yes.
00:21:44 Speaker 8
OK, OK?
00:21:45 Speaker 3
It also locks the time for 15 seconds so it doesn't get too long.
00:21:49 Speaker 3
Yeah, yeah.
00:21:50 Speaker 8
So you know 5 minutes of filming and.
00:21:52 Speaker 3
Yeah, we heard that yeah.
00:21:54 Speaker 6
Because I can.
00:21:55 Speaker 6
Mentioned when the movie isn't correct at the right place, it can affect your data probably.
00:22:03 Speaker 1
Yes, yeah, that's going to happen.
00:22:03 Speaker 6
Yeah, yeah, yeah, yeah.
00:22:07 Speaker 1
We also are thinking of implementing a function where the owner can only see the results of the analysis when a specialist has releases the results released, but that takes more effort of the specialists.
00:22:23 Speaker 2
Yeah, yeah.
00:22:25 Speaker 1
So that's something to think about.
00:22:27 Speaker 1
Would you be able to to maybe have a look at the results and compare it to the video and see?
00:22:38 Speaker 1
Yes, those are sound results, yeah?
00:22:42 Speaker 4
Yeah, I think yeah.
00:22:42 Speaker 1
Would it take too much time?
00:22:46 Speaker 4
Oh but.
00:22:48 Speaker 4
To release that data can be like.
00:22:50 Speaker 4
One switch, right?
00:22:51 Speaker 3
Yeah, should be one switch, but they need to be checked, especially in the beginning, because the AI model is still playing.
00:22:59 Speaker 3
So there may be like errors and.
00:23:01 Speaker 4
I think it's.
00:23:02 Speaker 4
It's it depends on because if if we implement this we say OK you need to download this app and install it and use it and then come back to us.
00:23:12 Speaker 4
Then it's no problem because then it's your treatment protocol as well.
00:23:18 Speaker 4
There'll be a problem if if people can.
00:23:21 Speaker 4
Download it on their cell and then themselves and then they come for.
00:23:25 Speaker 6
Yes, start making movies and.
00:23:25 Speaker 4
10 start making movies and they they're 10 minute visit and say Oh yeah, yeah, it's lame and I made these movies.
00:23:32 Speaker 4
You can watch and download and then you have to analyze this in 10 minutes.
00:23:36 Speaker 4
Yeah, that's.
00:23:36 Speaker 4
Not that's not doable.
00:23:37 Speaker 1
No, it should be done in advance.
00:23:40 Speaker 1
It should.
00:23:40 Speaker 4
Yeah yeah. And and the.
00:23:42 Speaker 4
Best thing is if we initiate the.
00:23:46 Speaker 4
Usage of the app I think.
00:23:48 Speaker 2
Yeah, yeah.
00:23:48 Speaker 3
But it's not the app on itself, they cannot download it to get results in the sense of, so it always needs.
00:23:55 Speaker 1
We want to have one sensor on the caller to track activity.
00:24:01 Speaker 1
Yeah, and that also makes the analysis more reliable, yeah?
00:24:07 Speaker 4
Yeah, well then that sensor and I do this and then you come back.
00:24:09 Speaker 1
For example.
00:24:10 Speaker 4
Yeah that's no problem.
00:24:13 Speaker 1
Also, that was a suggestion of one of the earlier dog owners.
00:24:13 Speaker 3
More secure.
00:24:24 Speaker 1
Veterinarians when you made an appointment that you get a pre visit questionnaire like you have some standardized questions.
00:24:33 Speaker 4
Oh, I hear you.
00:24:34 Speaker 1
You can also send them before.
00:24:36 Speaker 4
Looking into.
00:24:36 Speaker 2
Yeah, yeah.
00:24:37 Speaker 1
And then also, that's something I did add it in.
00:24:41 Speaker 1
So a little bit more on the usage, yeah?
00:24:43 Speaker 3
On the user side.
00:24:50 Speaker 1
This way, so after you filled in the the questionnaire that you can see, get a reminder like hey, don't forget to take a video before your appointment.
00:25:02 Speaker 1
And maybe we will.
00:25:04 Speaker 1
We will need to set a deadline like do it three days in advance so the veterinarian has some time to start to check.
00:25:09 Speaker 2
Yeah, yeah.
00:25:10 Speaker 1
Yeah, check beforehand.
00:25:12 Speaker 1
Would that be helpful or would you say it's too much of a workload?
00:25:18 Speaker 1
Like we we want to have certain teams.
00:25:19 Speaker 6
If if the questioner can.
00:25:24 Speaker 6
Because for now we have those 20 minutes appointments most of the time when the dog comes in and his name if the pre-visit questionnaire can help us to make it from a 20 to a 10 minutes appointment, for example, then it's helpful that if it's still is like a 20 minute.
00:25:44 Speaker 2
Yeah, yeah.
00:25:44 Speaker 8
Then it's just extra extra work.
00:25:46 Speaker 8
Yeah, yeah, yeah.
00:25:48 Speaker 2
Yeah, yeah, yeah yeah, that's what makes sense, yeah?
00:25:54 Speaker 6
I said she said she still playing for Thomas with me yeah yeah yeah, yeah.
00:25:57 Speaker 1
Thomas fine here.

00:26:01 Speaker 1
Yeah, she's you've been.
00:26:05 Speaker 1
Yeah it.
00:26:06 Speaker 4
Depends on the.
00:26:11 Speaker 1
Thank you.
00:26:14 Speaker 6
Oh yeah, yeah.
00:26:24 Speaker 1
I have a main e-mail address.
00:26:28 Speaker 6
And I understand my concern.
00:26:35 Speaker 4
Yeah, I think it also depends on the length of the questionnaire because it's like 4 pages.
00:26:41 Speaker 2
Uh, yeah.
00:26:41 Speaker 4
But if it's like 10 questions then you can screen.
00:26:44 Speaker 4
Through it especially.
00:26:45 Speaker 4
When you've done it a lot of times and you can filter through the information.
00:26:50 Speaker 8
I don't think it.
00:26:50 Speaker 8
Should be really more than 20 questions like.
00:26:54
It's too much.
00:26:54 Speaker 8
Work per owner.
00:26:55 Speaker 8
I think it's like they get.
00:26:56 Speaker 3
So we may get lost.
00:27:00 Speaker 4
Yeah also.
00:27:01 Speaker 1
From the feedback we got beforehand, he made a.
00:27:04 Speaker 1
I made a yeah, a kind of mock up questionnaire like it's standardized and then maybe you can.
00:27:11 Speaker 1
You will be able to add by hand some other questions if there are specific questions you want to know.
00:27:17 Speaker 1
Yes, yes, so something about the general background of the animal because you might want to know their weight.
00:27:25 Speaker 1
Or owners might not know it exactly, but maybe what they think.
00:27:30 Speaker 8
It is what if we have in the in the in the patient card?
00:27:30 Speaker 4
Yeah, does.
00:27:37 Speaker 1
This information in your own system.
00:27:39 Speaker 4
Yeah yeah, yeah.
00:27:41 Speaker 4
Yeah, the the lost weight and nutrition usually not sometimes if they're got like a medical nutrition from here, like hills or whatever, they yeah usually see it in the.
00:27:53 Speaker 4
Because we charge them for it, so you see it in the product list.
00:27:58 Speaker 4
One thing is you see that relevant medical history.
00:28:01 Speaker 8
I don't think owners can.
00:28:03 Speaker 4
No one really think it is some no, yeah.
00:28:04 Speaker 8
Filter what relevant.
00:28:08 Speaker 4
Sometimes they that can be one sentence.
00:28:10 Speaker 4
It can also be half a.
00:28:12 Speaker 8
Page he.
00:28:14 Speaker 4
He tried to poop.
00:28:15 Speaker 4
It didn't so, but yesterday he did well and yeah.
00:28:15 Speaker 8
Yeah, yes.
00:28:17 Speaker 8
He coughs then yes, OK, yes.
00:28:19 Speaker 1
Yeah, so you might add the maximum amount of words.
00:28:23 Speaker 1
Or should we rephrase it or?
00:28:24 Speaker 4
I think it's rephrased like as you, because this is about lameness, yeah?
00:28:29 Speaker 4
Has he been lame before and then when and how long yeah?
00:28:31 Speaker 8
Yeah, yeah, something like more specific to the lens, yeah?
00:28:35 Speaker 4
Or has he?
00:28:35 Speaker 4
Had like walking, yeah local local mode of problems but then different where the locomotive thing but like joint problems.
00:28:44 Speaker 4
Yes, I think that you should.
00:28:46 Speaker 4
Then you narrow it down to the locomotion part.
00:28:48 Speaker 1
Through walking, yes.
00:28:50 Speaker 8
Otherwise, people are gonna say yeah, you had the diarrhea three weeks ago.
00:28:53 Speaker 8
And yeah, there's nothing to do with the lameness.
00:28:57 Speaker 1
No no yeah not at all.
00:28:58 Speaker 4
If they still have something they want to tell, they can do it on the the one the comments on general function.
00:29:03 Speaker 8
Yeah, yeah.
00:29:05 Speaker 1
True, true, but also we might do a maximum amount of words on there too, so you don't get the whole.
00:29:11 Speaker 4
That can, yeah, that can be a good thing.
00:29:12 Speaker 1
Story yeah yeah.
00:29:14 Speaker 4
Yeah, like like a text message or something, yeah?
00:29:17 Speaker 1
OK, and then the next is about the health problem.
00:29:23 Speaker 1
I think I should make the this not not just days and but.
00:29:28 Speaker 8
I think, well, you could choose between day month here, but then also specify how many.
00:29:37 Speaker 8
Yeah like you can seven months and then two months or something like that.
00:29:37 Speaker 1
OK.
00:29:42 Speaker 8
Yeah yeah yeah.
00:29:44 Speaker 1
And then.
00:29:44 Speaker 4
Yeah, or or an option to when did the symptoms start?
00:29:50 Speaker 4
Or like in question like do you know when the symptoms start and then day month year just leave it like that and or for how long?
00:29:58 Speaker 2
For how long, yes.
00:29:58 Speaker 4
And then they can.

00:30:00 Speaker 4
Sometimes they don't know.
00:30:01 Speaker 4
It's like I don't know a couple of weeks.
00:30:04 Speaker 4
It's not that significant, but then you.
00:30:06 Speaker 4
Know generally what the.
00:30:12 Speaker 1
That the course is implemented.
00:30:16 Speaker 1
And the the orthopedic specialist did ask us to implement something in which we ask of whether there was previous research done or even already a treatment which did or didn't work.
00:30:33 Speaker 4
Naming research like an examination right?
00:30:34 Speaker 1
Would this be helpful?
00:30:35 Speaker 1
An explanation?
00:30:35 Speaker 4
Yeah, yeah, maybe yeah, maybe you.
00:30:40 Speaker 4
Phrase little bit different, like has he been to the vet for this problem before.
00:30:52 Speaker 4
Oh, that's amazing.
00:30:53 Speaker 2
It's a yeah.
00:30:57 Speaker 8
May as may as well, and by Subali and Garrett.
00:31:04 Speaker 8
Yeah, yeah.
00:31:06 Speaker 4
I guess I think that's.
00:31:13 Speaker 4
Because there's that question, I ask people as well.
00:31:15 Speaker 4
If I don't have any history, I think OK.
00:31:18 Speaker 4
Has he been laying before or.
00:31:19 Speaker 4
Has he been to?
00:31:20 Speaker 4
The to your colleague before.
00:31:24 Speaker 4
And did he get like medication and sometimes?
00:31:31 Speaker 4
Yeah, medication is. Yeah, that's.
00:31:36 Speaker 4
OK, yeah.
00:31:39 Speaker 1
It can also be just pain medication and did.
00:31:42 Speaker 1
It work or not or yeah.
00:31:45 Speaker 4
Yeah, usually it's that.
00:31:47 Speaker 4
But it is.
00:31:48 Speaker 4
What kind of medication?
00:31:51 Speaker 1
Yeah, what kind of medication, yeah?
00:31:51 Speaker 2
That was.
00:31:54 Speaker 4
Yeah, I think that's OK.
00:31:56 Speaker 4
Sometimes you can add like brand name, but then it would be a bit.
00:31:59 Speaker 4
Full I think yeah.
00:32:06 Speaker 4
Yeah, I think this is OK.
00:32:07 Speaker 1
Well, that's the.
00:32:09 Speaker 4
Ohh 8:00 o'clock here.
00:32:09 Speaker 8
So the telephone yes.
00:32:14 Speaker 1
Is there anything you missed there in the no.
00:32:21 Speaker 4
And that's screenshot or.
00:32:22 Speaker 1
In in the.
00:32:24 Speaker 1
This one in the the questions we asked beforehand pre visit.
00:32:30 Speaker 1
Would you like something else to be added?
00:32:37 Speaker 4
Did did it add a question like which limb they think it is?
00:32:41 Speaker 3
Or we need one?
00:32:41 Speaker 1
No, not yet.
00:32:43 Speaker 1
That's a nice one, yes.
00:32:46 Speaker 4
Think that yeah, you put it between the symptoms and the cause and the thing if it still fits.
00:32:49 Speaker 9
Somewhere yes, yeah.
00:32:55 Speaker 4
Yeah, which body part?
00:32:56 Speaker 4
Yeah but limp body part or yeah.
00:33:02 Speaker 4
Sometimes you have like the leg but also the neck.
00:33:05 Speaker 4
You know they go like.
00:33:07 Speaker 4
Yes, because it's the pain and comes from the neck maybe or shoulder, but the neck is also.
00:33:13 Speaker 4
Painful because of that.
00:33:14 Speaker 1
Something like, where do you think the the problem is situated?
00:33:21 Speaker 4
Yeah, that's kind.
00:33:22 Speaker 4
Yeah, that's general enough.
00:33:24 Speaker 4
OK, and then maybe like the front back left, right?
00:33:29 Speaker 1
Something like that.
00:33:29 Speaker 4
Like a hint.
00:33:31 Speaker 2
OK.
00:33:33 Speaker 4
For the rest.
00:33:36 Speaker 5
Let's see.
00:33:39 Speaker 1
We've got before when when they first open the application, they need to implement or put their dogs in there.
00:33:47 Speaker 1
We have implemented that they can put more than one dog in there for one owner.
00:33:51 Speaker 4
Yeah, OK.
00:33:53 Speaker 1
And then there is also like sort of questionnaire about your dog.
00:33:59 Speaker 1
It has a lot of information.
00:34:01 Speaker 1
We already had feedback on it and I did not edit it after the feedback, so this is not the end result, but maybe you've got some feedback too about what we.
00:34:10 Speaker 4
These are these are the three.
00:34:11 Speaker 8
Know from them.
00:34:14 Speaker 4
These are three the same ones, so they.
00:34:16 Speaker 4
Come after oh next next yeah yeah.
00:34:17 Speaker 1
Yes, this is the first one, the second one, the third one.
00:34:20 Speaker 1
Yeah first.
00:34:20 Speaker 4
Name and chip number.
00:34:22 Speaker 4
Yeah, that's
00:34:22 Speaker 8

Well, I think most of the.
00:34:26 Speaker 8
These we already know they are like the general information we have.
00:34:32 Speaker 4
That's the fat fat clinic ID number, is it?
00:34:34 Speaker 8
But yeah, yeah, but well, that could be used for if if yeah for us, but they don't know their their ID number.
00:34:34 Speaker 4
The patient number.
00:34:40 Speaker 4
Yeah for us.
00:34:43 Speaker 1
Then in the no.
00:34:44 Speaker 8
No, that's just the number for us and but we could use that to maybe.
00:34:47 Speaker 5
OK.
00:34:54 Speaker 8
Send the with the now on system.
00:34:58 Speaker 4
Yeah, maybe.
00:35:05 Speaker 8
Or should I?
00:35:11 Speaker 4
It should be handy if.
00:35:22 Speaker 1
Yeah, sure.
00:35:22 Speaker 4
How about this?
00:35:23 Speaker 4
Where did you search in?
00:35:27 Speaker 1
I guess it's just a database of what veterinarians or what clinics are connected to the application.
00:35:36 Speaker 1
Yeah, that's.
00:35:37 Speaker 8
OK.
00:35:40 Speaker 1
A certain dog is from your own dogs.
00:35:42 Speaker 1
Which of your dogs is the dog which?
00:35:42 Speaker 8
Yeah yeah yeah yeah yeah OK.
00:35:44 Speaker 1
Is because different dogs could have different veterinarians.
00:35:48 Speaker 8
Yeah OK, yes.
00:35:53 Speaker 4
Yeah, no, that's that's fine.
00:35:53 Speaker 1
Not mainly about this one.
00:35:55 Speaker 4
Yeah, passport issuing organization.
00:35:59 Speaker 1
It's it's also a little bit.
00:36:01 Speaker 1
This is something which is derived from the horses application, which was used by researchers.
00:36:05 Speaker 4
Oh yeah.
00:36:07 Speaker 4
Yeah, passports are very important in in horses, especially because of insurance and stuff like that.
00:36:11 Speaker 1
Yeah, Umm, but it's nothing those.
00:36:14 Speaker 4
For insurance now the microchip number is yeah, and the name and the the the the address and everything breed.
00:36:16 Speaker 1
Yes so.
00:36:22 Speaker 4
Photos nice, yeah?
00:36:25 Speaker 4
Yeah, if it's an error in this, OK.
00:36:30 Speaker 1
Maybe or yeah, maybe let this be filled in by the clinic if necessary.
00:36:34 Speaker 8
Yeah, yeah, but we if we have the name and the I think the ZIP code and the microchip number or something then we can copy it to the right patient.
00:36:50 Speaker 1
So we might even leave this out, yeah?
00:36:54 Speaker 8
Yeah, yeah.
00:36:57 Speaker 8
We don't really use the the patient numbers.
00:37:01 Speaker 8
The ID numbers only.
00:37:04 Speaker 4
But it's it's it's.
00:37:06 Speaker 4
Possible it's not wrong the.
00:37:06 Speaker 8
Yeah, it's possible, yeah.
00:37:08 Speaker 4
Only one that I think is quite useless to us is.
00:37:12 Speaker 4
The best part you.
00:37:13 Speaker 8
Yeah yeah, OK.
00:37:14 Speaker 4
And that's the only one I think is.
00:37:16 Speaker 8
Yeah, well, the issuing organization of the passports are all the same with dogs.
00:37:20 Speaker 4
I mean, since since a year or so we have to register the passport number that we issue in the system, but that's more for which passports we give.
00:37:30 Speaker 4
Out to people to dogs or whatever.
00:37:32 Speaker 4
Yeah puppies, but not, that's.
00:37:35 Speaker 4
Not any.
00:37:38 Speaker 4
For the owner or the dog, it's not really useful.
00:37:41 Speaker 1
No, no, not at all.
00:37:42 Speaker 1
OK, good to know, yes.
00:37:44 Speaker 4
But the rest is OK, but I would call it.
00:37:47 Speaker 4
A patient number patient number yeah.
00:37:50 Speaker 4
That's now it sounds like it's the ID number from the practice as a company.
00:37:57 Speaker 3
That's good, yeah.
00:38:01 Speaker 3
OK.
00:38:01 Speaker 4
Because sometimes usually you don't need it, but sometimes with when you order stuff you need to fill it.
00:38:06 Speaker 4
In or you.
00:38:07 Speaker 4
Send stuff for for diagnostics to laboratories.
00:38:11 Speaker 4
I think colleagues see that they may put in.
00:38:14 Speaker 4
The wrong number.
00:38:17 Speaker 1
And the patient number is not the same as the microchip number, no, no, there's something different.
00:38:21 Speaker 4
No, because Microchip is is really.
00:38:24 Speaker 4
The chip that's in the.
00:38:26 Speaker 4
Dog that or whatever and the patient number is.
00:38:29 Speaker 8
The number of the accounts actually.
00:38:30 Speaker 4
Yeah, you count the number.
00:38:34 Speaker 2
Thank you.
00:38:34 Speaker 8
That the system gives it to the patient.
00:38:36 Speaker 8

If you make a new patient, yeah.
00:38:37 Speaker 5
Yeah correct OK.
00:38:39 Speaker 1
So that's just for your organization.
00:38:41 Speaker 8
Yeah, yeah yeah, it's just yeah.
00:38:44 Speaker 4
Correct, because they're the same dark could be also coming in the clinic across the street and has a different.
00:38:44 Speaker 8
Just for our administration actions.
00:38:51 Speaker 8
A totally different patient than not here, OK?
00:38:51 Speaker 1
Vision number yeah.
00:38:55 Speaker 1
That's Vegas, that's also something which needs to be filled in by you and.
00:38:59 Speaker 1
Not by the owner.
00:39:00 Speaker 8
Yeah, the owner doesn't know their application number no no.
00:39:04 Speaker 8
OK, no, it doesn't no.
00:39:04 Speaker 4
Started Neuberg brief or so and.
00:39:07 Speaker 8
Doesn't say it anywhere.
00:39:09 Speaker 8
No on stickers or everything.
00:39:11 Speaker 9
OK, I showed you this one.
00:39:13 Speaker 3
Shut the boat and release result.
00:39:16 Speaker 1
Yes, the chat is in.
00:39:18 Speaker 1
We don't want you to be spent by owners, so we need to have a suggestion for this.
00:39:27 Speaker 1
One of the suggestions was to have a standardized questions which you can ask.
00:39:33 Speaker 4
Hi, I can contact form on the website.
00:39:35 Speaker 3
Yeah, yes, like a decision tree with all the questions they may have and just pull them down and have it standardized.
00:39:44 Speaker 1
And if they.
00:39:45 Speaker 8
If they have.
00:39:45 Speaker 8
More difficult questions you will they should go.
00:39:48 Speaker 1
Yeah indeed.
00:39:48 Speaker 8
For for advice, yeah.
00:39:49 Speaker 4
Maybe there can be like an option to that they send an e-mail.
00:39:54 Speaker 4
But then to the general e-mail, be can still leave that name with.
00:39:59 Speaker 4
The doctor blah.
00:40:00 Speaker 4
Blah and then that it sends an e-mail via the app to.
00:40:05 Speaker 4
Our regular e-mail info mail.
00:40:06 Speaker 8
To our info meal, yeah.
00:40:09 Speaker 4
Because then, at the desk they will filter it through and put it in, because that's the way we work.
00:40:14 Speaker 4
If we get an e-mail that's from me.
00:40:16 Speaker 4
They put it in there.
00:40:17 Speaker 4
Yeah, as a attack job for me to look at.
00:40:18 Speaker 2
OK.
00:40:22 Speaker 4
So they're the first filter as.
00:40:25 Speaker 5
OK, great, that's helpful.
00:40:27 Speaker 5
Yeah yes.
00:40:27 Speaker 4
Because we have like personalized company emails, but that's more for inter inter to this communication that you use but not for.
00:40:31 Speaker 8
Nobody listens.
00:40:36 Speaker 4
The people, because I didn't look at it every day.
00:40:36 Speaker 2
Not for the patients.
00:40:38 Speaker 8
And I think if we have another another app or system which sends us messages, well, that's.
00:40:46 Speaker 4
Yeah, that's available.
00:40:46 Speaker 8
I think.
00:40:47 Speaker 8
Gonna be a lot of work to take extra.
00:40:48 Speaker 4
We already have trouble with Facebook and Instagram so.
00:40:51 Speaker 8
Yeah, yeah.
00:40:52 Speaker 4
It's already work work enough.
00:40:54 Speaker 3
Oh God OK.
00:40:55 Speaker 1
Yeah, yeah I can.
00:40:56 Speaker 1
Imagine also the specialist total stuff there's by law, something that you need to keep track of.
00:41:04 Speaker 1
All communication is that.
00:41:06 Speaker 1
Also, for your practice, or is that only for the specialists?
00:41:12 Speaker 4
And not for us.
00:41:14 Speaker 4
I mean.
00:41:14 Speaker 4
Maybe, but nobody.
00:41:16 Speaker 4
Really does some.
00:41:18 Speaker 4
I've never heard of it.
00:41:20 Speaker 4
And the only thing I knew was like.
00:41:23 Speaker 4
Laws is the X-rays that you use. They save them for I think 20 years.
00:41:30 Speaker 4
Things like that.
00:41:33 Speaker 4
E-mail communications.
00:41:35 Speaker 8
No, no OK no, I mean.
00:41:39 Speaker 8
Sometimes we put an e-mail like in the patient card.
00:41:43 Speaker 1
Only if it's stating something important.
00:41:46 Speaker 8
Yeah, only only if it's telling some some medical information or something. Everybody needs to know when they open the patient's car or if it's just a question like I'd like to order a bag of food for my.
00:41:50 Speaker 7
It's important.
00:41:51 Speaker 2
Yeah, yeah.
00:41:58 Speaker 8
Dog, then no, we just answer it and throw it away.
00:42:01 Speaker 8
You know we we don't save.
00:42:03 Speaker 8
That community commute.
00:42:04 Speaker 8
That if it's medically relevant to we might put it in the car, but.
00:42:08 Speaker 9
Otherwise, otherwise not well, let's see last one also.

00:42:17 Speaker 1
I think I already told a lot.
00:42:19 Speaker 1
Yeah we would like to have some interruption in whether the owner can see the results or.
00:42:25 Speaker 8
Not, Oh yeah, yeah yeah, it's OK.
00:42:28 Speaker 1
Yeah, but I think it's nice to show them like this is our result and make an appointment or.
00:42:34 Speaker 4
Yeah, because because at first I told you I I would like them to see something.
00:42:39 Speaker 4
But if it's initiated from our side it doesn't matter then that this is OK.
00:42:42 Speaker 2
No, sorry.
00:42:43 Speaker 4
Yeah, and it's maybe a good thing to get them motivated to return because you don't really have the power over that.
00:42:52 Speaker 4
Sometimes sometimes they just say.
00:42:54 Speaker 4
Yeah, it's OK.
00:42:55 Speaker 4
And then you don't see them for two months.
00:42:58 Speaker 4
Because of some or the other and and now they have to come back because it's useless to them if they don't.
00:43:04 Speaker 2
Yeah yeah, yeah.
00:43:09 Speaker 3
Yeah, but the point and we're sisters with that.
00:43:11 Speaker 3
Especially so like we have clients from Friesland are very far away.
00:43:15 Speaker 3
So if we can release the results without having to come over, yeah.
00:43:20 Speaker 8
Yeah, for them, that's but here.
00:43:21 Speaker 4
Yeah yeah yeah no.
00:43:23 Speaker 4
I don't literally mean them to come over, but yes we what we do is.
00:43:29 Speaker 4
But that's more our choice that we see just come over, and then I'll release them.
00:43:34 Speaker 4
And but if they come over or release them from a distance, that's I.
00:43:40 Speaker 4
Don't care, but.
00:43:41 Speaker 4
I think she know she would, yeah, but then if if I'm still have the power of the switch then I can decide.
00:43:41 Speaker 1
Maybe it depends on the case.
00:43:49 Speaker 4
If they have to come over or not so.
00:43:51 Speaker 8
Yeah, yeah.
00:43:53 Speaker 4
So no, I'll just yeah.
00:43:55 Speaker 1
Maybe we can show them this, but have some extra information after you release that.
00:44:03 Speaker 1
We say, OK, we we found this and this or a particular diagnosis you sent a diagnosis instead of you think something is.
00:44:14 Speaker 4
Yeah, like a like a.
00:44:17 Speaker 4
Result, yeah.
00:44:19 Speaker 4
Written result, yeah, that's that's.
00:44:21 Speaker 7
That's OK.
00:44:23 Speaker 4
Maybe something that we can put.
00:44:24 Speaker 4
In there.
00:44:25 Speaker 4
Yeah, yeah, what did you mean? Yeah, like like they usually what? What I why I want them to come along is because I can show it on the screen and I can point at it and say this is this this if you want to do that with the X-ray and even blood work as well because I can tell you the values are OK.
00:44:29 Speaker 1
Well, actually.
00:44:45 Speaker 4
To the by the phone.
00:44:47 Speaker 4
But it's for them more helpful if I just point them through, because then they see the bar if it's it's.
00:44:52 Speaker 4
OK, or it's red or blue?
00:44:55 Speaker 1
Colours do work.
00:44:56 Speaker 4
We have their attention a bit more.
00:44:56 Speaker 1
Yeah, it's magic.
00:44:59 Speaker 1
Yes, because in the first person below we implemented a lot of.
00:45:07 Speaker 1
Graphs which they told it's way too complicated that normal fats don't understand.
00:45:14 Speaker 1
But if you have the graphs, we did implement a section where you can leave a comment on top of a graph or make a notation on top of a graph.
00:45:26 Speaker 1
Would something like this still be helpful or would you say it's way too complicated to see those graphs?
00:45:33 Speaker 8
For the owner.
00:45:35 Speaker 4
Yeah, this is for the veterinarian right?
00:45:36 Speaker 4
Or for the owner as well.
00:45:38 Speaker 1
Maybe even not for the veterinarian, but only for the researcher side of the.
00:45:45 Speaker 1
If you would like it, like.
00:45:52 Speaker 4
Yeah, it doesn't really matter for us as much.
00:45:55 Speaker 5
OK.
00:45:56 Speaker 1
Like the chance that you're going to use it is maybe quite low as it's more complicated and more time consuming.
00:46:01 Speaker 4
Yeah, maybe if you do it on a regular basis and it's really your thing as a vet to do this.
00:46:07 Speaker 4
Not like an orthopedic but more like a.
00:46:12 Speaker 4
You do these consults a lot, then you know then it's maybe nice to know all these values.
00:46:20 Speaker 4
But it is nice to see if one is more.
00:46:25 Speaker 4
Affected than the other?
00:46:26 Speaker 4
Yeah to see a difference.
00:46:29 Speaker 4
So this is like these bars or something that's.
00:46:32 Speaker 1
It's in person between left and right.
00:46:33 Speaker 4
That's OK.
00:46:37 Speaker 4
Like the standard deviation and stuff like that.
00:46:41 Speaker 4
That's research side, that's.

00:46:42 Speaker 1
The response may be nicer, but you can see there's quite a big difference here between.
00:46:48 Speaker 4
Yeah, this is this is nice.
00:46:49 Speaker 1
Left and right.
00:46:51 Speaker 4
Yeah, then you just see the difference.
00:46:53 Speaker 4
It's optical you.
00:46:54 Speaker 4
Don't have the.
00:46:57 Speaker 4
Because the numbers then you have to check what the numbers mean.
00:47:02 Speaker 4
And yeah, if you do this once a month, you forget that all time you look it up and then you forget it about it.
00:47:07 Speaker 4
And then yeah, you have one again, so that's not for an orthopedic surgeon.
00:47:11 Speaker 4
They they see them all day every day, so.
00:47:16 Speaker 1
This might be more helpful.
00:47:18 Speaker 1
You can see look it's different, but that's actually.
00:47:23 Speaker 1
The same as something like this.
00:47:26 Speaker 1
Yeah, I can see the left and the right.
00:47:31 Speaker 1
Actually, this is right.
00:47:32 Speaker 1
This is left.
00:47:33 Speaker 1
That's maybe a little bit confusing, but.
00:47:37 Speaker 4
Withers what are those?
00:47:38 Speaker 1
Where there's the shoulders.
00:47:41 Speaker 1
Between the shoulders.
00:47:42 Speaker 1
It's used in horses, it's the yeah, yeah.
00:47:48 Speaker 1
And that's because in these measurements there was still a sensor on the weatherson on the sacrum, so it's basically it will be shoulders and hips probably.
00:48:01 Speaker 4
And what is like the color and the size?
00:48:05 Speaker 4
That's the deviation.
00:48:07 Speaker 1
Yes it is.
00:48:08 Speaker 1
Yeah yes.
00:48:09 Speaker 1
So this was the average.
00:48:11 Speaker 1
From one whole measurement.
00:48:13 Speaker 1
And then.
00:48:13 Speaker 4
And do you also have like?
00:48:15 Speaker 4
A normal line like a reference line.
00:48:18 Speaker 1
Well, it's mostly comparing between left and right.
00:48:21 Speaker 1
Here you can see this is higher and this is lower, yes.
00:48:24 Speaker 4
Oh yeah, of course.
00:48:25 Speaker 4
Yeah yeah forgot.
00:48:26 Speaker 1
And then here the left front leg is lower and the right front leg is higher and.
00:48:33 Speaker 1
This was a horse in which there was an induced limp on the right front leg.
00:48:40 Speaker 1
So you can see on the right front leg the head is higher and on the sound limb the left one.
00:48:46 Speaker 9
Head slower.
00:48:47 Speaker 1
That is low, but those are the Withers, so the witters are higher and lower, so it's also telling you that it's putting less weight on.
00:48:55 Speaker 1
The right front leg and more on the left.
00:48:58 Speaker 4
Yeah it's right or left.
00:49:02 Speaker 4
It goes down, yeah.
00:49:04 Speaker 1
So and for now, you can see there's not much of a difference in this one, and that's because the induced lameness was in the front legs and the back legs weren't that much affected.
00:49:14 Speaker 4
These these graphs are, I think helpful.
00:49:16 Speaker 4
Yeah yeah, because as long as you because this is quite easy to see.
00:49:18 Speaker 3
OK.
00:49:21 Speaker 4
It's it's visual.
00:49:23 Speaker 4
You know what it means?
00:49:24 Speaker 4
A bit, especially with the bars on the on the.
00:49:28 Speaker 4
Underneath, I just think that like the numbers, they don't matter.
00:49:33 Speaker 4
But this is visual, so it's.
00:49:35 Speaker 1
It's more helpful than here.
00:49:36 Speaker 4
Yeah, I didn't mean these numbers don't matter, it's because of, right, you know, but the standard deviation which we saw in the other graph.
00:49:44 Speaker 2
Yeah, OK.
00:49:45 Speaker 4
That's too specific.
00:49:47 Speaker 1
Too much of pain.
00:49:49 Speaker 4
Yeah, but this this is yeah.
00:49:50 Speaker 1
Also here is the like what is happening during push off and impact moment of impact head is.
00:50:00 Speaker 1
Nearly always at this place in the moment of push off, it's in this place and it could be helpful, but I actually don't really know what it is saying, but in the horses they use this.
00:50:17 Speaker 1
To see well at least you can see here in the during the push off they are more leaning towards the left side.
00:50:25 Speaker 1
Well, which is, I think if they're limping on the right side, they put more of their weight to the.
00:50:34 Speaker 4
Yeah, it's the same thing with open down with the the good and the bad leg of thing.
00:50:41 Speaker 4
I don't really think it's really useful in dogs though, where you need that left like a Great Dane.
00:50:41 Speaker 3
And then.
00:50:47 Speaker 4
That's really big.
00:50:48 Speaker 4
It's almost like a war.
00:50:48 Speaker 9
Yeah, yeah.
00:50:50 Speaker 4
Then you can get maybe just.
00:50:54 Speaker 1

So and on the right leg you can see on the moment of impact it's more to the right, maybe because it's a little bit of falling or not really have control, but.
00:51:04 Speaker 4
Yeah you can what what we talked about.
00:51:06 Speaker 1
I think.
00:51:07 Speaker 4
The dogs they sometimes go all over the place.
00:51:10 Speaker 4
Yeah, and sniff something and it moves that way.
00:51:12 Speaker 4
It moves that way, and.
00:51:13 Speaker 4
It's like horses, they know OK, I have to go trot and do my thing.
00:51:16 Speaker 1
They follow their nose no.
00:51:17 Speaker 4
Yeah, they're trained and everything.
00:51:23 Speaker 4
So yeah, especially Labrador retriever or something.
00:51:25 Speaker 4
They're like these happy dogs that go.
00:51:29 Speaker 4
They sniff something in the bushes, they're gone so.
00:51:34 Speaker 3
Hat symmetry may be lost.
00:51:39 Speaker 4
That's that head bobbing.
00:51:41 Speaker 4
That's that's, I think.
00:51:45 Speaker 1
This fullness may be more useful.
00:51:49 Speaker 5
This one right?
00:51:50 Speaker 4
Yeah, I think so.
00:51:51 Speaker 5
I think we've had everything.
00:51:55 Speaker 5
This is what we showed in the.
00:51:58 Speaker 1
Dog owner application.
00:52:03 Speaker 1
Yeah, and those those are the frames for the videos.
00:52:03 Speaker 9
They're the same bot.
00:52:07
Oh yeah.
00:52:07 Speaker 1
And well, yes, there's a task below someone today said us that it needs to be larger.
00:52:19 Speaker 1
And then it's the idea that the.
00:52:24 Speaker 1
The dog should be inside the dog frame through the video so the dog frame is currently from 15 going to one, and then every time it's moving a little bit towards the right.
00:52:36 Speaker 1
So should contain your dog inside the frame.
00:52:43 Speaker 1
I think that's the easiest way to show the pace or the speed in which the dog should move from left to right.
00:52:49 Speaker 4
Well, they don't.
00:52:49 Speaker 4
They don't.
00:52:50 Speaker 4
They don't move the.
00:52:52 Speaker 1
We want the camera to be fixed because too much shaking in the camera might.
00:52:59 Speaker 1
Violent yeah yes.
00:53:01 Speaker 3
There it goes.
00:53:05 Speaker 4
Like steadily fixed or.
00:53:09 Speaker 3
You know, just stay like this.
00:53:11 Speaker 4
That's OK.
00:53:12 Speaker 3
Yeah, yeah, OK.
00:53:13 Speaker 3
They're not going to have a standing, probably.
00:53:17 Speaker 4
But they can't turn or something or.
00:53:20 Speaker 3
We would like them not to.
00:53:21 Speaker 4
Because the film had to be like 50 seconds 15.
00:53:24 Speaker 5
Yes 15.
00:53:26 Speaker 4
Ohh, I thought you said 50 years and.
00:53:29 Speaker 1
No, that's not doable, yeah.
00:53:29 Speaker 3
We were told it's too much.
00:53:32 Speaker 4
I thought it was a big along with.
00:53:34 Speaker 3
Yeah, we keep it short and sweet so it's clear.
00:53:37 Speaker 4
Yeah yeah, yeah.
00:53:38 Speaker 1
In the end.
00:53:39 Speaker 3
Because it's also free perspectives or of the weightlift.
00:53:41 Speaker 4
You know, 15 seconds is quite long I think for the average dog and long owner.
00:53:43 Speaker 1
Yeah, we need like a minimum amount of strides to make sure we have a good measurement.
00:53:51 Speaker 4
Yeah, yeah.
00:53:51 Speaker 1
To have a reliable measurement.
00:53:53 Speaker 4
Yeah no. I thought that 56.
00:53:55 Speaker 4
Into that frame.
00:53:59 Speaker 1
And then also, if it's going too fast, we can get the notification go a little bit slower or faster.
00:54:02 Speaker 2
Yeah, like.
00:54:05 Speaker 1
Or this is just the example.
00:54:09 Speaker 1
I think about it.
00:54:10 Speaker 4
Yeah, that's that's good, because sometimes sometimes we let people like take a picture of the wound or something just to check or they don't want to come.
00:54:21 Speaker 4
And they say OK, can you make a picture of the spot or whatever?
00:54:24 Speaker 4
And it's like everything is on there except the spot like everything is sharp except the spot or the wound.
00:54:31 Speaker 4
Yeah, so I think this is a quite a good barrier that.
00:54:36 Speaker 4
Prevents us from getting a lot.
00:54:38 Speaker 4
Of moving material.
00:54:39 Speaker 4
That's yeah, crap, yeah.
00:54:42 Speaker 1
OK nice, any remarks on what we did or things that just pop in your mind.
00:54:50 Speaker 4
No, not yet.
00:54:50 Speaker 4
I think everything is in there.
00:54:52 Speaker 4
I'm not sure about all the information that we're getting, how much I'm going to be able to do with it.
00:55:01 Speaker 4
Well, that's Sir.
00:55:03 Speaker 1

How much time do you think you would?
00:55:08 Speaker 1
Have to use the app or would you say it's just opening seeing this picture and then closing it again or?
00:55:15 Speaker 4
I think if if if you use it a lot, you can just see that in the graphs and you think OK, this and that that you become acquainted to it.
00:55:24 Speaker 4
It goes quite quickly, I mean.
00:55:27 Speaker 4
It's just with the patient chart.
00:55:30 Speaker 4
In the beginning, when you start working, it's a little bit difficult, but now if I have a patient that has a problem, I scan like six months of what is going on and I.
00:55:40 Speaker 4
Can do that in a.
00:55:41 Speaker 4
Couple of minutes.
00:55:42 Speaker 4
So it's the same with this and beginning.
00:55:45 Speaker 4
It will take you a long time.
00:55:46 Speaker 4
So yeah, what's this?
00:55:47 Speaker 4
What's that?
00:55:48 Speaker 4
And then if you use it often enough then I think it will be quite quick.
00:55:54 Speaker 4
OK, I think the the biggest problem is going to be to get people to.
00:55:59 Speaker 4
Make movies right.
00:56:01 Speaker 6
That's my vibe.
00:56:02 Speaker 4
Yeah, I think that will be the main threshold.
00:56:05 Speaker 2
I think yeah, yeah.
00:56:07
OK.
00:56:08 Speaker 3
Instructions and.
00:56:10 Speaker 3
Refusing them when it's not good and still keeping them engaged, yeah.
00:56:15 Speaker 4
I would like to think OK, I'm never gonna make.
00:56:17 Speaker 4
It never mind.
00:56:19 Speaker 3
Yeah, because it's the attitude though the the app is acting up, that's not the save.
00:56:29 Speaker 3
Right leftover questions after the week.
00:56:34 Speaker 1
You can check the swing.
00:56:35 Speaker 4
She had that cripple cap, I think I.
00:56:38 Speaker 4
Don't know how.
00:56:38 Speaker 4
Much you still want to see.
00:56:41 Speaker 1
Oh for the yeah.
00:56:43 Speaker 1
The patients, yes.
00:56:45 Speaker 1
I think it's there.
00:56:48 Speaker 3
Oh yeah, just one last question like should the app assist the dog in like professional advice like telling them maybe do this type of exercise to system improvement or is that?
00:56:59 Speaker 4
I don't think that's helpful.
00:57:02 Speaker 3
OK.
00:57:03 Speaker 4
I think it.
00:57:03 Speaker 4
Should be more of the no, just it can give them that information, but always after a check from.
00:57:12 Speaker 4
Us or the assistant?
00:57:17 Speaker 4
Because then you know.
00:57:17 Speaker 1
So it's easier if you say hey, they need to get a reminder after a few days so you get an automated reminder.
00:57:25 Speaker 1
Or you can choose that they get an automated automated reminder.
00:57:30 Speaker 4
I think that's that's more convenient because we do that as well now, because of the employments we we make, the reminders and we send them.
00:57:39 Speaker 4
To the people.
00:57:42 Speaker 4
Because sometimes you have these people.
00:57:44 Speaker 4
Go on holiday or whatever.
00:57:45 Speaker 4
So you need to be able.
00:57:48 Speaker 4
Maybe just those dates or they're not here or whatever.
00:57:52 Speaker 3
OK.
00:57:54 Speaker 4
I think that's.
00:57:56 Speaker 4
That for the regular updates, maybe for the long term treatments maybe.
00:58:01 Speaker 4
You can do.
00:58:04 Speaker 4
Automated 1 yes.
00:58:08 Speaker 1
Or let you choose after how much time an automated message will be sent.
00:58:13 Speaker 4
Yeah, I think that's because if she's going to do that, that regular checks, then she makes the appointment with the owners and.
00:58:19 Speaker 4
Then we put in the reminder.
00:58:21 Speaker 4
Thing that's that's more convenient.
00:58:25 Speaker 4
But that that's for us and.
00:58:27 Speaker 4
I don't know for other.
00:58:28 Speaker 4
If it's it's if you practice this his own.
00:58:31 Speaker 3
Yes, thanks, OK, thank you.
00:58:36 Speaker 4
Still have any questions you can always.
00:58:43 Speaker 1
Weekly by weekly online.
00:58:44 Speaker 4
Yeah, so you can always ask them to transfer this to me.
00:58:48 Speaker 1
OK, that's nice, thank you.
00:58:53 Speaker 1
Would you also like?

APPENDIX G TRANSCRIPT FIRST DOG OWNER INTERVIEW

00:00:00 Speaker 1 interviewee
Ik hoop dat ik kan helpen hoor [I hope I can help at all]
00:00:01 Speaker 2 Monique
Ja nee het is oke, zo niet dan [yeah it's okay, if not then]
00:00:03 Speaker 2
Dan hebben we in ieder geval wat meer input was als het niet helpt dan kunnen we ook dingen aanpassen [then we've got at least a bit more input, cause even when it doesn't help we also kan change our prototype]
00:00:03 Speaker 1
Yeah, yeah.
00:00:08 Speaker 2
Want dan is het blijkbaar niet handig dat we het maken en als het niet gebruikt wordt is het zinloos [cause then its apparently not gonna be used and it will be useless]
00:00:14 Speaker 1
Yeah yeah OK, yeah.
00:00:17 Speaker 2
Our first question is starting with your dog, did you?
00:00:24 Speaker 2
Ever see your dog limping or euh, heb je mankheid gezien [did you see lameness]
00:00:30 Speaker 1
No, not at all.
00:00:30 Speaker 2
Is de hond nooit mank geweest of een klein beetje moeite met lopen [is the dog never been lame or even a little bit trouble walking?]
00:00:36 Speaker 1
Only when I stepped on his toe and then he was walking limp and but we went to the.
00:00:39
OK.
00:00:44 Speaker 1
The vet and now.
00:00:46 Speaker 1
After a while it was OK
00:00:47 Speaker 2
So you exactly knew which leg it was and what was happening.
00:00:49 Speaker 1
Yes, yeah.
00:00:51 Speaker 2
What did you see in your dog?
00:00:52 Speaker 2
What did it do?
00:00:53 Speaker 2
How did you see it was limp?
00:00:55 Speaker 1
He didn't put pressure on this on the leg.
00:01:01 Speaker 1
And he was walking..
00:01:01 Speaker 2
You put no weight down.
00:01:02 Speaker 1
Yeah, no weight down.
00:01:04 Speaker 2
Yeah he was walking?
00:01:06 Speaker 1
Yeah, and he didn't, yeah.
00:01:10 Speaker 1
I I don't know how to say it in Dutch [she mend English].
00:01:12 Speaker 1
Hij was aan het strompelen [he was stumbling]
00:01:14 Speaker 2
Yeah, little bit of stumbling maybe.
00:01:18 Speaker 1
Yeah yeah.
00:01:20 Speaker 1
But then that was only in small accident, not from himself, yeah.
00:01:25 Speaker 2
That's OK because we generally see that it's quite hard to see if a dog is lame or which leg is lame.
00:01:32 Speaker 2
You knew exactly because you saw it happen.
00:01:32
OK.
00:01:33 Speaker 1
Yes yeah yeah.
00:01:36 Speaker 2
So, did you also use something to monitor?
00:01:40 Speaker 2
Maybe a dagboek [diary] or something to see what happened the day after or to see?
00:01:46 Speaker 1
I did not use diary, but when I went to the vet then he got something for pain and after that the next day he was not so.
00:01:59 Speaker 1
Lively with as normal that is running, but two days later it was already OK.
00:02:05 Speaker 2
It was just OK.
00:02:06 Speaker 1
Yeah, yeah.
00:02:06 Speaker 2
Yes, so we got a little bit of pain medication and.
00:02:10 Speaker 2
That's it, yes, yes.
00:02:14 Speaker 2
Check my questions.
00:02:20 Speaker 2
So did the veterinarian.
00:02:23 Speaker 2
You already knew the problem.
00:02:24 Speaker 2
There was something with his toe, maybe because you stepped on his foot.
00:02:28 Speaker 1
Yeah it was.
00:02:30 Speaker 1
Yeah, it's the food was because I was on it with my shoes so they would have for.
00:02:36 Speaker 2
Oh yeah, yeah. Zoals wij zeggen een blauwe plek of een kneuzing [as we say a bruise or contusion]
00:02:38 Speaker 1
Maybe yes
00:02:44 Speaker 2
Did the veterinarian explain exactly what what was wrong?
00:02:49 Speaker 2
Did you have? Was het makkelijk te begrijpen [was it easy to understand?]
00:02:53 Speaker 1
He said something with a muscle maybe was yeah injured, yeah, but nothing was broken.
00:03:02 Speaker 1
He felt everything and no pees [tendon].
00:03:07 Speaker 1
The pees [tendon] they don't.
00:03:07 Speaker 2
Yeah yeah, like the the muscle is fastened with.
00:03:15 Speaker 3
OK, it's fine [about the translation, we didn't know the correct English word for tendon].
00:03:17 Speaker 1
And I don't know.
00:03:19 Speaker 1
But but he examined everything.
00:03:22 Speaker 1
If it was broken or because I I carried him all the way home.
00:03:28 Speaker 1
And He was very heavy because he didn't want to walk.
00:03:31 Speaker 1
On it and, but yeah no, nothing broken.
00:03:36 Speaker 1
And is he said that it's painful and when he has his medication he will notice I have no pain and he.
00:03:44 Speaker 1
Will walk again, yeah.
00:03:45
[dog noise]
00:03:50 Speaker 2
He Almost opened the door.
00:03:56 Speaker 2

So did you.
00:04:00 Speaker 2
Yeah, we can ask if.
00:04:03 Speaker 2
I wear smart Smart watch which tracks.
00:04:05 Speaker 2
My activity yes.
00:04:07 Speaker 2
Do you ever use it yourself or something like that?
00:04:09 Speaker 1
No no no.
00:04:10 Speaker 2
Or when you monitor your own activity.
00:04:13 Speaker 2
No, oh steps, yes, step counter that's.
00:04:13 Speaker 1
Only my daily steps, yeah, yeah.
00:04:16 Speaker 1
Yeah, but that's also good.
00:04:17 Speaker 1
Yeah, yeah.
00:04:17 Speaker 2
Also here, yes because.
00:04:20 Speaker 1
Also with the phone But sometimes I forgot.
00:04:21 Speaker 1
Then I lay my phone down on the desk and then.
00:04:24 Speaker 2
We we can do similar things with dogs.
00:04:26 Speaker 2
Would you be interested in something like this?
00:04:28 Speaker 2
Like to to monitor their activity, how much they walk or how much they?
00:04:35 Speaker 1
Do you like it to have it for your study or something?
00:04:40 Speaker 2
Yeah, for for example, yeah.
00:04:41
Yeah, yeah.
00:04:43 Speaker 1
So if if it helps you, I can.
00:04:45 Speaker 1
Do it.
00:04:46 Speaker 2
Or would you be interested in where in general we're not going to give you something or but?
00:04:53 Speaker 1
Yeah, maybe in in in general.
00:04:55 Speaker 1
Yeah I, I know this dog has to walk at least.
00:05:00 Speaker 1
More than a one hour walk, so most of the time he has two hours in the day or something.
00:05:09 Speaker 1
So I know.
00:05:10 Speaker 1
It for myself this I yeah sometimes.
00:05:13 Speaker 2
You know the dog good enough to know he has exercised enough or.
00:05:16 Speaker 1
Yeah, yes, we last the Tuesday.
00:05:18 Speaker 1
We went to the opvang [daycare] yeah and then I know at night he doesn't have to walk that long because yeah he has played with all the all the dogs.
00:05:29 Speaker 1
So then he's tired.
00:05:30 Speaker 2
He's tired enough, he's exhausted.
00:05:31 Speaker 1
Yeah, yeah.
00:05:35
Good thing.
00:05:37 Speaker 2
So, UM, we are creating this application [ill move to your side]. Please show it OK.
00:05:49 Speaker 2
So the idea of the application is to keep track of the the movement of a dog.
00:05:56 Speaker 2
So if it's lame or not, or and the idea is to have some sort of a diary, but maybe not daily but.
00:06:06 Speaker 2
And every now and then that.
00:06:09 Speaker 2
You can take a video of the dog.
00:06:11 Speaker 2
This is the main screen and this is already the video screen which is inside.
00:06:17 Speaker 1
Yeah, OK.
00:06:17 Speaker 2
Yeah, then we take a video of your dog.
00:06:21 Speaker 2
Follow the instructions.
00:06:24 Speaker 2
The application is able to make an analysis.
00:06:26 Speaker 1
Yeah, it's like when I go to a sports shop.
00:06:27 Speaker 2
What is happening in the.
00:06:31 Speaker 1
And you have to wear running shoes sometimes some shops.
00:06:35 Speaker 1
They then you have to walk and they make and analyze from the front from video.
00:06:40 Speaker 1
If you are walking with your leg, yeah they like that or more inside or outside balances, maybe yeah.
00:06:41
Oh wow.
00:06:44 Speaker 2
OK examples yes yeah.
00:06:47 Speaker 2
That's indeed a good example of what can be done.
00:06:51 Speaker 2
What we do is we.
00:06:54 Speaker 2
See how the joints are moving?
00:06:57 Speaker 2
Yeah and yeah.
00:06:59 Speaker 3
[dog jumps at Alex] Good boy.
00:07:02 Speaker 2
And then we can extract all the information to see what kind of movement this dog is making and compare.
00:07:09 Speaker 2
For example, the left and the right which with each other because what you see if a dog is lame, they most of the time show that there is a difference.
00:07:19 Speaker 2
They're not so symmetrical anymore.
00:07:25 Speaker 2
So it's very important to see if the dog is walking symmetrically on the left and right side and then you.
00:07:30 Speaker 1
Yeah yeah yeah yeah.
00:07:32 Speaker 2
Can see and.
00:07:33 Speaker 2
There might be something happening.
00:07:35 Speaker 1
And are you of taking a video from the left to the right or also the?
00:07:39 Speaker 1
Then he walks through towards you?
00:07:42 Speaker 2
Both both yeah.
00:07:43 Speaker 1
Oh yes, OK.
00:07:43 Speaker 2
So there are actually three steps here with the first from the left to the right and then towards you and away from you and the towards and away are used.
00:07:51
Oh yeah.
00:07:56 Speaker 2
Yeah, it's depending on if there's something maybe in the front legs or in the back legs, or you do it both.

00:08:05 Speaker 2
Taking too long. [the dog gets impatient]
00:08:09 Speaker 2
So the results should be something like this.
00:08:11 Speaker 2
In your case where you can see we saw something which was not symmetrical.
00:08:12
OK.
00:08:18 Speaker 2
The problem might be in the right leg in the shoulder even and then please contact your vet to make an appointment.
00:08:25 Speaker 2
OK, and the idea is also to have.
00:08:28 Speaker 2
The results compared to maybe an earlier measurement?
00:08:31 Speaker 1
Yeah, that you can see the difference, yeah?
00:08:33 Speaker 2
Yes may overtime.
00:08:35 Speaker 2
So if you say every month take a video, was it the same last?
00:08:39 Speaker 2
Month was it different, yeah?
00:08:44 Speaker 2
Stell [suppose], for example, you would be using such an application.
00:08:51 Speaker 2
How often would you be interested in taking a video?
00:08:55 Speaker 2
Would you do it weekly, daily, monthly?
00:08:57 Speaker 1
I think yeah, yeah.
00:08:59 Speaker 2
Monthly, monthly is a nice interval?
00:09:01 Speaker 1
Yes, I think so.
00:09:03 Speaker 2
And then also the idea is to have the application connected to your veterinarian.
00:09:10 Speaker 2
To the dierenarts [vet].
00:09:12 Speaker 2
So he can also thank you a reminder like, hey, it's time to, for example, take a walk with your dog and film, make make a video.
00:09:21 Speaker 1
Yeah, OK yeah and is it?
00:09:23 Speaker 2
To be evaluated.
00:09:25 Speaker 1
Maybe because these labradors are known on the [unaudible]?
00:09:31 Speaker 2
The hip dysplasia, the shoulder and elbow, and.
00:09:33 Speaker 1
Yeah, yeah.
00:09:38 Speaker 1
Is it necessary?
00:09:39 Speaker 1
Do you think when?
00:09:41 Speaker 1
They are young.
00:09:42 Speaker 1
Or after they are five years or so.
00:09:46 Speaker 1
That it's more.
00:09:47 Speaker 1
That's a more grown weight is stable.
00:09:52 Speaker 2
I think, Ideally you would.
00:09:55 Speaker 2
See that the dog is lame at the the the beginning of that.
00:10:00 Speaker 2
He becomes lame.
00:10:02 Speaker 2
So if you keep track of it all his life long you know hey now is something different.
00:10:06 Speaker 1
Yes, OK yeah yeah yeah.
00:10:09 Speaker 2
But not only from adulthood.
00:10:13 Speaker 1
No, because it's because I think.
00:10:17 Speaker 1
When there's a pop or like this, he's 1 1/2 year almost.
00:10:22 Speaker 1
Is he done?
00:10:23 Speaker 1
Is he not more lively than when they become older?
00:10:26 Speaker 1
I think I don't know
00:10:27 Speaker 3
Yeah, it's also the possibility when the young to have a minor injury and you don't know this and then they develop with a.
00:10:27 Speaker 1
Know, yeah, probably.
00:10:35 Speaker 1
Yeah, yeah.
00:10:35 Speaker 3
Bit of a skew.
00:10:37 Speaker 1
And maybe then.
00:10:38 Speaker 1
It's too far already.
00:10:39 Speaker 1
Yeah, OK yeah yeah, but that would be nice.
00:10:44 Speaker 1
Especially by dogs who are at risk for this.
00:10:49 Speaker 1
Because we we bought him and we know that his parents do not have the the the.
00:10:55
It is.
00:10:55 Speaker 1
This in the genetics.
00:10:56 Speaker 1
And and don't have it, but it's not not not said that he won't get it.
000:11:02 Speaker 2
Yeah, yeah, it might also happen, although it's not in his family.
00:11:07 Speaker 2
Yeah, yeah.
00:11:13 Speaker 2
We also have some sort of a chat function.
00:11:16 Speaker 3
Latest chat list.
00:11:16 Speaker 2
Be cautious with the chat box, for example the chat the the veterinarian come give you a reminder that you have got an appointment upcoming and they ask you to fill in a questionnaire.
00:11:24 Speaker 1
Yeah, yeah.
00:11:30 Speaker 2
Maybe you have noticed your veterinarian.
00:11:33 Speaker 2
Asked a lot of questions before you come, and maybe about what food he gets or what.
00:11:39 Speaker 2
Such type of things and.
00:11:43 Speaker 1
So I think maybe he has to go outside. [the dog]
00:11:46 Speaker 2
Yeah, maybe maybe it's a nice one.
00:11:49 Speaker 1
Diarrhea so yeah.
00:11:50 Speaker 2
Yeah, but do you want?
00:11:52 Speaker 2
To do.
00:11:52 Speaker 2
No, to take them outside.
00:11:53 Speaker 1
Yeah, but then then he walks again.
00:11:56 Speaker 1
I don't know how long, yeah.
00:11:56 Speaker 2
OK, we will quickly finish so.
00:12:11 Speaker 2
How long is there?
00:12:12 Speaker 2
One question we really want.
00:12:14 Speaker 3
To ask, no, we asked the notification.
00:12:16 Speaker 3

We ask the reminders, maybe last impressions on the.
00:12:20 Speaker 2
App, yeah,
00:12:21 Speaker 3
It's just something.
00:12:22 Speaker 1
Yeah, about the design or the.
00:12:26 Speaker 2
Yeah, for example
00:12:37 Speaker 1
Oh yeah.
00:12:49 Speaker 1
What what I see what I see is that the the pictures and I don't know if you are want to get it more is similar like I did more.
00:13:00 Speaker 1
A Pictionary like a strip album?
00:13:03 Speaker 1
The like, the conversation with the vet.
00:13:07 Speaker 1
But this is.
00:13:08 Speaker 1
More, uh? Rechtlijnig [linear]
00:13:18 Speaker 2
Dus of alles hoekig of alles rond [so either everything angular or everything curved]
00:13:20 Speaker 1
Yeah, kijk zoals hier is het dan dit zijn meer pictogrammen, dat past meer bij dit en daarbij, maar die met dat hondje waar die pijn heeft dat is dan weer anders of zo he. [Yeah, look like here it is then these are more pictograms, that fits more with this and there, but the one with that little dog where it's in pain that's different or something.]
00:13:34 Speaker 2
Ja dus het mag iets meer een geheel zijn [so it can be more coherent]
00:13:38
Yeah, sorry you.
00:13:39 Speaker 2
Hey, it's it's.
00:13:40 Speaker 1
OK yeah, good luck.
00:13:41 Speaker 3
Thank you very much for your time with your afstuderen enzo [thesis].
00:13:45 Speaker 2
Yeah thanks thanks.

APPENDIX H TRANSCRIPT SECOND DOG OWNER INTERVIEW

Speaker 1, Speaker 2, Speaker 3

00:00:00 Speaker 2 Monique
So now recording on and you just told us that you have never seen any lameness no in your dog berry, so.
00:00:15 Speaker 2
Are you aware that if your dog maybe has another pattern in his walking that might be affecting his lameness, like als hij in een ander patroon loopt [if he walks in a different pattern]?
00:00:32 Speaker 1 Alex
Ongezond [unhealty]
00:00:34 Speaker 2
Dan kan het effect hebben op zijn gezondheid [it could have effect on its health]
00:00:41 Speaker 3 I. Bothof
Oh nee, wist ik niet [no, I did not know]
00:00:52 Speaker 2
Want, is het u wel eens op gevallen dat hij anders loopt als hij bijvoorbeeld rent? [did you notice that your dog walks differently as he runs for example?]
Speaker 3:
Ja ja dan loopt hij anders [yess when he runs it's different]
00:01:04 Speaker 2
Ja en op die manier zijn er diverse patronen waarin een hond kan lopen, en als hij dus een ander patroon aanneemt, dan kan het zijn dat daar ehm, ja dat je daaraan kunt zien dat de hond mank wordt [well in that way there are various patterns in which your dog can walk, and when he switches patterns that might be a clue for lameness]
00:01:09 Speaker 3
Oh OK, OK. Vooral bij herdershonden denk ik he? [mainly in shepherd breeds I think?
00:01:15 Speaker 2
Yeah, yeah.
00:01:16 Speaker 2
In in large dogs it's more much more effective.
00:01:18 Speaker 2
Yeah, yeah.
00:01:22 Speaker 2
Let's see, we can skip that one.
00:01:27 Speaker 2
So have you ever used a health monitoring device for yourself, like a smart watch or something which?
00:01:36 Speaker 2
Fitbit or for yourself?
00:01:39 Speaker 2
No, no, nothing because we can use something like a smart watch for a dog.
00:01:48 Speaker 2
We can yes yes.
00:01:49 Speaker 3
Yeah oh nice, on his belt?
00:01:51 Speaker 2
And then also the application which we made.
00:01:56 Speaker 2
Is it's the idea that you take a video of your dog and the application will render.
00:02:04 Speaker 2
Will will make an analysis so you can see what your dog is doing in his gate.
00:02:10 Speaker 3
OK, you can see it when he's going backwards.
00:02:14 Speaker 2
Yeah, yeah.
00:02:14 Speaker 3
Yeah, yeah.
00:02:15 Speaker 2
For example, would you be interested in using something like this or?
00:02:19 Speaker 3
No, because I don't have a watch watch or something.
00:02:20 Speaker 2
Not at all.
00:02:22 Speaker 3
I'm not.
00:02:23 Speaker 3
But I don't.
00:02:23 Speaker 2
No, you can just do it with your phone.
00:02:24 Speaker 3
Or with your.
00:02:25 Speaker 2
OK.
00:02:25 Speaker 3
Yeah, yeah, maybe I don't know, but I think.
00:02:29 Speaker 3
Most people liked it [most people will like it], I think so.
00:02:32 Speaker 2
Yes, it's also if your dog one time maybe gets lame and shows some lameness, and you can also connect it with the veterinarian.
00:02:47 Speaker 2
With the dierenarts [vet] you're going to, and he can also see what is happening in your dog, so he he can get an easier assessment.
00:02:48 Speaker 3
OK.
00:02:52 Speaker 3
Oh whoa.
00:02:56 Speaker 2
He can look at it.
00:02:56 Speaker 3
OK yeah yeah.
00:03:01 Speaker 2
So I can show you the application.
00:03:06 Speaker 2
It's a little bit messy because I don't have Wi-Fi, so it's going to be like this.
00:03:12 Speaker 3
OK.
00:03:13 Speaker 1
Maybe a bit more like this.
00:03:15 Speaker 1
Don't have to like.
00:03:16 Speaker 2
Coming, let's see.
00:03:17 Speaker 2
So the first screen is a home screen with your dog.
00:03:25 Speaker 2
You can put in some medical history, like maybe sometimes if a dog is walking and not normally it can.
00:03:35 Speaker 2
Het kan komen omdat hij iets anders heeft [it can be because there is something else going on]
00:03:38 Speaker 2
So it can be caused by something else, yeah, so it's sometimes it's very important to have a medical history.
00:03:45 Speaker 2
Yeah, you can check the gate.
00:03:47 Speaker 2
The gate is the pattern which he is walking and you can also add another dog if you have more than one dog.
00:03:54 Speaker 2
Like for example have more.
00:03:56 Speaker 2
Than one dog.
00:03:56 Speaker 2
Oh yeah, yeah.
00:03:59 Speaker 2
Then also there there is some sort of chat function like your veterinarian and in which you can see like there's a next appointment for example, and then fill in this questionnaire beforehand.
00:04:15 Speaker 2
Most of the time, the veterinarian is going to ask what is he eating?
00:04:20 Speaker 2
Well, is he on the right weight?

00:04:23 Speaker 2
That sort of things, which can be very time consuming.
00:04:27 Speaker 2
But also if you are coming in.
00:04:30 Speaker 2
With the problem with The Walking, we can already ask some things, like when did you first see it?
00:04:38 Speaker 2
What are the things you see is?
00:04:39 Speaker 2
Wrong or yeah.
00:04:41 Speaker 2
So this kind of questionnaire we want to implement in the application.
00:04:45 Speaker 3
Yeah, yeah.
00:04:47 Speaker 3
Yeah, it's easy to see.
00:04:51 Speaker 2
And then yeah, those are just example questions.
00:04:56 Speaker 2
But do you think that's helpful also to monitor?
00:04:59 Speaker 2
When did it start?
00:05:01 Speaker 2
When did you first see it?
00:05:03 Speaker 3
Yeah I think so, yeah.
00:05:05 Speaker 2
May be easier to remember.
00:05:08 Speaker 3
Yeah, I think if.
00:05:09 Speaker 3
It's your dog.
00:05:10 Speaker 3
You see it immediately immediately.
00:05:12 Speaker 3
Yeah yeah, yeah.
00:05:18 Speaker 2
Also then we come to the part where we want to film a dog.
00:05:22 Speaker 3
OK.
00:05:22 Speaker 2
If you can switch those, well, it's.
00:05:24 Speaker 3
Oh, and it's nice.
00:05:26 Speaker 2
If you see this, what do you think it's?
00:05:30 Speaker 3
You must put the.
00:05:31 Speaker 2
Yes please like this.
00:05:34 Speaker 2
Yeah, for example yeah.
00:05:35 Speaker 2
And then it says while keeping the camera fixed.
00:05:38 Speaker 2
Film Scott, that's the example dog.
00:05:40 Speaker 2
Yeah, as he walks from left to right.
00:05:42 Speaker 2
Yeah yeah so.
00:05:45 Speaker 3
Maybe that must.
00:05:45 Speaker 3
Be bigger, I think that I don't see that yeah, yeah.
00:05:47 Speaker 2
Bigger, yes.
00:05:49 Speaker 2
OK, that's good feedback.
00:05:52 Speaker 2
Thank you.
00:05:54 Speaker 2
So if you have a dog in frame, it's the idea that for 15 seconds you film your dog as it's walking from left.
00:06:02 Speaker 2
To right, yeah and.
00:06:05 Speaker 2
And then.
00:06:07 Speaker 2
Have your dog inside of this frame all the time so the frame will be moving along the time?
00:06:16 Speaker 2
And in that way the application is able to make an analysis and then here you can see the steps.
00:06:26 Speaker 2
Sometimes we need them to go a little slower or a little faster.
00:06:28 Speaker 3
Yeah yeah, yeah so yeah.
00:06:30 Speaker 2
So we have some feedback.
00:06:32 Speaker 2
And then also, there's a recording progress.
00:06:35 Speaker 2
You can see how far you are.
00:06:38 Speaker 2
OK, three steps, because for most of the problems we need to have different views, like one from the side and one from the back.
00:06:44 Speaker 3
OK.
00:06:45 Speaker 3
Yeah, yeah.
00:06:46 Speaker 2
When the dog is walking away and when the dog is walking towards you.
00:06:50 Speaker 3
Yeah, OK.
00:06:53 Speaker 2
So there are if the analysis is successfully done, you will get some results.
00:07:03 Speaker 3
It's very nice.
00:07:06 Speaker 2
For example if the The Walking is asymmetrically
00:07:10 Speaker 2
that's a very big point.
00:07:13 Speaker 2
How you can see that your dog is not walking normally, but it can be limping so holding its paw up and in the earlier stages you don't see that you might see that.
00:07:26 Speaker 2
His head, for example, is going more up and down than normally because he wants to have less weight on that painful leg and more weight on the other.
00:07:31 Speaker 3
OK.
00:07:35 Speaker 3
Yeah yeah, yeah.
00:07:37 Speaker 3
So he's going zo [like this] yeah, yeah, OK.
00:07:43 Speaker 2
So that might be something you can see, yeah, and then it will safe and most likely the problem is in the right front shoulder.
00:07:53 Speaker 2
You can contact your veterinarian, to?
00:07:58 Speaker 2
Let him check it out and then also you already know which limp which leg is affected because that's something which is very hard.
00:08:03 Speaker 3
OK, yeah.
00:08:06 Speaker 2
To see.
00:08:07 Speaker 2
If You see your dog?
00:08:09 Speaker 2
having.
00:08:10 Speaker 2
Trouble walking, it's only very nice [easy].
00:08:14 Speaker 2
Very good to see if it's already in a further stage.
00:08:19 Speaker 3
Yeah, OK.
00:08:19 Speaker 2
If he already pulls up a leg or that's easy to see.
00:08:21 Speaker 3
Yeah yes yeah.
00:08:24 Speaker 2
Uh, so.
00:08:26 Speaker 2
That's what this application can help with the veterinarian.
00:08:29 Speaker 3
Yeah, OK.
00:08:31 Speaker 2

On the other hand, will be able to see this kind of graphs.
00:08:38 Speaker 3
OK, it's heartbeat or something
00:08:41 Speaker 2
Not really, no.
00:08:42 Speaker 2
The heartbeat is not that important for evaluating lameness.
00:08:47
OK.
00:08:49 Speaker 2
But what we can see is the vertical displacement, so.
00:08:53 Speaker 2
And where the head is, yeah, where to where it should be.
00:08:56 Speaker 1
OK, what foot is down?
00:08:58 Speaker 2
Yeah, yes, this is the time yes, so you can see at this moment this falls on the ground and then.
00:08:59 Speaker 1
Because this is the leg.
00:09:01 Speaker 3
Oh yeah, four yeah yeah.
00:09:08 Speaker 2
But this pattern can be very different.
00:09:12 Speaker 2
For example.
00:09:14 Speaker 2
In horses, this this is an example with horses.
00:09:17 Speaker 2
They do the same, where if they more if they walk faster or even they might have go with two legs the same time.
00:09:26 Speaker 3
Oh yeah, yeah.
00:09:27 Speaker 2
That's also what dogs do, that that will be like this.
00:09:29 Speaker 3
Yeah, oh very nice OK. Het ziet er echt goed uit [that really looks very nice]
00:09:37 Speaker 2
Dit is onze voorbeeld application [this is our example application]
00:09:43 Speaker 2
Het systeem bestaat dus voor paarden en we maken het nu voor honden. En nu is dus het belangrijkst voor ons [the system is thus already existing for horses, and now we translate it for dogs. And now, to us it's the most important that]
now is it like the most important is what kind of information do you think is useful and what kind of information do you think do we still?
00:09:59 Speaker 2
Need to add or.
00:10:01 Speaker 2
Like what would you like to see?
00:10:03 Speaker 2
Or is it to complicated te moeilijk [to hard]?
00:10:05
No no.
00:10:07 Speaker 3
This is very easy to see.
00:10:10 Speaker 3
I understand, so that's very.
En ik vind het ook heel leuk hoe die hond daar is getekend [and I really like how that dog there is drawn]
00:10:20 Speaker 3
Hij heeft nog nooit iets gehad, dus ik heb ook helemaal geen ervaring met hoe dat normaal gaat
[He (her dog) has never had anything (regarding to lameness), so i've got no experience at all with how that normally goes]
00:10:29 Speaker 3
Maar over euh, ja dat staat er allemaal al in [but about err, yeah that's all already in there]
00:10:32 Speaker 3
Wat je nodig euh, volgensmij staat alles er wel in wat je nodig zou hebben [what you need, I think all what you need is in there]
00:10:35 Speaker 3
Yeah, ik vind hem heel uitgebreid hoor [I think it's very extensive]
00:10:41 Speaker 3
And also, ohja, dat kleine regeltje dan [oh, that smal sentence then, should be a bit larger]
00:10:45 Speaker 2
Yeah, yeah.
00:10:50 Speaker 2
OK.
00:10:55 Speaker 3
So yeah, voor de rest vind ik hem heel goed [apart from that, I think it's really good]
00:10:57 Speaker 2
Zou je ook kunnen vertellen wat de verschillende icoontjes zijn? [could you tell the different icons?]
00:11:01 Speaker 3
De linkse de informatie van de hond [the left one the information about the dog]
00:11:06 Speaker 3
De tweede chatten met de docter, de andere het filmpje van het lopen en dan de instellingen van hoe oud [the second one chat with the doctor, the other the movie of the walking and next to it the settings from how old]
00:11:16 Speaker 2
Precies [exaclty]
00:11:12 Speaker 3
Ohnee, niet hoe oud een hond is, maar gewoon van de app [no, not how old the dog is, but just from the app}
00:11:16 Speaker 2
Ja inderdaad de instellingen van de app want hoe oud de hond is enzo [indeed the setting of the app because how old the dog is etc.]
00:11:17 Speaker 3
Dat staat natuurlijk daar [that's of course over there]
00:11:19 Speaker 2
Want hoe oud de hond is dat vragen we de eerste keer zodra je de hond in de app zet en ook de naam, het microchip number, maar die weet jij misschien niet zo maar die weet de dierenarts, die kan de dierenarts er dus inzetten
[because we ask the dog's age the first time you put the dog in the application, and also the name and microchip number, but you might not now that but the vet knows, and he can also put it in
00:11:32 Speaker 3
Ja ik vind het heel goed ik ben heel benieuwd, wat als jullie nou, euh, zijn jullie de oprichters hiervan? [yes I think this is really good and i'm very curious, what if you, err, are you the founders of this?]
00:11:41 Speaker 2
Nou dit onderzoek is ons afstudeerproject, en wij doen alleen het design van de app en er is een hele onderzoeksgroep die achter ons staat
[well this research is our thesis, and we are only working on the design of the app and there is a reserachgroup who is behind this project
00:11:46 Speaker 3
OK.
00:11:50 Speaker 3
Yeah, oh.
00:11:52 Speaker 2
Everything yes.
00:11:53 Speaker 3
Maar leuk als dat dan doorgaat dat jullie dat hebben gemaakt. [But nice if that goes through then that you made that]
00:11:55 Speaker 2
Yeah, yeah.
00:11:57 Speaker 1
Could you also ask the question about the reminders and the notification?
00:12:02 Speaker 2
You can .
00:12:03 Speaker 1
Yes, so the app for the dog owner would also send notifications to

remind the dog owner, hey, if you're going on the.
00:12:10 Speaker 1
Walk if you're going on a walk, put the sensor on and start recording so they actually have the data.
00:12:17 Speaker 1
When the dog is moving because they're not going to keep the sensor on all the time.
00:12:19 Speaker 3
Yeah, yeah.
00:12:24 Speaker 2
Er komt een sensor op de halsband dan inderdaad, dus dan is er een sensor die werkt samen met de app en dan gaat de app dus een herinnering sturen zo van he goh doe de sensor om en ga een een stukje wandelen
[there will be a sensor on the collar indeed, so the sensor works together with the app and the app will send a reminder like hey put the sensor on and go walk for a bit]
00:12:42 Speaker 2
En vergeet niet om een filmpje te maken [and don't forget to take a video]
00:12:45 Speaker 3
OK, yeah. Want het zou haast nog handig zijn als dit erin staat, van elke drie maanden ontworming, want dat vergeet je gewoon [it would almost because usefull if you put even this in, the every 3 months deworming because you just tend to forget that]
00:12:56 Speaker 2
So you can also add deworming and the medication. And inentingen [vaccinations]
00:12:58 Speaker 3
Yeah, maybe yeah, yeah, maybe it's a good idea.
00:13:03 Speaker 1
Also add more functions so it makes it more useful.
00:13:06 Speaker 2
Yeah yeah, yeah.
00:13:08 Speaker 2
That's a very good idea.
00:13:11 Speaker 2
Yeah yeah, yeah yeah yeah.
00:13:14 Speaker 2
Thank you Oh no.
00:13:15 Speaker 1
Thank you.
00:13:24 Speaker 3
Yes yeah yeah, yeah, yes, you're saying that now.
00:13:30 Speaker 1
Good luck, thanks.

References

[1] P. Jensen, “Domestication of Dogs,” in *The behavioural biology of dogs, Wallingford: CABI, 2007.*

[2] M. Rhodin, A. Bergh, P. Gustås, and C. B. Gómez Álvarez, “Inertial sensor-based system for lameness detection in trotting dogs with induced lameness,” *The Veterinary Journal*, vol. 222, pp. 54–59, Apr. 2017.

[3] F. Okeke et al., “Opportunities and challenges in connecting care recipients to the community health feedback loop,” in Proceedings of the Tenth International Conference on Information and Communication Technologies and Development, 2019.

[4] C. McGowan, L. Goff, and N. Stubbs, Eds., “Animal physiotherapy: Assessment, treatment and rehabilitation of animals”, 1st ed. Hoboken, NJ: Wiley-Blackwell, 2013

[5] S. Heldenbrand et al., “Assessment of medication adherence app features, functionality, and health literacy level and the creation of a searchable Web-based adherence app resource for health care professionals and patients,” J. Am. Pharm. Assoc. (2003), vol. 56, no. 3, pp. 293–302, 2016.4

[6] Y. Jabareen, “Building a conceptual framework: Philosophy, definitions, and procedure,” Int. J. Qual. Methods, vol. 8, no. 4, pp. 49–62, 2009.

[7] K. Herrmann and K. Jayne, Eds., *Animal experimentation: Working towards a paradigm change. Leiden, Netherlands: Brill, 2019.* CH8 **The Moral Status of Animal Research Subjects in Industry: A Stakeholder Analysis**

[8] M. M. Kosecoff, J., B. S. Gottlieb, N. & Wilkes, M. S., 1987, "Conceptual Frameworks in Qualitative Research," Qualitative Health Research, vol. 1, no. 2, pp. 243-253.

[9] W. Creswell, J., 2013, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, Sage Publications, Inc.

[10] J.A. Burke, D. Estrin, M. Hansen, A. Parker, N. Ramanathan, S. Reddy, and M.B. Srivastava, "Participatory Sensing," UCLA: Centre for Embedded Network Sensing, 2006, https://escholarship.org/uc/item/19h777qd.

[11] A. K. Dey, “Understanding and using context,” *Personal and Ubiquitous Computing, vol.*
5, no. 1, pp. 4–7, 2001.

[12] F. Restuccia, S. K. Das and J. Payton, "Incentive Mechanisms for Participatory Sensing: Survey and Research Challenges," Missouri University of Science and Technology and University of North Carolina at Charlotte, respectively, pp. 47-52, 2012.

[13] J. Li, X. Wang, R. Yu, and R. Liu, “Reputation-based incentives for data dissemination in mobile participatory sensing networks,” *Int. J. Distrib. Sens. Netw.*, vol. 11, no. 12, p. 172130, 2015.

[14] H. Michie, S. Holmes, and J. Prestwich, "The Behaviour Change Wheel: A Guide to Designing Interventions," Silverback Publishing, available at: http://www.behaviourchangewheel.com/the-wheel, 2013.

[15] A. Basavaraju, J. Du, F. Zhou, and J. Ji, “A machine learning approach to road surface anomaly assessment using smartphone sensors,” *IEEE Sensors Journal*, vol. 20, no. 5, pp. 2635–2647, 2020.

[16] F. Okeke *et al.*, “Opportunities and challenges in connecting care recipients to the community health feedback loop,” in *Proceedings of the Tenth International Conference on Information and Communication Technologies and Development*, 2019.

[17] Jose Juan Dominguez Veiga and Tomas E. Ward. 2016. Data collection requirements for mobile connected health: an end user development approach. In Proceedings of the 1st International Workshop on Mobile Development (Mobile! 2016). Association for Computing Machinery, New York, NY, USA, 23–30. https://doi.org/10.1145/3001854.3001856

[18] .S. Bosch, F. Serra Bragança, M. Marin-Perianu, R. Marin-Perianu, B. van der Zwaag, J. Voskamp, W. Back, R. van Weeren, and P. Havinga, “EquiMoves: A wireless networked

inertial measurement system for objective examination of Horse Gait," *Sensors, vol. 18, no. 3, p. 850, 2018.*

[19] P. Figueirinhas *et al.*, "Development of an artificial neural network for the detection of supporting hindlimb lameness: A pilot study in working dogs," *Animals (Basel),* vol. 12, no. 14, p. 1755, 2022.

[20] M. Bhatia, "Fog computing-inspired Smart Home Framework for predictive veterinary healthcare," *Microprocessors and Microsystems, vol. 78, p. 103227, 2020.*

[21] A. Mader and W. Eggink, "A Design Process for Creative Technology," in Proceedings of the 17th International Conference on Engineering and Product Design Education, Dublin, Ireland, 2016, pp. 409-416.

[22] F. Duerr, *Canine Lameness*. Hoboken, NJ: Wiley-Blackwell, 2020.

[23] C. M. Dorsten and D. M. Cooper, "Use of body condition scoring to manage body weight in dogs," *Contemp. Top. Lab. Anim. Sci.,* vol. 43, no. 3, pp. 34–37, 2004.

[24] K. J. Heffernan *et al.*, "Guidelines and recommendations for developing interactive eHealth apps for complex messaging in health promotion," *JMIR MHealth UHealth,* vol. 4, no. 1, p. e14, 2016.

[25] P. Lally and B. Gardner, "Promoting habit formation," *Health Psychol. Rev.*, vol. 7, no. sup1, pp. S137–S158, 2013.

[26] P. Lally, C. H. M. van Jaarsveld, H. W. W. Potts, and J. Wardle, "How are habits formed: Modelling habit formation in the real world," *Eur. J. Soc. Psychol.*, vol. 40, no. 6, pp. 998–1009, 2010.

[27] K. Stawarz, A. L. Cox, and A. Blandford, "Beyond self-tracking and reminders: Designing smartphone apps that support habit formation," in Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15), pp. 2653-2662, 2015. [Online]. Available: https://doi.org/10.1145/2702123.2702230

[28] A. P. Moores, L. Benigni, and C. R. Lamb, “Computed tomography versus arthroscopy for detection of canine elbow dysplasia lesions,” Vet. Surg., vol. 37, no. 4, pp. 390–398, 2008.

[29] J. P. Morgan, A. Wind, and A. P. Davidson, “Bone dysplasias in the labrador retriever: a radiographic study,” J. Am. Anim. Hosp. Assoc., vol. 35, no. 4, pp. 332–340, 1999

[30] E. Corley and W. D. Carlson, “Radiographic, genetic, and pathologic aspects of elbow dysplasia,” J Am Vet Med Assoc, vol. 147, pp. 1651–1653, 1965

[31] Fryer, L.K., Larson-Hall, J., Stewart, J. (2018). Quantitative Methodology. In: Phakiti, A., De Costa, P., Plonsky, L., Starfield, S. (eds) The Palgrave Handbook of Applied Linguistics Research Methodology. Palgrave Macmillan, London. https://doi.org/10.1057/978-1-137-59900-1_3

[32] J. Nielsen, ‘How many test users in a usability study?’, Nielsen Norman Group, Jun. 03, 2012. Summary: The answer is 5, except when it’s not. Most arguments for using more test participants are wrong, but some tests should be bigger and some smaller. (accessed Jan. 19, 2023).

[33] J. Nielsen, ‘Iterative user-interface design’, Computer (Long Beach Calif), vol. 26, no. 11, pp. 32–41, Nov. 1993, doi: 10.1109/2.241424.

[34] A. I. Middya, S. Roy, and R. Das, “Spatiotemporal variability analysis of air pollution data from IoT based participatory sensing,” *J. Ambient Intell. Humaniz. Comput.*, 2021.

[35] A. Rebeiro-Hargrave *et al.*, “City wide participatory sensing of air quality,” *Front. Environ. Sci.*, vol. 9, 2021.

[36] CORE Issues in Professional and Research Ethics, Volume 1, Paper 5, 2012 ISSN: 2160-8784 http://nationalethicscenter.org/content/article/177

[37] G. Stevanin, "Development of an Ethogram for Predatory Behaviour in Dogs," Dipartimento di Biomedicina Comparata e Alimentazione - BCA, Animal Care - Tutela del Benessere Animale (D.M. 270/2004), Laurea di Primo Livello, 2021 (Thesis).

[38] K. Hamari, J., Koivisto, J. & Sarsa, H., 2014, "Does Gamification Work? —A Literature Review of Empirical Studies on Gamification," Systems, vol. 2, no. 3, pp. 95-105.

[39] W. R. Boot, D. Souders, N. Charness, K. Blocker, N. Roque, and T. Vitale, “The gamification of cognitive training: Older adults’ perceptions of and attitudes toward digital game-based interventions,” in Human Aspects of IT for the Aged Population. Design for Aging, Cham: Springer International Publishing, 2016, pp. 290–300.

[40] Kappen, D. L., Mirza-Babaei, P., & Nacke, L. E. (2018, January). Gamification of Older Adults’ Physical Activity: An Eight-Week Study. In Proceedings of the 51st Hawaii International Conference on System Sciences (pp. 1-10). Humber College and University of Ontario Institute of Technology, Canada.