# Designing a graphical user interface for gait analysis in dogs

## Bachelor Thesis

Monique de Waal - s2564092

Creative Technology, BSc Program
Faculty of Electrical Engineering,
Mathematics and Computer Science
University of Twente

Supervisor: Dr. Duc le Viet, University of Twente
Critical Observer: Prof. Dr. P.J.M Havinga, University of Twente
Client: Dr. F.M. Serra Bragança, University of Utrecht, Veterinary Medicine, Department Clinical Sciences

Date: 2023-02-03

## ABSTRACT

The aim of this study is to design a user based graphical interface for mobile devices, regarding gait analysis in dogs based on sensor fusion.

A literature review was conducted, and more background research was done. Then, a first prototype was made, and an iterative design process started. Dog owners, veterinarians, orthopaedic specialists, gait researchers and a graphical designer were interviewed and asked to test the prototype, and afterwards the research team evaluated the feedback from the testers. This is implemented in the prototype and in the next iteration evaluated again. Also, an ethical reflection has been conducted.

Due to the unique needs of the target groups, there was chosen to create both an expert, including veterinarians, specialists and researchers and a non-expert interface. Interviews and user tests resulted in a list of functional and non-functional requirements. Most importantly when designing the application are the following requirements: the instructions for the data collection must clear and the output of the analysis must be easy to interpret. Besides, a colour-blind friendly palette was chosen to include as many users as possible. Functionalities that need to be considered are a communication channel, a pre-visit questionnaire, and a diary.

# TABLE OF CONTENTS

# LIST OF FIGURES

# CHAPTER 1 – INTRODUCTION

Lameness, which is limping due to pain, is a health problem that affects many animals. Unfortunately, lameness is often not recognized by the owners. Lameness is often caused by orthopaedic problems, and it can be recognized by changes in locomotion symmetry or changes in behaviour. However, if the best veterinarians of the world were asked to observe a dog who is showing lameness, they will fail to agree upon each other about their visual evaluation [1]. Recently, some technological breakthroughs allowed to identify lameness using sensor technology in horses, but unlike horses, dogs are not as cooperative when it comes to the instrumentation, as they tend to bite and scratch any instruments attached to their body. Hence, a collaboration between Dr. Duc le Viet from the University of Twente and Dr. Filipe Serra Bragança, PhD and Veterinarian/researcher at Utrecht university in biomechanics and quantitative gait analysis, and his research group are developing a gait analysis module based on computer vision techniques and IMUs. Currently, the data collection is taking place in Utrecht. During this development, a graphical user interface needs to be designed. Therefore, the current study by Monique de Waal, student of the bachelor Creative Technology from the University of Twente, will address the graphical user interface.

## Problem statement

There is an existing graphical user interface, called EquiMoves [2], but it is designed for displaying the gait of a horse. Translating this application for dogs would be an option, however, the target group for this application are veterinarians, experts with pre-knowledge. For the current project, also dog owners are included in the target group, which means that the results of an analysis should be easily interpretable by non-experts who might not have any pre-knowledge about gait analysis. EquiMoves proved itself with remarkable results, and the application is expected to be great for dogs too. Besides, while the best veterinarians fail to agree on visual evaluation of dog gait, the application will help in visualizing the gait which makes the evaluation much easier. So, designing a graphical user interface for gait analysis in dogs will benefit the veterinarians as they can base their decisions for diagnosis and treatment plans on the application. The visualisations in the application are much more precise than visual evaluation, and besides, the dog owner would be able to see what the veterinarian can see in the dog's gait. As more dogs will be following the correct treatment plan, the impact on society is clear: more dogs will have a higher chance of healing, as a result of better health care in dogs.

## Business requirements

Dr. Duc le Viet and Dr. Filipe Serra Bragança have set some requirements for the application. The application must be able to show the gait of a dog, without regard to what breed the dog is. The users of the application are veterinarians, also called experts, and dog owners, called the non-experts. Dr. Duc le Viet and Dr. Filipe Serra Bragança suggest that the application consists of two different interfaces, one for the experts and one for the non-experts.

The non-expert interface should contain an option to take a video of a dog, which will be analysed and sent to the expert for evaluation. So, there needs to be a connection between the two interfaces, moreover, there must be a connection between a certain non-expert and a certain expert.

## Research questions

The main research question of this study is: How to design a user based graphical interface for mobile devices, regarding gait analysis in dogs based on sensor fusion? To answer this question, a literature review is done with the aim to give more insight into how a graphical interface for gait analysis can be designed. Key elements of this literature review are previous visualisations of gait analysis, important functionalities and factors that play a role in visualizing gait and visualizations for non-experts. Furthermore, this research has four sub questions.

First, how to display the data so it is usable and appealing to the expert? And linked to this, the second question: how to display the data so it is usable and appealing to the dog owner? For both questions, it is important to investigate what functionalities the target user needs. The third sub question is: how can the veterinarian and the dog owner be connected through the application? For this question, it needs to be investigated what they need from each other. Lastly, in the fourth sub question it is investigated how the feature where data can be collected from the camera of the mobile device can be implemented.

# CHAPTER 2 – BACKGROUND RESEARCH

In order to give more insight in how a graphical interface for gait analysis can be designed, a literature review was conducted. The graphical user interface should be tailored to the needs and experiences of the users, hence different approaches to visualisation will be investigated, followed by key factors and functionalities which play a role in visualisation of gait. Then, visualisations aimed to show the various aspects of gait analysis in humans to both patients, non-experts and therapists, experts will be discussed. Finally, EquiMoves is presented which is an example of the current study but with different animals. Thereafter, background information about, among others, colour-blindness and ethics is given. Finally, the first set of functional and non-functional requirements for the application are listed.

## Approaches to visualize gait

For gait analysis using IMUs, researchers use four separate ways of visualisations. First, the result of the gait analysis can be showed using tables [3]. Then, boxplots can be created where the median, lowest and highest quartiles and minimum and maximum values are presented for each variable [3]. Boxplots can also be used to pre-process data [1]. The third way to visualise gait analysis is using line graphs with synchronized video recordings. Both Figueirinhas et al. [1] and Ladha et al. [4] designed an application for veterinarians were the results of his gait analysis in dogs where visualised using line graphs with synchronized video recordings. Lastly, real time motion can be compared to a templated desired motion [5]. Ghazal et al. [5] did not collaborate with dogs, but with humans. He placed IMUs on human joints and compared the real time motions to a templated desired motion. This was done by using signal alignment to segment the motion into regions of acceptable error margins and regions needing improvement. The visualisation was also presented in an application. Gait analysis with IMUs can be visualised using tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion. Furthermore, an application can be used to show the visualisations to experts and non-experts.

In order to visualise gait data, firstly the data needs to be analysed. Rhodin et al. [6] processed data with the corresponding soft-ware packages for the IMU system used. This included procedure comprised filtering, stride splitting and double integration of the uniaxial vertical acceleration of head and pelvis to calculate the vertical displacement in the sensor reference frame. The mean amplitude and sign (negative values for left limb and positive values for right limb asymmetry, as defined by Gómez Álvarez et al. [7]) for each variable for all strides per trial were calculated. A value of zero indicates perfect symmetry. For each variable, positive values denoted lameness and motion asymmetry attributed to the right limb, and negative values to the left limb. For descriptive purposes and to illustrate both

magnitudes and left–right directions of asymmetry, signed means (positive or negative) and standard deviations (SDs) were calculated for each trial, before and after induction of lameness.

Applications can be used to show the visualisations to both non-experts and experts. Two important functionalities in applications used for visualising gait analysis are mentioned by researchers. Figueirinhas et al. [1] state that the interface they made allows for setting different filters restricting the displayed canines. This function is a crucial element for the final user, the veterinarian. Within the application made by Ghazal et al. [5], the user can select a specific joint and retrieve their motion pattern over time and a visualization of how it meets or differentiates from the golden standards. Both filters for restricting data and enabling more data by, for example, clicking on a joint are important functionalities in applications used for visualising a gait analysis.

## Visualisations for non-experts and experts

Anwary, Yu, and Vassallo [8]–[10] have done research about gait asymmetry visualization approaches, aimed to show the various aspects of gait symmetry analysis to both patients and therapist. An important note must be made, this is research about human gait. They propose four novel visualisation approaches, with the focus on the results being accessible and useful for both non-experts and experts. The approaches are real time dial visualization, visualization of individual leg time variation, visualization of both legs' asymmetry and boxplot-based visualisations [8], [10] In Real time dial visualisation, stride, step, and swing information is used for the visualisation. Spatiotemporal measurements are shown in six dials. The three factors stride, step and swing each have a dial representing distance in meters and time in seconds. Theoretically, both legs should give identical results and therefore perfect asymmetry should give dial indicator readings of zero. This tool offers an easy and user-friendly way to visualize and monitor gait asymmetry. Secondly, in visualization of individual leg time variation, the maximum and minimum values are estimated of each stance time and swing time together, they form the stride time. For both the left and the right leg are these phases stacked on top of each other, for a length of thirty strides. The ratio of a stride is ideally built up out of 60% stance and 40% swing [8], [10].

The third visualisation approach is visualization of both legs' asymmetry. In this visualization, the stride and step asymmetry data for both time and distance is presented in bar graphs. For both legs, it should be observable that while there is good symmetry in the stride, there is strong variation in the step phases. Lastly, the boxplot is a representation of descriptive statistics where it is easy to understand each features distribution, non-normal level, outliers, symmetry, and the overall gait asymmetry information. The four proposed visualisations for human gait are easy to interpret and therefore, the visualisation

approaches can be used for different applications at home as well as in clinics for both gait monitoring and rehabilitation.

By combining the features extracted with the four approaches above, one can create a Cartesian coordinate in order to monitor improvement with treatment [9]. The features (stride length, time, velocity, step length, time velocity, stance time, swing length, time, and velocity) of both legs are represented on the x and y axis by dimensionless numbers respectively. Each of the features is represented by a shape. The degree of abnormality can be estimated for individual features with a standard normal mean gait shape (NMGS), which is estimated using Procrustes superimposition. The result is plotted to visualize the feature. Using the Cartesian coordinate technique to visualise gait, one can monitor progression of an illness as well as monitor improvement with treatment.

## EquiMoves

Researchers working on the current study, have also taken part in the study concerning EquiMoves. EquiMoves is an existing application for gait analysis in Horses [2], [11]. It is focussed on veterinarians as users. EquiMoves uses line graphs and boxplots, interestingly the background of the charts is showing the part of the horse which is being measured. Also, for the visualisation of limb retraction and protraction, the movement of the legs is shown in figures above the line graphs, corresponding to the time and colour the line graph is showing. The application provides the possibility to compare various parts of a measurement, like walking and trotting, but also to compare different measurements from the same horse with each other. The visualisations are clear, however as a non-expert it is hard to tell what exactly affects the horse to limp. Veterinarians are already trained and know what to look for. EquiMoves is an example for how an expert interface could look, but it is too complicated for non-experts.

## Literature Review: Conclusion, Discussion and Recommendation

The goal of this literature review was to give more insight in how a graphical interface for gain analysis can be designed. It was found that a graphical user interface for gait analysis can be designed using visualisations like tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion. For descriptive purposes and to illustrate both magnitudes and left–right directions of asymmetry, signed means (positive or negative) and standard deviations (SDs) can be calculated. An application can be used to show the visualisations to the user. Both filters for restricting data and enabling more data by, for example, clicking on a joint are important functionalities in applications used for visualising a gait analysis.

Four proposed visualisations, real time dial visualization, visualization of individual leg time variation, visualization of both legs' asymmetry and boxplot-based visualisations, are easy to interpret and therefore, the visualisation approaches can be used for different applications at home as well as in clinics for both gait monitoring and rehabilitation. Using the Cartesian coordinate technique to visualise gait, one can monitor progression of an illness as well as monitor improvement with treatment. EquiMoves is an existing application for gait analysis in horses, and an example for how an expert interface could look, however it is too complicated for non-experts. Future research should contain user evaluations in order to confirm the current literature review.

## Inclusivity in graphical user interface for gait analysis in dogs

### Ethical landscape

A challenging aspect is that the application should be accessible for the colourblind people. If it is not, this is a problem for the users who are colourblind. These contain both veterinarians and dog owners. The moral issue is that it is not fair towards the colourblind that they cannot make use of the app, and thus they will not be able to analyse their dog's gait before it is too late. Including this group might be a trade-off between equality of access and an appealing look. A solution to satisfy both the colourblind and the non-colourblind could be implementing a toggle button to change the colour palette. This however could mean that two different colour palettes need to be designed.

Another concern towards the application is how to manage personal data. Maybe, the first question to ask ourselves is what personal data is actually needed, so the least amount of data needed can be identified. Then, the challenge is to handle them with care, to ensure the privacy of the users of the application. If not, the safety of the users cannot be guaranteed, as their personal data might be used against them by malicious third parties.

Another dilemma is algorithmic bias. This is more important for future work, when the option to film your dog will be implemented in order to do the gait analysis based on video. It is important to keep in mind that software can only learn from the training it is given, and therefore, bias must be scrubbed from the training data and the algorithms build. According to George Lawton [12], bias within software system can perpetuate systemic racism against specific population, which creates lost opportunity, worsens medical care, and increases rates of incarceration. This, of course, is something we want to elude in the design, in order to prevent wrong diagnoses in less known breeds.

## Code of ethics

To guide the project through those ethical issues, a code of ethics was made.

### *Professional Responsibility*

The results of the design will have meaning, whether intentional or not. Hence, it is important that the values considered should not negatively affect any sector of society. With designing, one should for example uphold basic human dignity by being aware of the cultural ethnic backgrounds. It is important that a designer complies the values of competence, dignity, honesty, honour, integrity, morality, and truthfulness in everything they undertake, including the current project. [13]

### *Privacy and Security*

Two moral principles which are closely related to each other and truly relevant for considering when planning the project are privacy and security. The data of users must be respected, and their personal data must be secured. The privacy of the users of the application must be ensured. If not, the safety of the users cannot be guaranteed, as their personal data might be used against them by malicious third parties.
A widespread problem with applications connected to the internet is that they have to little informational security. And then there is an underlying problem, the application can be connected to sensors which are linked to communicators. Without the user's knowledge or consent, they can transmit data from one location to another. In addition, devices have been targeted by distributed denial of service attacks. The security of IoTs is very weak, and the reason is found in costs: robust security features increase price. Those features however are a trade-off between security and usability. The greater security, the more attenuated is the aim of IoT devices: seamless and invisible integration into our working and personal lives [14].

### *Inclusivity*

Next, the moral principal inclusivity is relevant for considering in the project. According to [15], 1 in 12 men and 1 in 200 women have "red-green" colour vision deficiency. This includes 99% of the population who are colourblind. This means that worldwide, there are estimated to be about three hundred million people with colour blindness. Because these people also have a right to see what their dog's walking pattern is like, and most importantly, because we do not want to exclude the colourblind veterinarians, it is important to take this into account when designing the application.

*Responsibility to Society and the Environment*

A user, while engaged with the graphical user interface, is not encouraged by the design to not do, or fail to do anything that constitutes a deliberate or reckless disregard for the health and safety of the communities in which they live and practise or the privacy of the individuals and businesses therein. To achieve this, the sophisticated design of the application should encourage protection of animals and the environment. For example, when the application asks for a recording, this must be recommended to be done in a safe environment, where the dog cannot just be run over by a car.

*Intellectual Property and Authorship*

During the design process, the design or work of another person shall not knowingly be copied without the consent or agreement of the person who owns the copyright or their agents and in accordance with the copyright laws in the countries concerned. [16]

## Colour-blindness

According to [15], 1 in 12 men and 1 in 200 women have “red-green” colour vision deficiency, which means they cannot distinguish between red and green. This includes 99% of the population who are colourblind. This means that worldwide, there are estimated to be about three hundred million people with colour blindness. Because these people also have a right to see what their dog’s walking pattern is like, and most importantly, because we do not want to exclude the colourblind veterinarians, it is important to take this into account when designing the application.

The moral principal inclusion is important for the colourblind people. If the application is not accessible, this is a problem for the users who are colourblind. These contain both veterinarians and dog owners. The moral issue is that it is not fair towards the colourblind that they cannot make use of the app, and thus they will not be able to analyse their dogs’ gait before it is too late. Including this group might be a trade-off between equality of access and an appealing look. A solution to satisfy both the colourblind and the non-colourblind is implementing a toggle button to change the colour palette. This however could mean that two distinct colour palettes need to be designed.

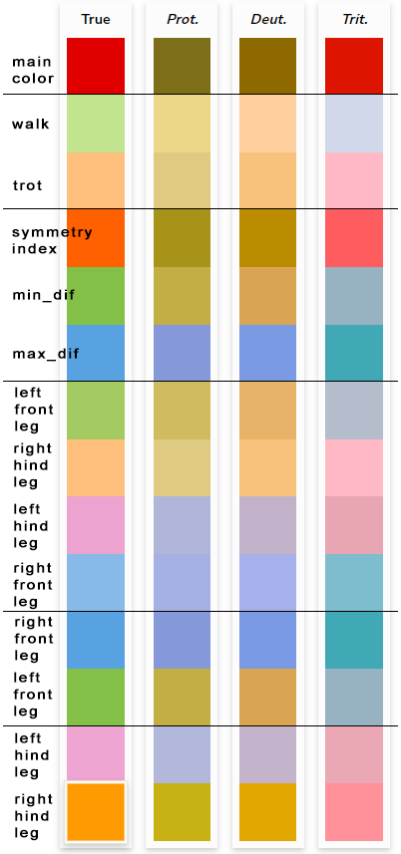



**Figure 1: Colours used in the EquiMoves application, and how they look like in different cases of colour-blindness.**

The colours used in the application EquiMoves are displayed in the first column of figure 1. Besides, columns 2, 3 and 4 show the perceived colour in different cases of colour-blindness, being protanopia, deuteranopia and tritanopia, respectively. Both protanopia and deuteranopia are forms of red-green colour-blindness [17]. Tritanopia is a form of blue-yellow colour blindness. The rows are split up by appearance in graphs, for example, the symmetry index, min_dif and max_dif can be found in the exact same graph as different values.

Both Nichols and Goedhart [17], [18] suggest different Colour-blind friendly palettes. It is recommended to use a colour-blind friendly palette by default and to use a maximum of 8 different colours of labelling of different categories[19]. Additionally, it is suggested to use patterns or labels to distinguish categories.

# Chapter 3 – Methods and Techniques

The design of the application will be an iterative process including showing the current design to the users and implementing their feedback. The design process is based on the Creative Technology Design process developed by Mader and Eggink [20]. The process starts with background research and ideation. Then, a prototype will be made according to the requirements based on the research done already and the ideation. next, the prototype will be shown to or assessed by both the target users, and gait researchers with experience in visualizing gait, and moreover, they will be asked for feedback. The feedback will be evaluated by the research team and the requirements will be adapted accordingly. Then, the new requirements will be implemented in either the existing prototype or a new prototype. Here, the cycle will repeat to get closer to the solution. The prototypes can be made using the online tool Figma, explained in chapter 6.

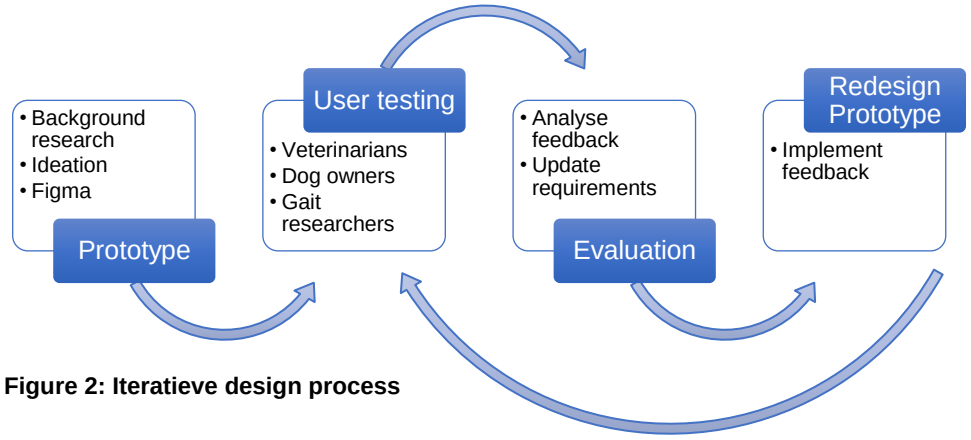



**Figure 2: Iteratieve design process**

## Ideation

The initial phase of the iterative design process is ideation. The aim is to produce different ideas and solutions for the current project. For this phase, it is important to have and understanding of the user group and their targets. In a brainstorming session, possible functionalities corresponding to the user's needs are identified. Also, a mock-up application will be created to have something visual to start with. Finally, a colour-blind colour palette fitting the application its purpose is chosen.

## Specification and realisation

In the specification phase, the aim is to further refine the concept and identify detailed requirements for the project. The list of user requirements will be prioritised using the MoSCoW method, which stands for Must, Should, Could and Won't. Finally, the first

prototype will be realised using the tool Figma. After every user test, an evaluation will follow, and the prototype needs to be updated.

### Digital Tool Figma

Using Figma, various templates and interactions can be used to make a mock-up interface which can evolve to a full-fledged working interface. These templates are based on real devices, including computers, tablets and mobile phones. This way, an interface can be directly created which fits perfectly on those devices. Figma is a vector based graphical editor which has built in prototyping tools for designing interactions. It is based on user interface and user experience design for web- and mobile-based applications and can be used for both lofi and hifi prototyping. Figma was the main program used for the development of the graphical user interface. It was chosen because of its powerful tools and functions, and for its focus on interface design

## User testing

Usability tests will be done by participants who are potential users of the interface. They are interviewed and confronted with the prototype, to share their opinions about the interface. Expert reviews will be done by gait research specialists, supervisors, and a graphical designer.

## Evaluation

The research team of this project will evaluate the interviews and reviews. It is important that the feedback fits with the code of ethics. The feedback will be prioritized, and the list of requirements will be updated accordingly. The feedback will be implemented in either the existing or a new prototype.

## Interviews

Preliminary needs of the target users will be acquired through interviews. The interviews will also be used to gain a better knowledge of what the target groups want. An interview can be structured, unstructured or semi-structured [21]. A structured interview follows strictly the list of questions set up for the interview. That means that during the interview, one can not deviate or change the order of questions. An unstructured interview is more like a conversation, as it does not follow a protocol or set of questions. The interviewer is free to go in any direction that pops up in mind. In a semi-structured interview, the interviewer does have a list of questions prepared, but is free to ask for more information or to dive deeper in a certain subject. As semi-structured interviews give room for unexpected ideas, this approach will be used in the current study.

## User testing and expert review

To evaluate the interface, usability tests will be conducted. Before the potential user will assess the interface, it is being interviewed using a semi-structured interview. The user is being encouraged to think aloud while interacting with the interface. The user is free to say thoughts that pop up in mind and may even change an answer given to a previous question in the interview. The interviewer will then ask if the user can perform certain tasks, and afterwards starts an open interview to trigger more thoughts about the interface. This combination will help the researcher to pin-point problem areas in the interface, for example when the interaction is not sufficient or intuitive. Nielsen [22] stated that two iterations of evaluations is sufficient for creating a good working interface. Each of the user testing rounds can be performed by about 5 participants. More is not needed as this is qualitative research [23].

The expert review will follow the same pattern as user testing, including a semi-structured interview and evaluating the interface. However, the list of questions will be different and tailored to the speciality of the expert.

# Chapter 4 – Ideation

A List of possible functionalities based on the user its needs was made in a 15-minute brainstorm session, The results can be found in figure 5.

A quick mock-up application was made just to have something visual to start brainstorming with. The mock-up was made using Figma and can be found in figures 6 and 7. It was based on the EquiMoves application [2].

The researcher ideated colour palettes with 5 colours. One colour could function as a main colour for the application, and the four remaining can be used in visualizations. Because a dog has usually four legs, this should be sufficient to display different values in a graph. All palettes have been checked for colour-blindness using David Nichols's [17] colour palette tool. The results can be found in figure 4.


**Figure 3: Colour-blind friendly colour palettes**

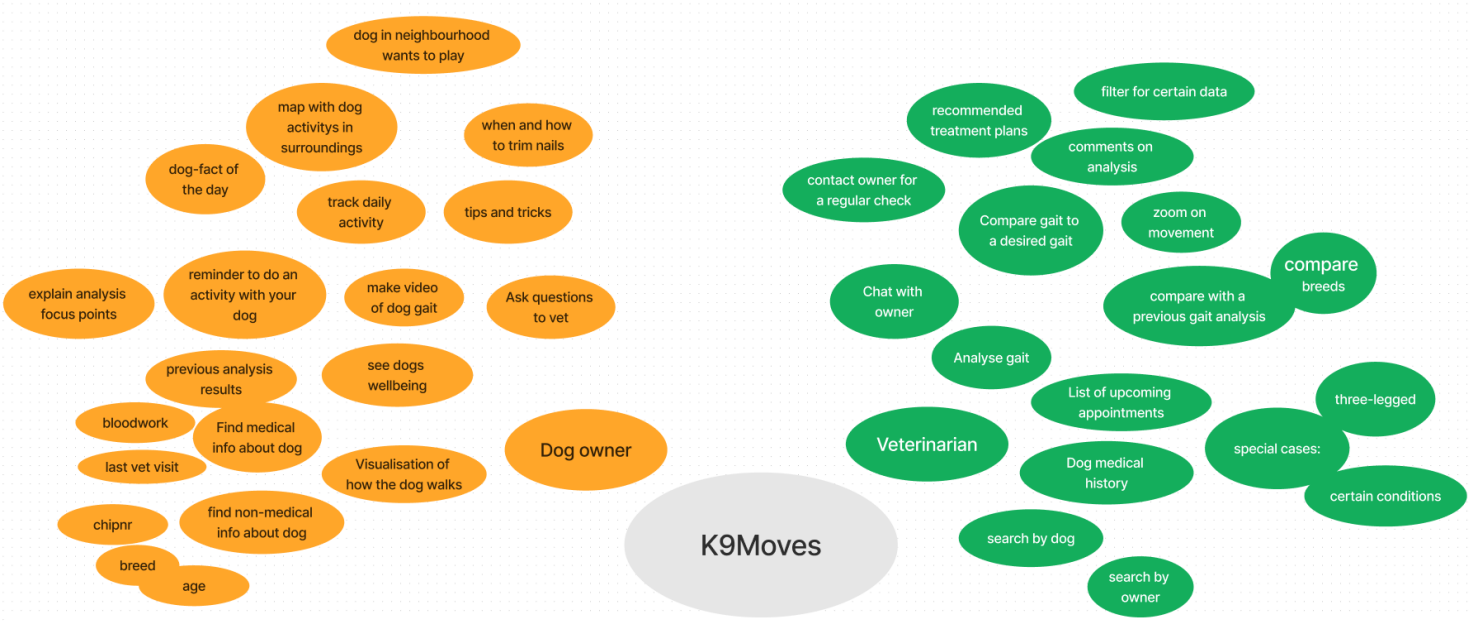



**Figure 4: 15 minute brainstorm session on functionalities**

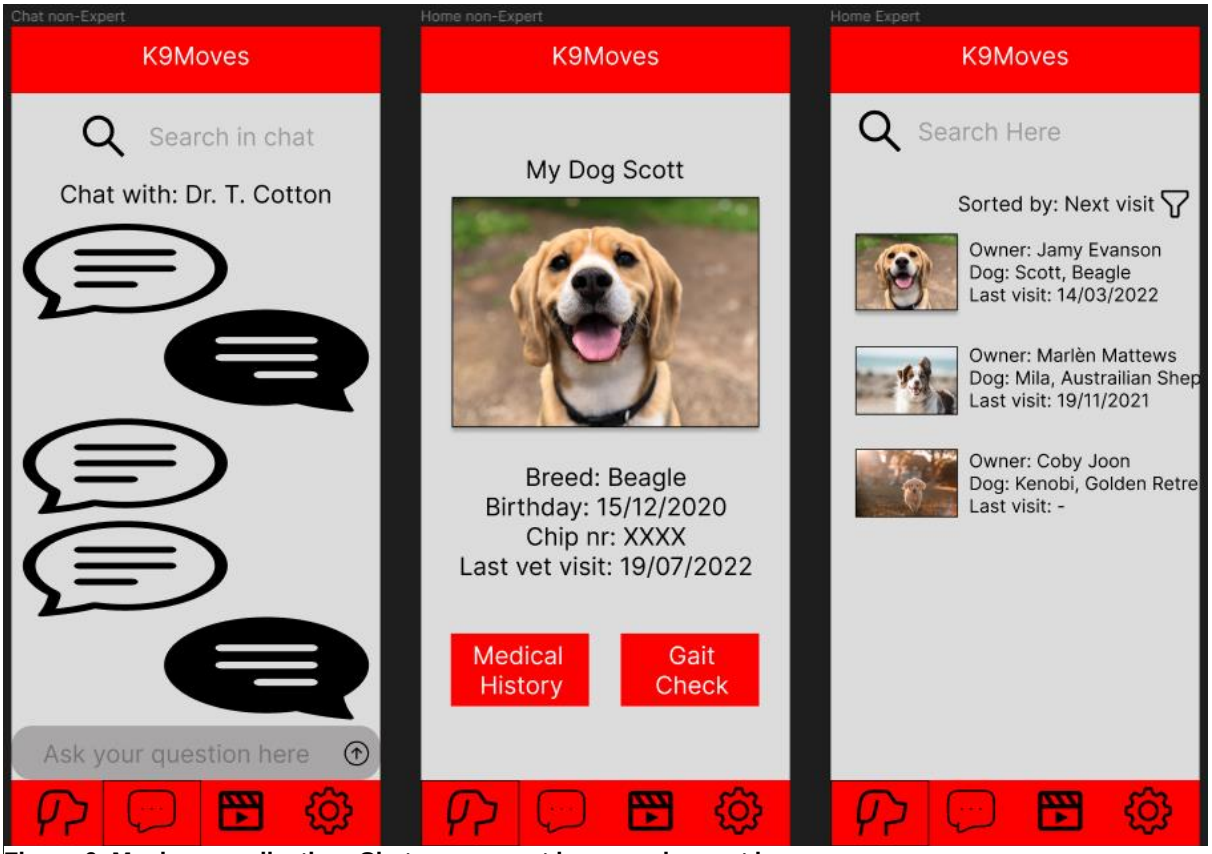



**Figure 6: Mock-up application: Chat, non-expert home and expert home**

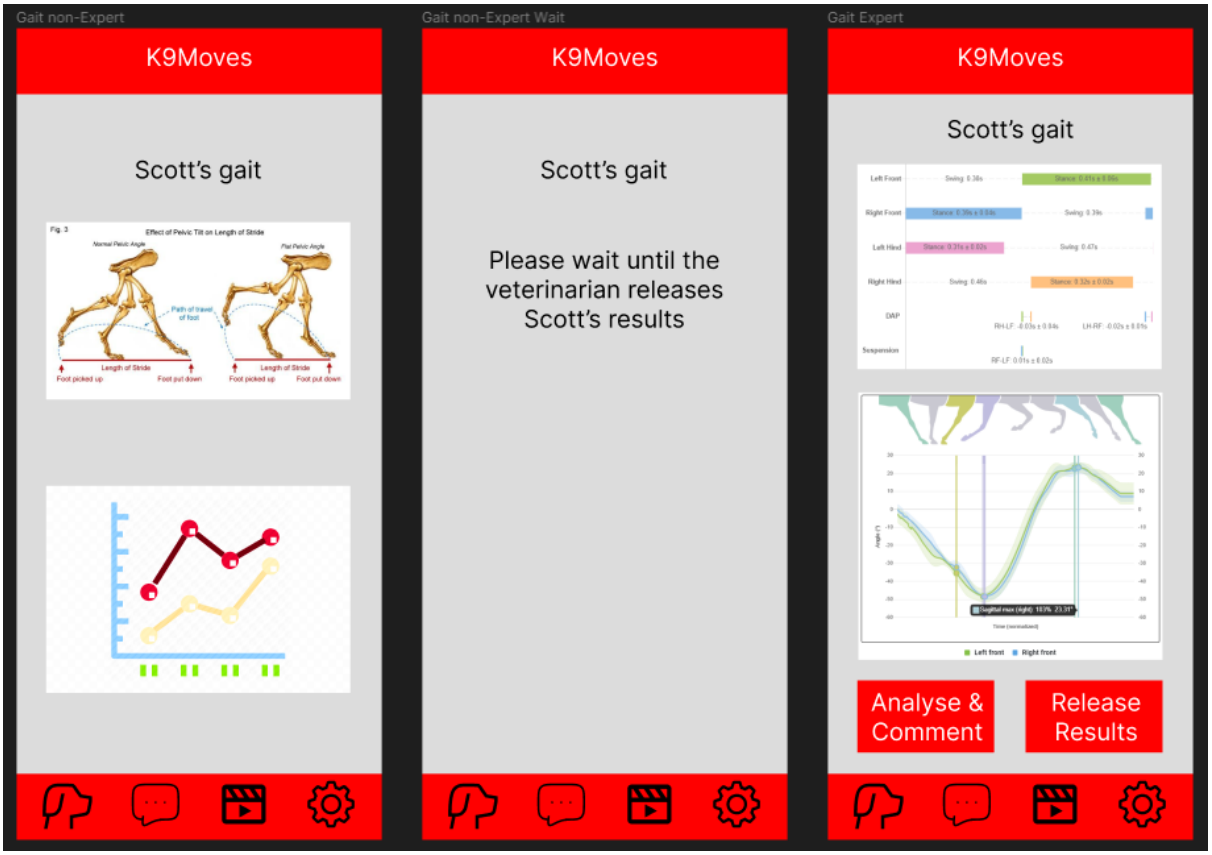



**Figure 5: Mock-up application: Gait non-expert, waiting for gait non-expert and gait expert**

# Chapter 5 – The first iteration

## Functional and non-functional requirements of the first prototype

When analysing the background research in chapter 2, functional and non-functional requirements can be identified. Functional requirements are features or functions of the application, which will enable users to accomplish their tasks. Functional requirements describe the system behaviour. Functional requirements are supported by non-functional requirements, which describe the attributes or features of the system. The non-functional requirements serve as constraints on the design [24]. Non-functional requirements can include, among others, accessibility, and security.

Furthermore, the functional and non-functional requirements can be prioritized using the Moscow method. The term “Moscow” is an acronym and derived from the four prioritization categories: M for Must have, S for Should have, C for Could have, and W for Won’t have [25].

| **Functional requirement** | **MoSCoW** |
|---|---|
| The application visualises the gait of a dog | Must |
| The veterinarian must be able to interpret the visualized gait correctly | Must |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) | Must |
| The application must collect data about dogs | Must |
| The dog-owner must be able to interpret the visualisations without much explanation | Must |
| The expert must be able to switch to different dogs from different owners | Must |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait | Should |
| The application consists of two different interfaces, one for experts and one for non-experts | Should |
| The owner should be able to switch between their different owned dogs | Should |
| The details corresponding to the dog should be visible to both the owner and the veterinarian (name, chip nr, sex, breed, etc) | Should |
| Slow motion can be used to show the gait to the user | Could |
| Medical history can be visible for the non-expert | Could |
| A tutorial that guides the first-time user though the interface | Could |

| **Non-functional requirements** | **MoSCoW** |
|---|---|
| The data collected by the application must be stored and shared with regard to the user’s privacy | Must |
| The buttons used must have natural functionality | Must |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a setting for a zoom factor (magnification) | Could |
| The application could have a step-by-step guide (help) | Could |
| | |

Based on these requirements, the brainstorm session, the colour palette and the EquiMoves application, a first prototype was made. The colour green was chosen to be a main colour. It exudes calmness and is a commonly used colour in the medical world. The pastel colour palette suits it best. Two different interfaces have been created. One for dog owners, with a frame format for mobile phones, and one for veterinarians, with a frame format for tablets.

The visualisations in the first prototype are the video recordings synchronised with line graphs of the limb angle tracks and bar graphs of the strides.

## Pictures of the first prototype

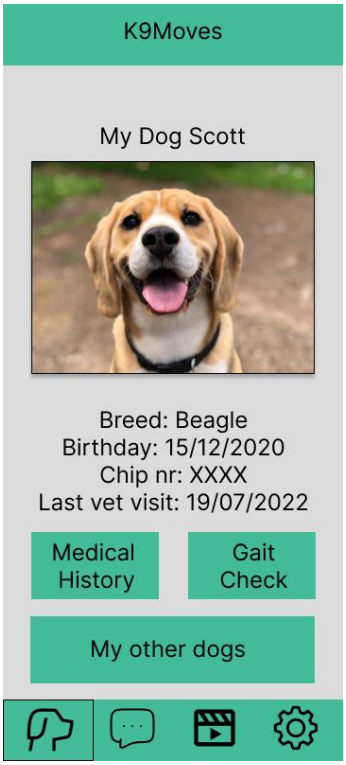



**Figure 7: Home dog owner**

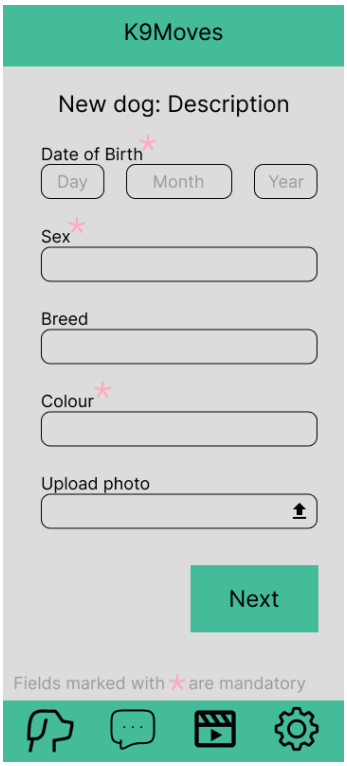



**Figure 10: New dog part 1**

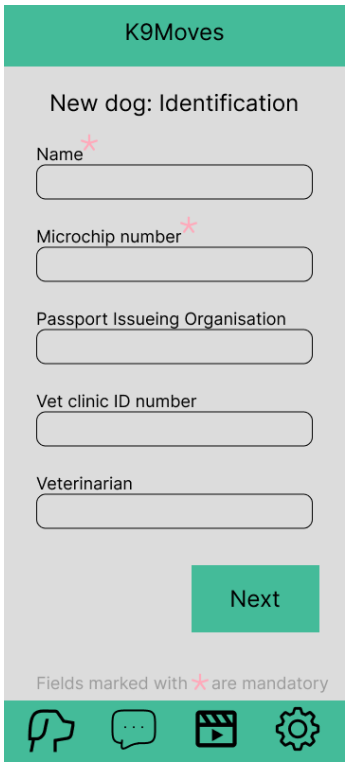



**Figure 9: New dog part 2**

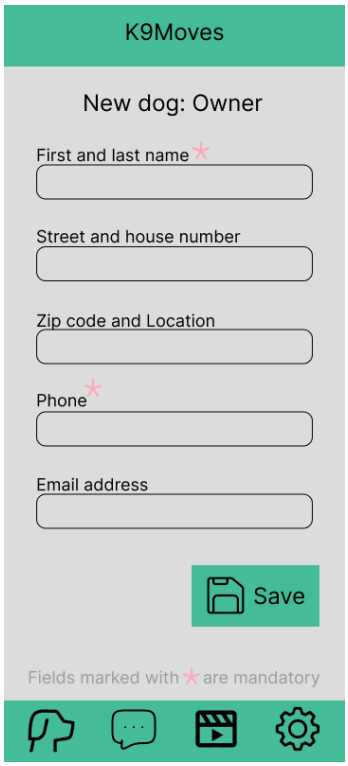



**Figure 8: New dog part 3**

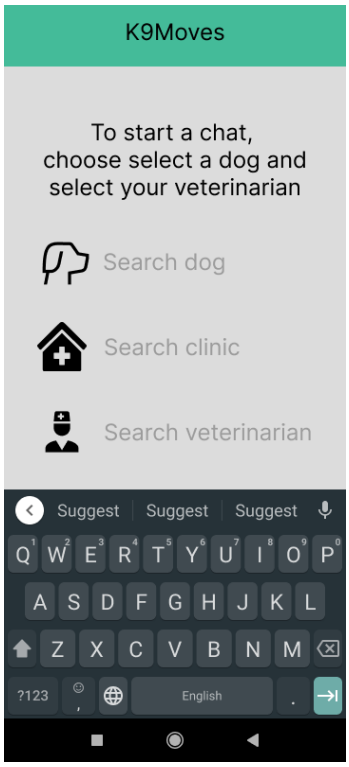



Figure 18: Start a Chat

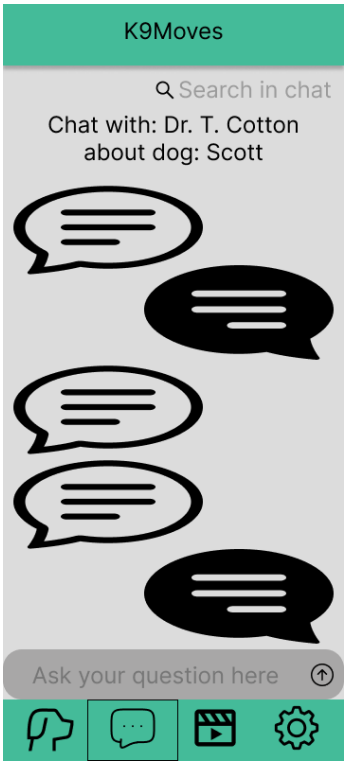



Figure 17: Chat

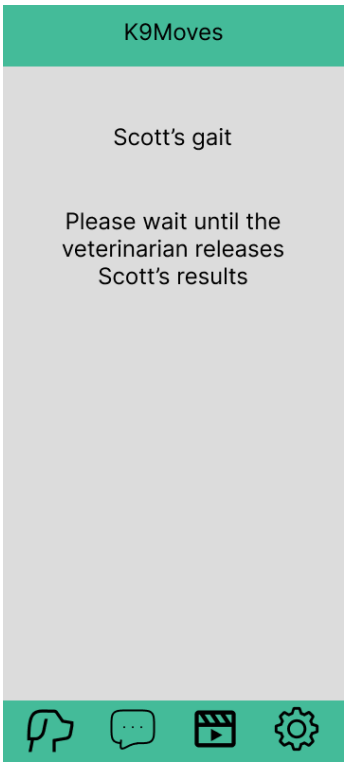



Figure 16: Waiting for results

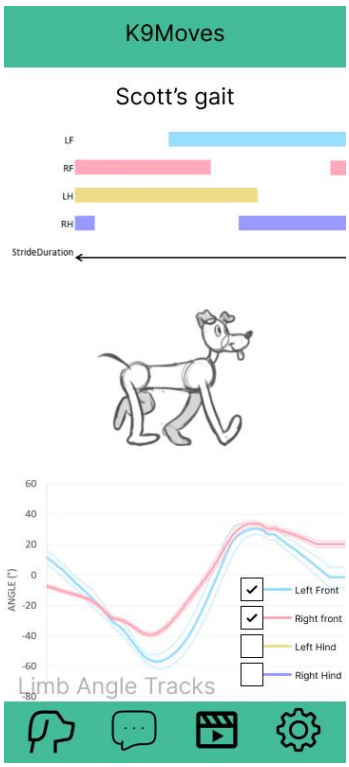



Figure 15: Results

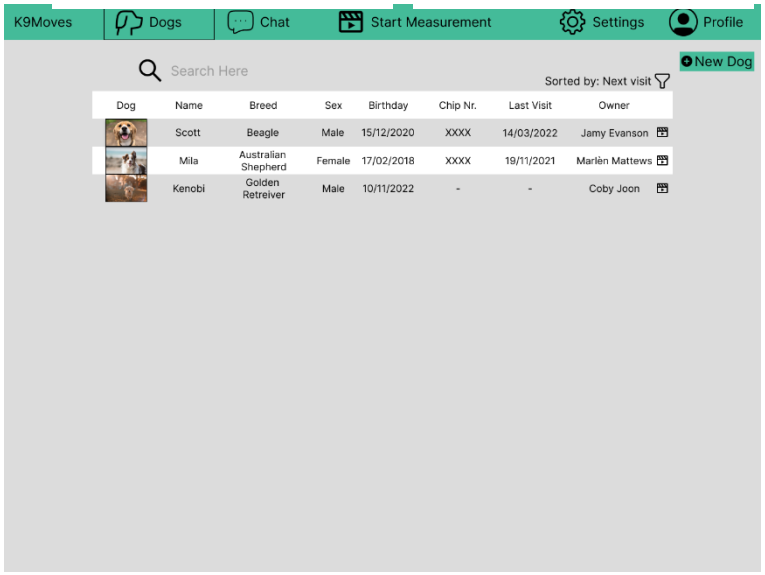



Figure 13: Home veterinarian

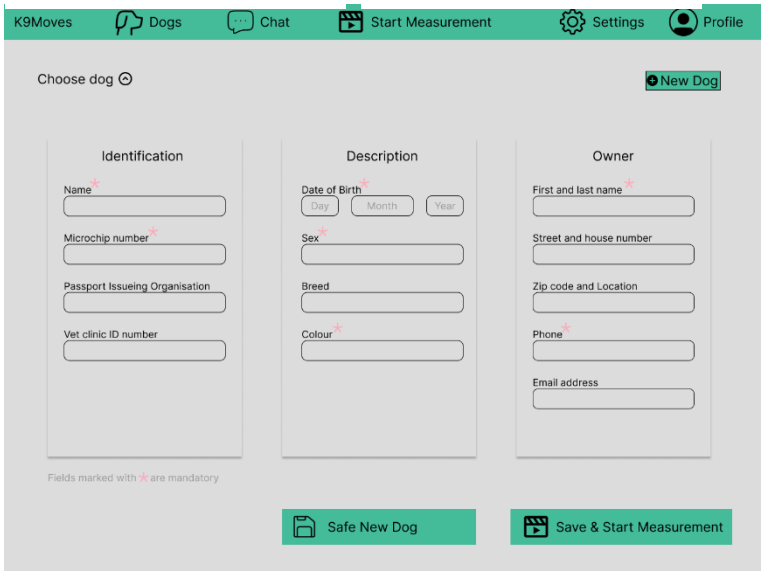



Figure 14: Add new dog veterenarian

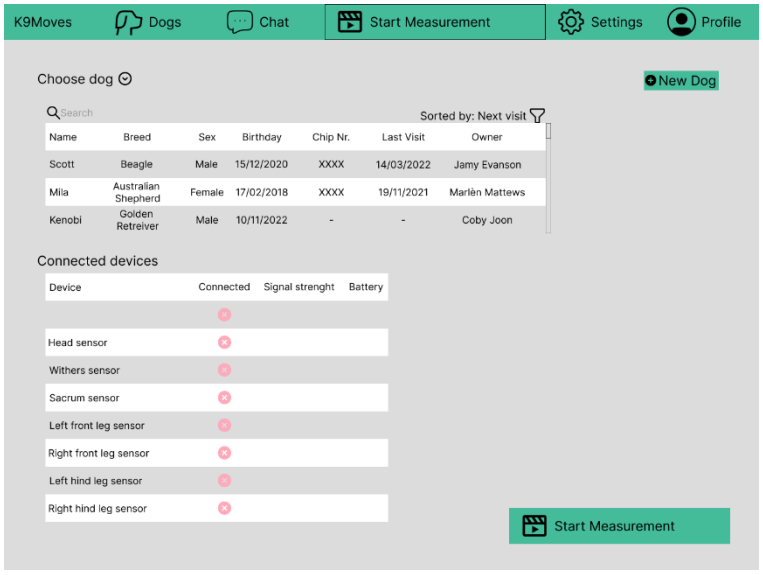



Figure 12: Start measurement

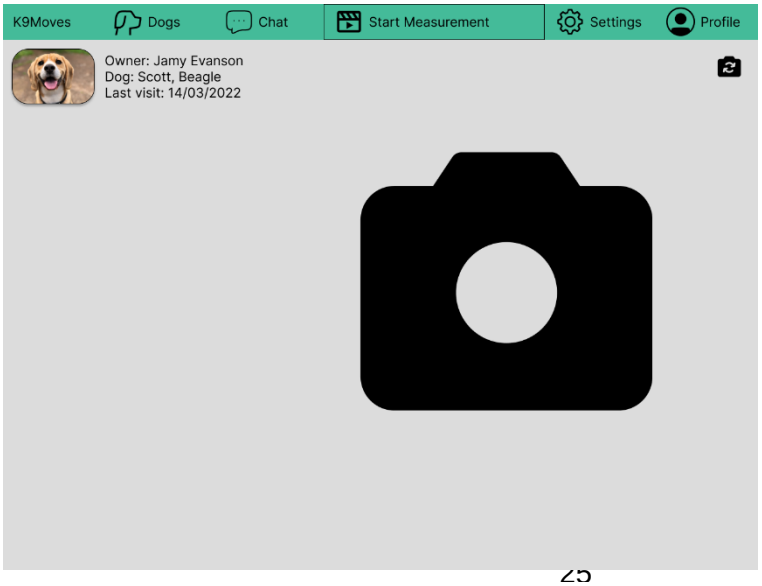



Figure 11: Recording/measurement

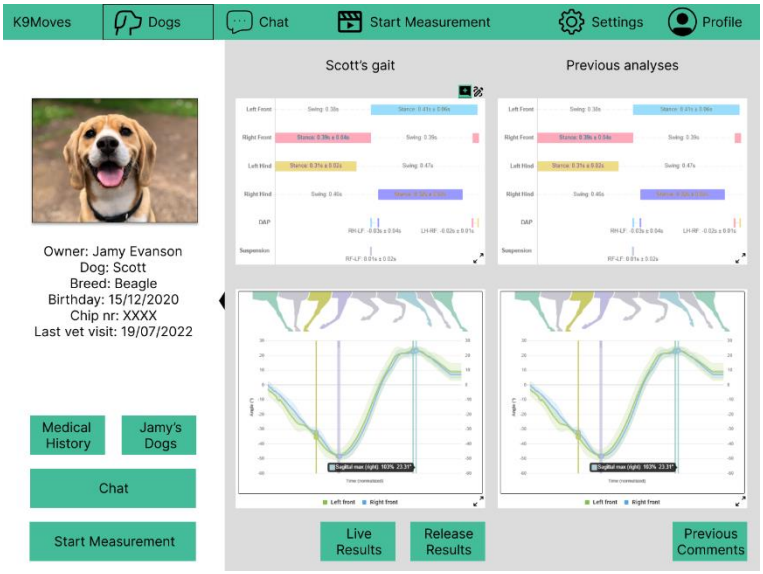



**Figure 22: Vet results**

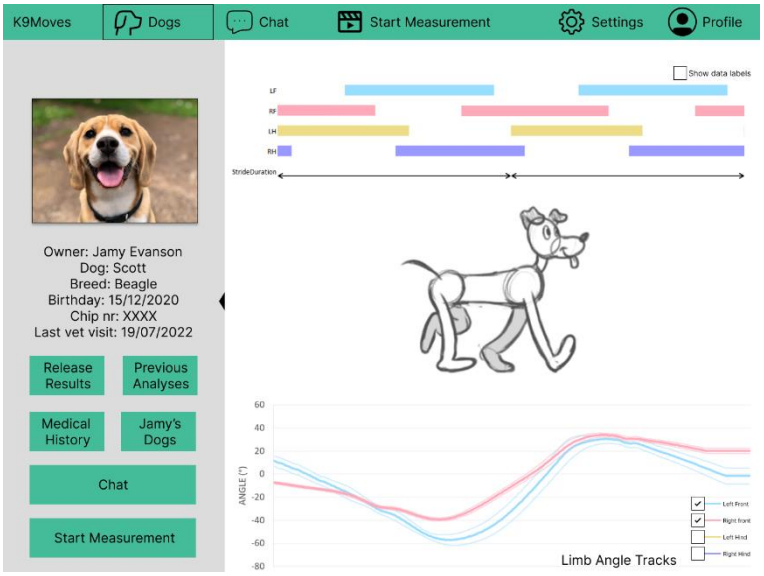



**Figure 21: Vet results 2**

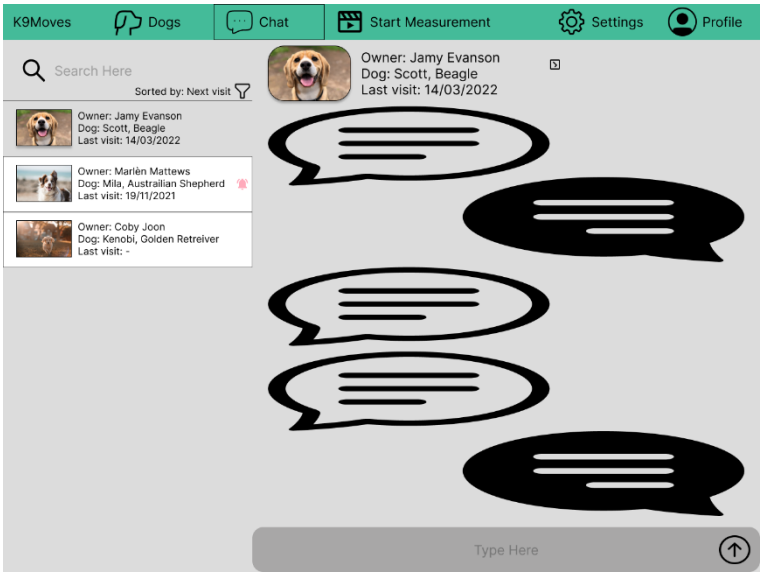



**Figure 20: Chat function**

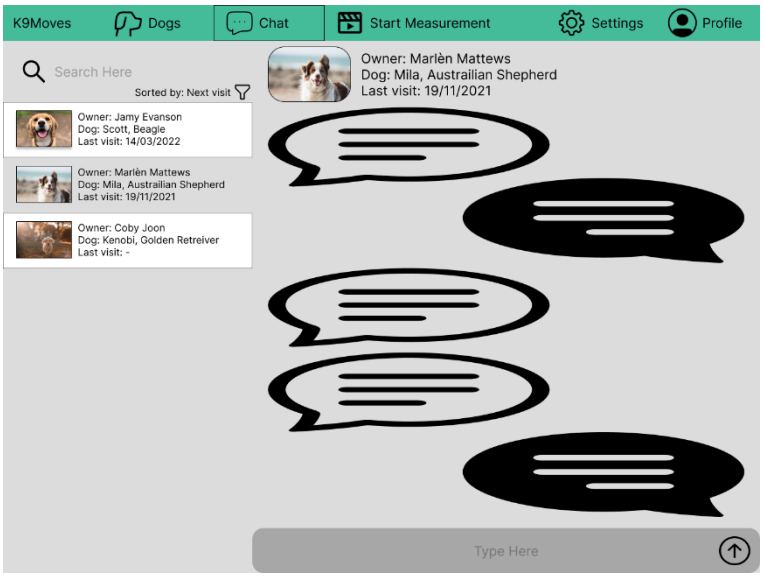



**Figure 19: Chat function 2**

## Feedback from veterinarian orthopaedic specialists on the first prototype

To evaluate the first prototype, two veterinarian orthopaedic specialists from Utrecht University faculty of veterinary medicine were interviewed, they are speaker 1 and 5. Also, a researcher from Utrecht University faculty of veterinary medicine attended this interview as speaker 4. The interview questions are asked by speakers 2 and 3.

### Functions

According to the specialists, helpful functions for the application could be: a diary of the dog's activity and weight / body condition, basic patient information, a pre-visit survey for essential information (screening) the day / morning before the appointment. Questions could

for example be: which leg do you think is lame? So, the veterinarian can check whether it fits with their assessment. Currently, there is a standardized system of questions which veterinarians ask before a patient comes in. Those are questions about the health problem, the nature of the problem and duration, whether or not there already was research done and if there was treatment, besides of course some questions about the general background of the animal, such as lifestyle, living conditions, nutrition, general function / general health, medical history and combinations of things. That is, because some disorders can have an origin in something completely different. E.g., an animal could have a general illness which also makes it lame. In the pre-visit survey, the dog owner can prepare for the appointment and make the duration of the appointment less by already filling out these questions. However, a full medical history is not needed in this application, as not everything is relevant and most of it can be found in their current system. Besides, *"Speaker 1: it is confusing to have another form of communication parallel to our normal patient registration system."* And most importantly, veterinarians are obligated by the Dutch law to keep track of all the communication. A solution is to have an import/export function to keep track of it in the main system.

*"00:36:23 Speaker 1: Well, 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 startup.*
*00:36:37 Speaker 4: And maybe the questionnaire that journal stuff, yeah."*

## Recording

The specialists suggest prioritizing the side view when taking videos of the dog, however it can depend on the injury. But also, the front and hind view are both needed to get a full picture of the situation. In order to get useful videos, the specialists think it is best to use always the same mode, either landscape or portrait mode, and maybe have some sort of silhouette or something in the frame so the dog owner knows the dog is correct in view.

## Results and usage

In terms of the results, the veterinarians want a quick overview of what is happening in the dog. A suggestion by speaker 5 was to do a risk assessment and show in which leg the problem most likely is. When showing more detailed information, parameters which are interesting for the specialists are left right differences and front hind differences, some assessment of the duration of the lameness, the extent of the lameness (maybe use the grading system 1 to 4), suggestion: use colour codes (red being the more affected side, green the ok side) and the symmetry of the head (left to right). However, the current graphs used are not suitable for veterinarians, as they do not understand them. A specialists said:

*"Speaker 1: for if you want to have this app also used by normal veterinarians then it's way too complicated"* The output must be simple and easy to see at a glance. The estimated time the veterinarian currently could spent to check the application would be just opening and closing it, up to maximally 5 minutes of use. One specialist mentioned *"Speaker 1: I would rather see the interpretation than having to watch the videos by myself"*

The orthopaedic specialists think the application could help identifying the correct leg faster. However, they are not convinced yet that the application could draw a correct diagnosis. When the question was asked whether they thought the application could be used for diagnosis or just with monitoring therapy, the answer read: *"Speaker 1: It's just seeing on which limb a dog is lame, you still need to palpate the joints too. This application is for monitoring the dog. 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."* Besides, the specialists would like to have the option to disapprove an analysis result because a video is not correct or reliable. This can be used to prevent owners from getting confused, as the veterinarian might say something different than the results of the analysis.

### Notification and reminder system

A suggestion made by the specialists was to implement notifications after surgery. This way, the veterinarians can keep track of the dog's gait recovery. If the recovery goes well, this might result in a client not having to come to an extra check-up and saves both the veterinarian and the dog owner's time. The notifications could be simple: "please record a new video of your dog walking", but there also might be implemented an option for the veterinarian to put some custom text in the notification and set the interval of the reminder.

*"Speaker 1: Have like access to videos 2 weeks after surgery with an analysis and you see like this symmetry index improving. If it works really well the dog maybe does not have to come back for check-ups, which saves traveling time e.g. when you've come from the other side of the country"*

## Updated requirements

The red colour represents old requirements that need to be updated, as they do not fit with the received feedback. Blue coloured represents new requirements based on the feedback from the orthopaedic specialists. When the text is highlighted with Yellow, the requirement was adjusted.

| **Functional requirement** | **MoSCoW** |
|---|---|
| The application visualises the gait of a dog | Must |
| The veterinarian must be able to interpret the visualized gait correctly | Must |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) -> another form of communication should either be avoided or there must be an import/export function in order to keep track of it in the main system | Must |

| | |
|---|---|
| The application must collect data about dogs | Must |
| The dog-owner must be able to interpret the visualisations without much explanation | Must |
| The expert must be able to switch to different dogs from different owners | Must |
| The application must include a diary function to keep track of the gait over time | Must |
| The application must include a pre-visit survey for screening | Must |
| The application must include a notification system | Must |
| The output of the analysis must be simple and easy to see at a glance | Must |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait | Won't |
| A colour coded risk assessment should be used as a quick overview of the results | Should |
| The application consists of two different interfaces, one for experts and one for non-experts | Should |
| The owner should be able to switch between their different owned dogs | Should |
| The details corresponding to the dog should be visible to both the owner and the veterinarian (name, chip nr, sex, breed, etc) | Should |
| The side view should be prioritized over the front and hind view | Should |
| There should be a silhouette in the frame to let the owner know the dog is right in view when recording | Should |
| the application can be used to monitor the gait of a dog before, during and after treatment | Should |
| the application should draw a correct diagnosis to lame dogs | Should |
| include the option to disapprove a non-reliable analysis | Could |
| Slow motion can be used to show the gait to the user | Could |
| Medical history can be visible for the non-expert | Could |
| A tutorial that guides the first-time user though the interface | Could |

| **Non-functional requirements** | **MoSCoW** |
|---|---|
| The data collected by the application must be stored and shared with regard to the user's privacy | Must |
| The buttons used must have natural functionality | Must |
| The estimated time the veterinarian spends in the application would be up to 5 minutes, but most likely just opening and closing the application | should |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a step-by-step guide (help) | Should |
| The application could have a setting for a zoom factor (magnification) | Could |

## Feedback from researchers on the first prototype

Next to orthopaedic specialist, also three gait researchers were interviewed about the first prototype. All of them were involved in the development of EquiMoves, the gait application for horses. Speakers 1, 3 and 4 are the researchers, and the questions are asked by speakers 2 and 5. As the researchers were familiar with horses' gait, questions about the differences between dogs and horses were asked to measure their understanding of the dogs' gait. They thought the dogs responded differently than horses but could not tell exactly the differences. Hence, the answers related to the dog it is gait should be looked at

with care. However, the comments on the design of the application are of excellent value because they went through the process of designing the horse app.

Because the horse application EquiMoves serves as a model for the current study, the differences between horses and dogs need to be recognized and so the differences in the target group. According to the researchers, examining a dog for lameness is different compared to a horse because of their different size, a different attachment of the sensors and besides, dogs are anatomically and neurologically different, dogs are for example more fluent in their gait. However, the researchers expect that for dogs the same variables are important, like asymmetry comparison, footdrop, and vertical displacement, but they are not sure whether it means the same, or maybe the opposite. To check whether their behaviour aligns, it is suggested to look into pain induction studies for dogs.

According to the researchers, interesting parameters to include in the analysis could be stride patterns, asymmetries, speed, because a dog can get better or worse over time, positions, as limping might be worse when switching from laying to standing or sitting, surface detection, because a dog can for example walk differently on gras compared to concrete, direction of movement, for example straight or in circles and lastly the metadata of the dog. It might be helpful to implement a diary function to keep track of the activities of 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. This kind of data would be remarkably interesting to know if research is being done with the application data.

### EquiMoves compared to the current project

According to the researchers, the user friendliness of EquiMoves can be improved by less scrolling and an easier method of comparing results. What the researchers like about the EquiMoves application is that it prevents from comparing two incomparable values, by not being able to select them at the same time. The researchers came with a few suggestions to improve the application. One of them was to include a chip scanner for quickly selecting the right dog. *“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.”* Colour wise, the researchers think it is calmer than EquiMoves, and it looks more professional “*Speaker 3: even with the playful picture*”. Next, the researchers would like to see some feedback implemented in the applications, for example if the sensor is worn correctly. But also, to check if the measurement is ok or needs to be retaken. This can be due to too much loss of samples, which makes it an unreliable measurement. It could also show the battery level of the

sensor, the connectivity status and calibration warnings. During the recording of the video, it would be nice to have a timer and possibly a pause and stop button.

### Chat function

The researchers were asked to share their opinion about the chat function. The general opinion was that this would ask too much of the veterinarian. The researchers recommended to implement some sort of a protective layer, to prevent the veterinarian from having to answer a lot of questions. There should be a FAQ section and there could be a set of pre-existing questions or problems, which pinpoints the user towards the actual person to contact. For example, if there is a technical question there is a support system so the vet does not have to go out of its scope. An option that could be implemented at the end of the support system is a button to request an e-consult.

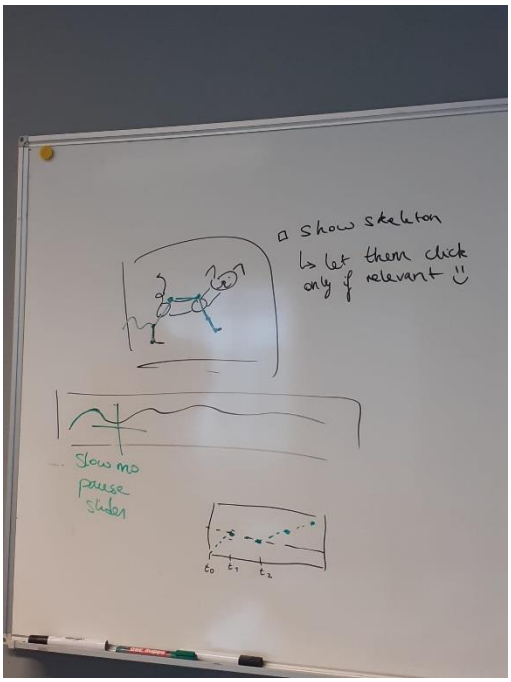



**Figure 23: visualisation of the real time results drawn by the researchers**

### Results

In terms of the results, the researchers want to see the curves, patterns, standard deviation, and data behind the values. This is because it proves reliability. The researchers however think that the veterinarian would like to see the discrete values. One of the researchers said the following about having different interfaces for different users: *"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." And "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."*

Another suggestion was to put the video of the recording parallel to the results, with a slider bar to highlight the current timestamp from the video in the results. *"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?"* please see figure 8 for a visualisation of this idea. Other suggestions were to have a slowdown and maybe even a speed up option, and

a clickable dog skeleton implemented using a check box to activate this layer, to zoom in on certain movements.

In addition to this live movement, speaker 3 suggested to have separated tabs for real time measurements and average measurements. This is because for example limb angle comparison cannot be done in real time because then they need to be shifted. Related to this, the user should not make a choice that is not possible, such as comparing two variables that cannot be compared. *"Speaker 3: 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."*

Currently, to the researchers considered most useful graph in the application EquiMoves is the strides split curve, where just the mean stride and standard deviation is shown. It can often be seen in horses that they are most asymmetrical when they speed up and slow down, so it is especially important to have an overview of the whole measurement, according to speakers 3 and 4. Hence, they want to see that difference between stable speeds and variables like acceleration, and deceleration.

Finally, the researchers where asked whether they thought any veterinarian would be able to interpret the results of a gait analysis in the format they would like to see it. They answered optimistic, expecting veterinarians being able to understand all of it. However, the researchers acknowledged the fact that veterinarians are under a lot of pressure, and hence they agreed on discrete values with standard deviations, *"speaker 3: but not too complicated ones, so asymmetry and perfect stride pattern".* Then, the researchers came with a suggestion: it would be nice to have a popup whenever there is an atypical pattern found in the dog, for example the dog had no asymmetries in the last measurement and now it suddenly is asymmetric.

## Updated requirements

The red colour represents requirements that need to be updated, as they do not fit with the received feedback. Blue coloured represents new requirements based on the feedback from the researchers. When the text is highlighted with Yellow, the requirement was adjusted.

| **Functional requirement** | **MoSCoW** |
|---|---|
| The application visualises the gait of a dog | Must |

| | |
|---|---|
| The veterinarian must be able to interpret the visualized gait correctly | Must |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) -> another form of communication should either be avoided or there must be an import/export function in order to keep track of it in the main system -> A support system with FAQ section and a protective layer with a set of pre-existing questions or problems must prevent veterinarians from being overloaded with questions. | Must |
| The application must collect data about dogs | Must |
| The dog-owner must be able to interpret the visualisations without much explanation | Must |
| The expert must be able to switch to different dogs from different owners | Must |
| The application must include a diary function to keep track of the gait over time | Must |
| The application must include a pre-visit survey for screening | Must |
| The application must include a reminder and notification system | Must |
| The output of the analysis must be simple and easy to see at a glance | Must |
| the application must provide feedback about the reliability of the recording and whether it should be retaken | must |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a researcher | Should |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a veterinarian | could |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a dog owner | Won't |
| A notification should pop up in the expert interface if an analysis result shows an atypical pattern in the dog | should |
| A chip scanner should be included | Should |
| The user should not be able to compare values that are incomparable | Should |
| The recording interface should include a timer to show how much longer the video needs to be | Should |
| the communication function should include a button to request an e-consult | Should |
| A colour coded risk assessment should be used as a quick overview of the results | Should |
| The application consists of three different interfaces, one for experts, one for non-experts and one for researchers | Should |
| The owner should be able to switch between their different owned dogs | Should |
| The details corresponding to the dog should be visible to both the owner, the researchers and the veterinarian (name, chip nr, sex, breed, etc) | Should |
| The side view should be prioritized over the front and hind view | Should |
| There should be a silhouette in the frame to let the owner know the dog is right in view when recording | Should |
| the application can be used to monitor the gait of a dog before, during and after treatment | Should |
| the application should draw a correct diagnosis to lame dogs | Should |
| The results section should have a layer with a clickable skeleton of the dog, which can show magnified motion of a certain joint | Should |
| The results should be split up in different tabs, one for real time motion and one for averages | Should |
| The real time motion tab could include a video recording parallel to the results, including a slider bar to highlight the current timestamp | Could |
| The recording interface could have controls to pause a recording etc. | Could |
| include the option to disapprove a non-reliable analysis | Could |
| Slow motion can be used to show the gait to the user | Could |
| Medical history can be visible for the non-expert | Could |

| | |
|---|---|
| A tutorial that guides the first-time user though the interface | Could |

| **Non-functional requirements** | **MoSCoW** |
|---|---|
| The data collected by the application must be stored and shared with regard to the user's privacy | Must |
| The buttons used must have natural functionality | Must |
| The application could have a step-by-step guide (help) | Should |
| The estimated time the veterinarian spends in the application would be up to 5 minutes, but most likely just opening and closing the application | should |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a setting for a zoom factor (magnification) | Could |

## Pictures of the second prototype

Given the time between the first and the second round of evaluations, only the mayor new requirements where fully implemented.

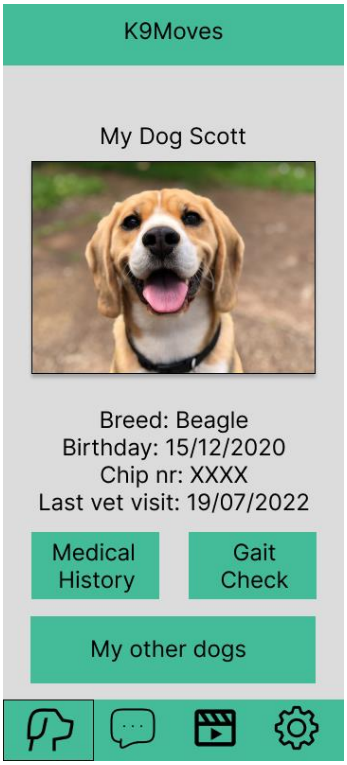



Figure 27: Home dog owner

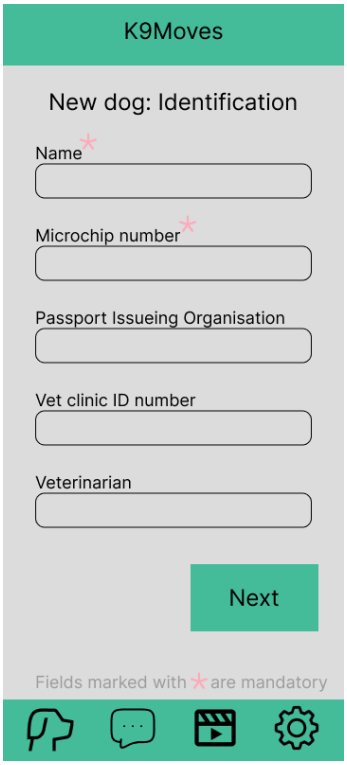



Figure 26: New dog ID

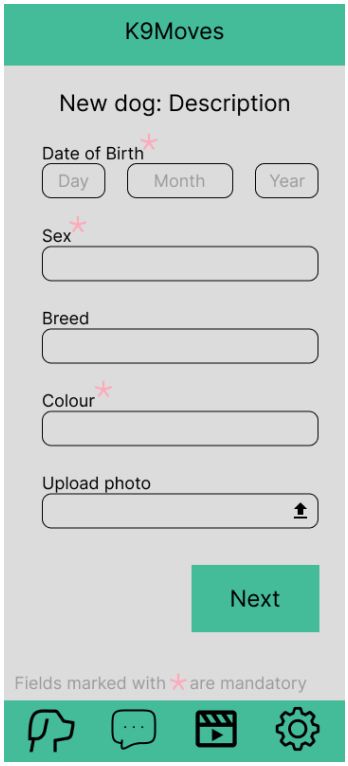



Figure 25: New dog description

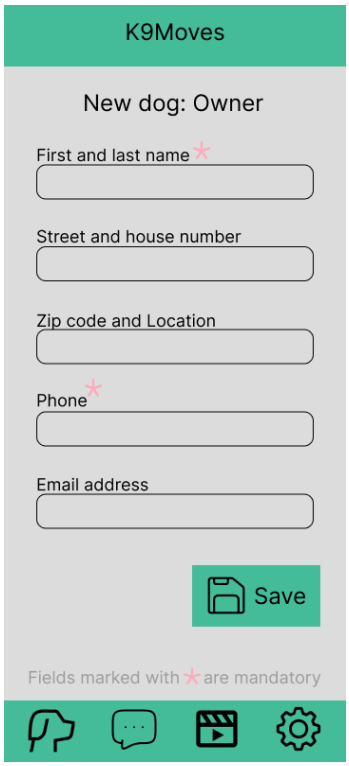



Figure 24: New dog owner details

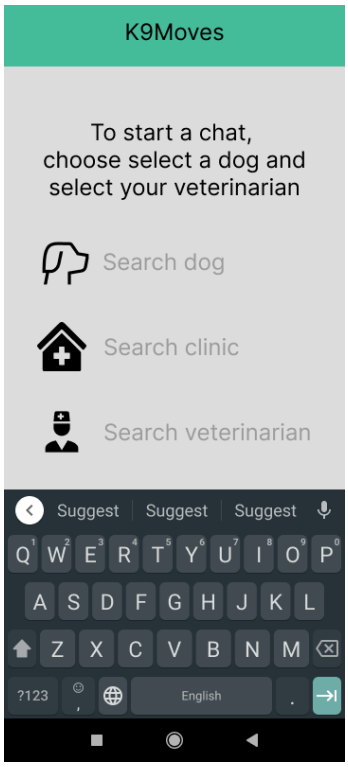



Figure 35: owner: start chat

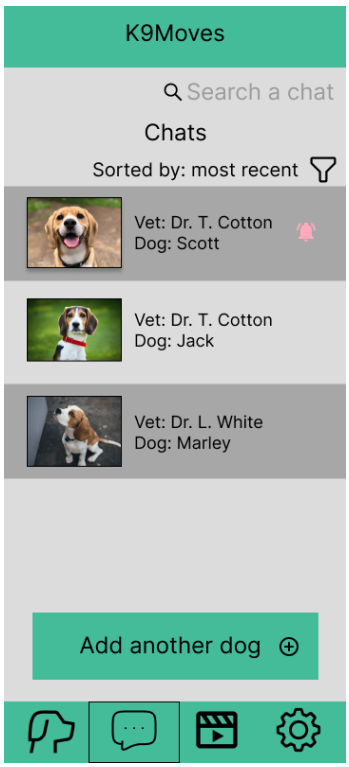



Figure 34: Chat overview owner with more than one dog

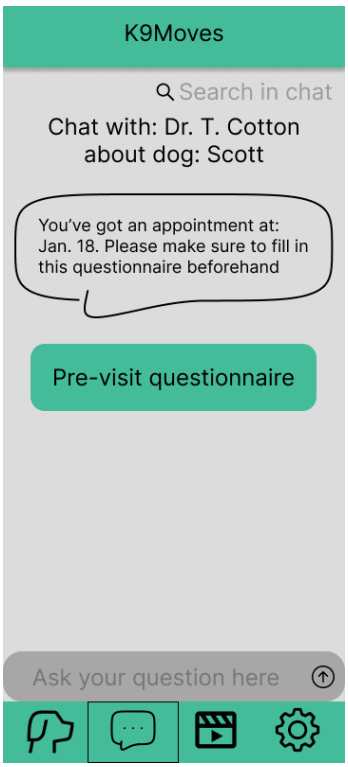



Figure 33: Chat 1

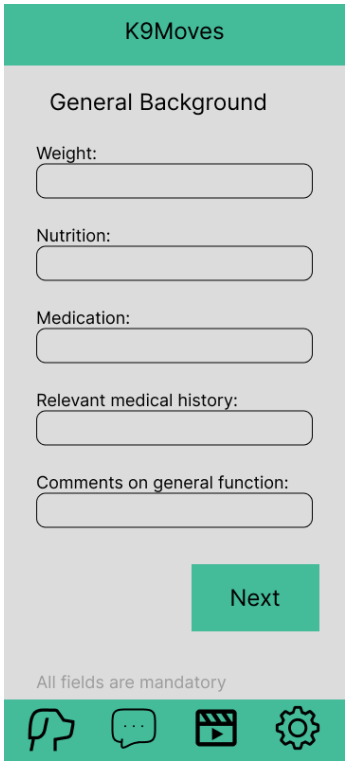



Figure 32: Pre-visit questionnaire 1

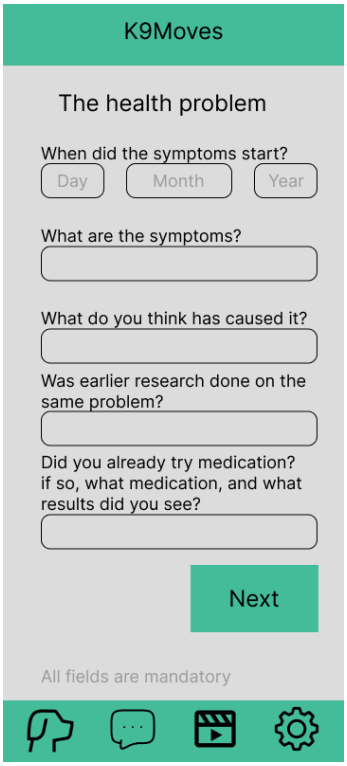



Figure 31: Pre-visit questionnaire 2

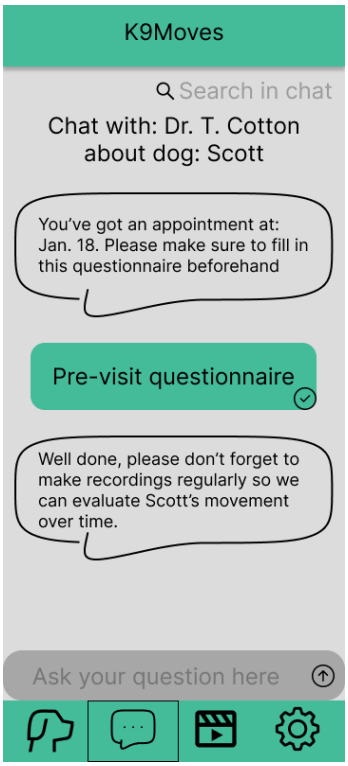



Figure 30: Chat 2

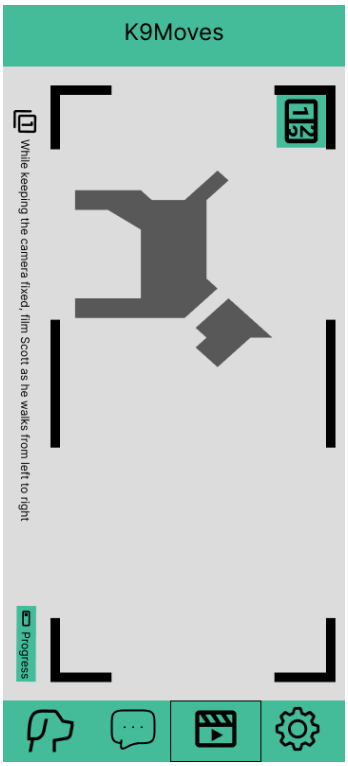



Figure 29: Start recording

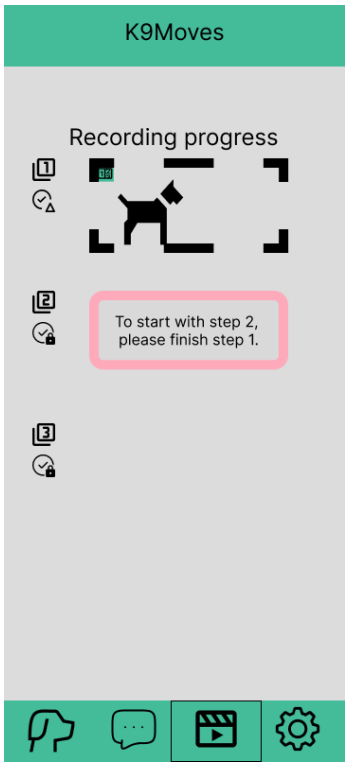



Figure 28: Recording progress

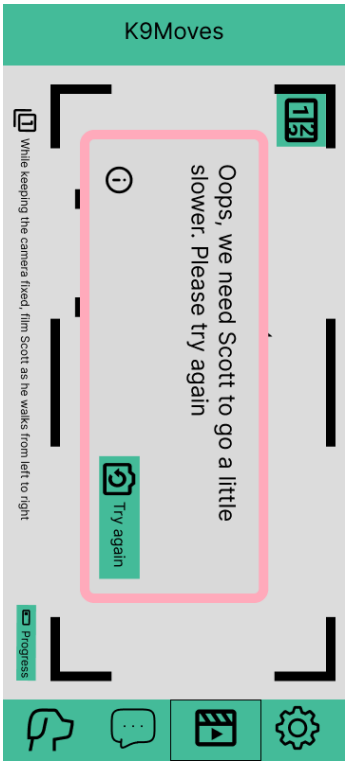



Figure 41: Recording oops

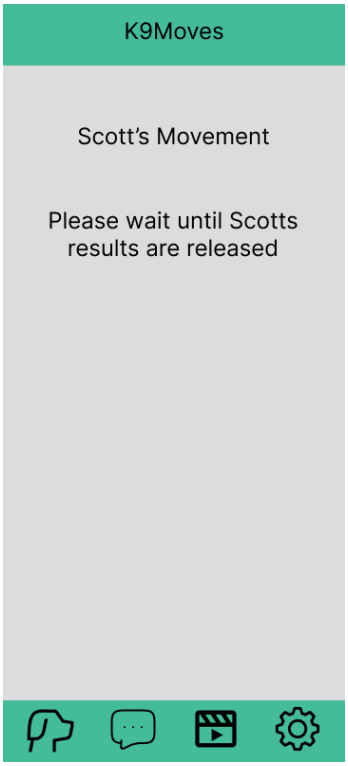



Figure 40: owner wait for results


Figure 39: Owner results

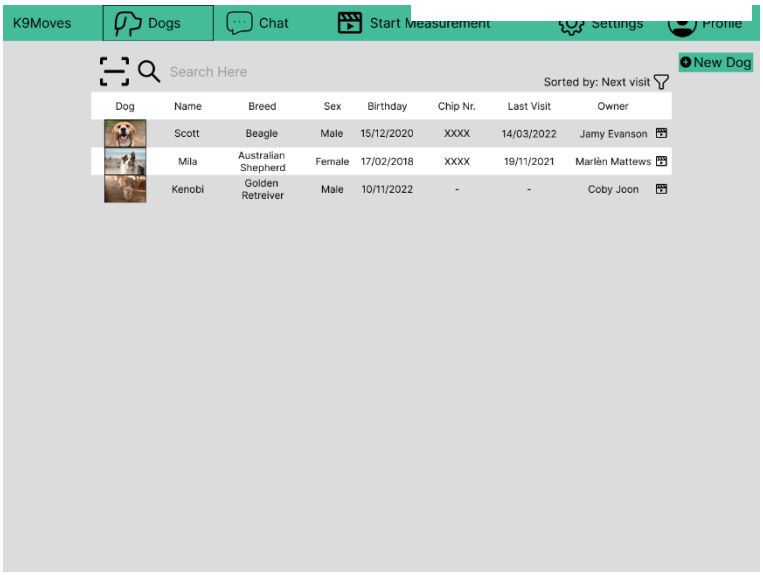



Figure 37: Veterinarian main

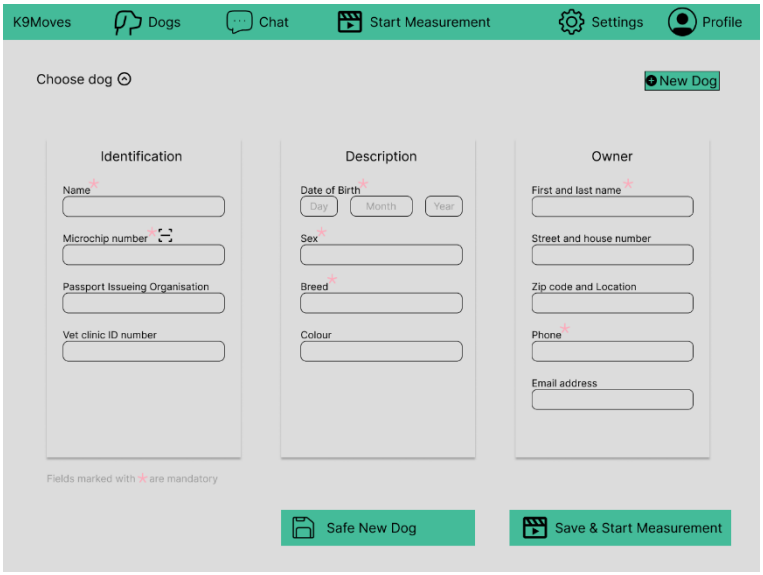



Figure 38: Veterinarian new dog


Figure 42: Veterinarian Chat 1

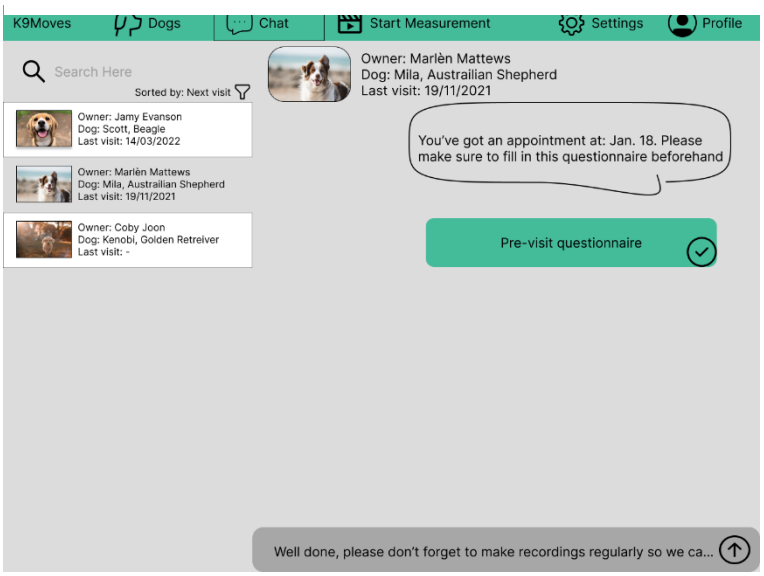



Figure 36: Veterinarian Chat 2

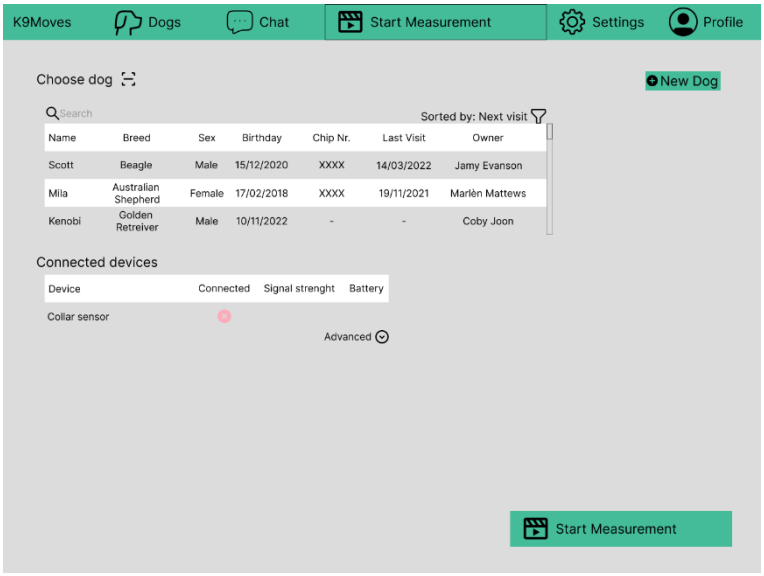



**Figure 46: Start measurement 1**

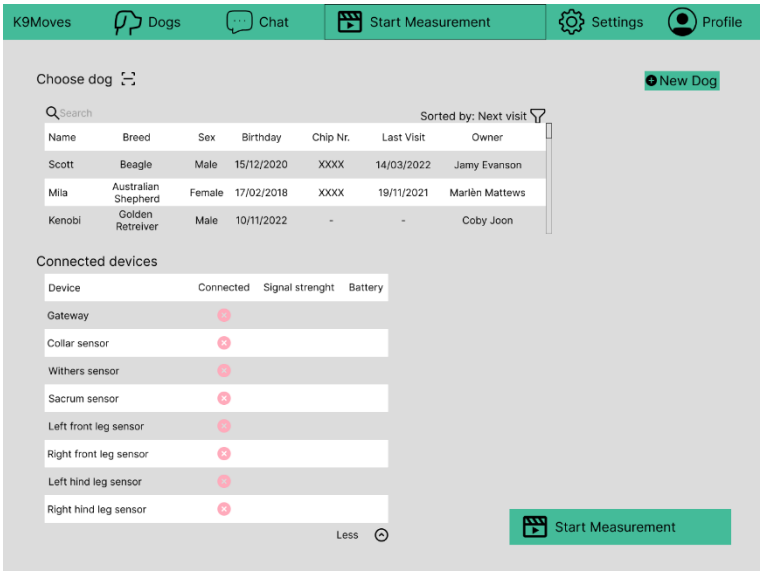



**Figure 44: Start measurement 2**

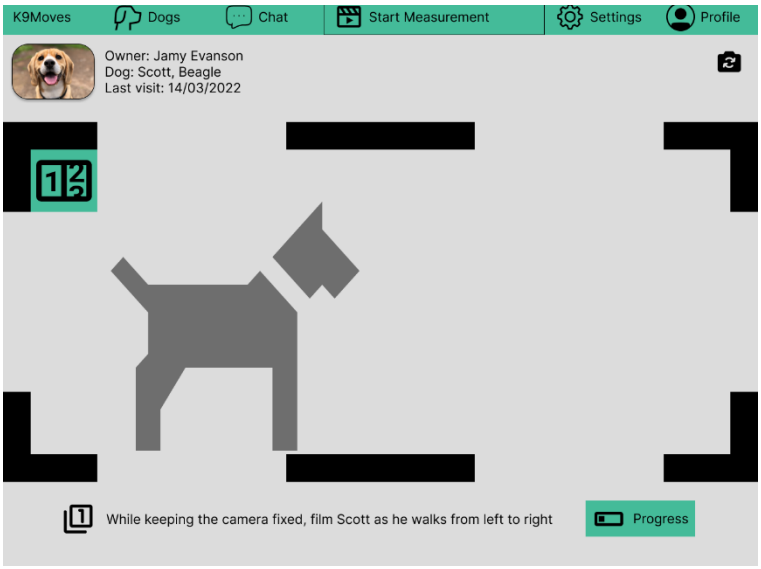



**Figure 44: Recording**

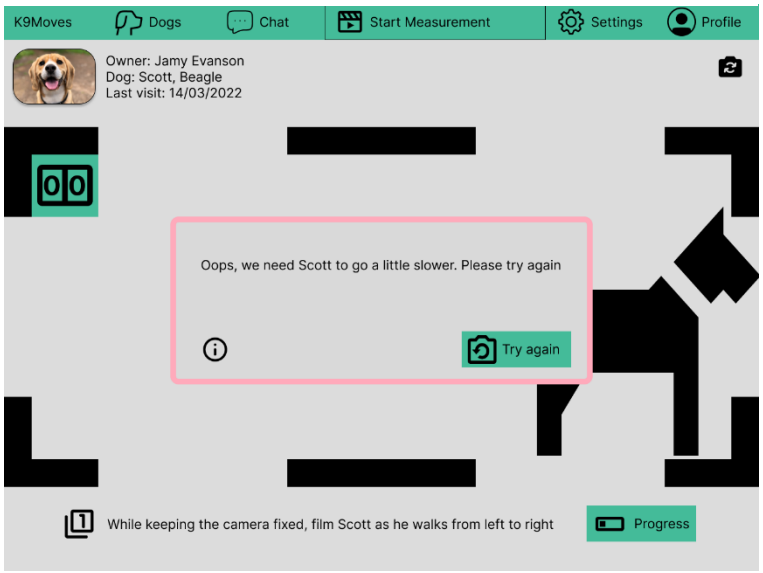



**Figure 45: Recording oops**

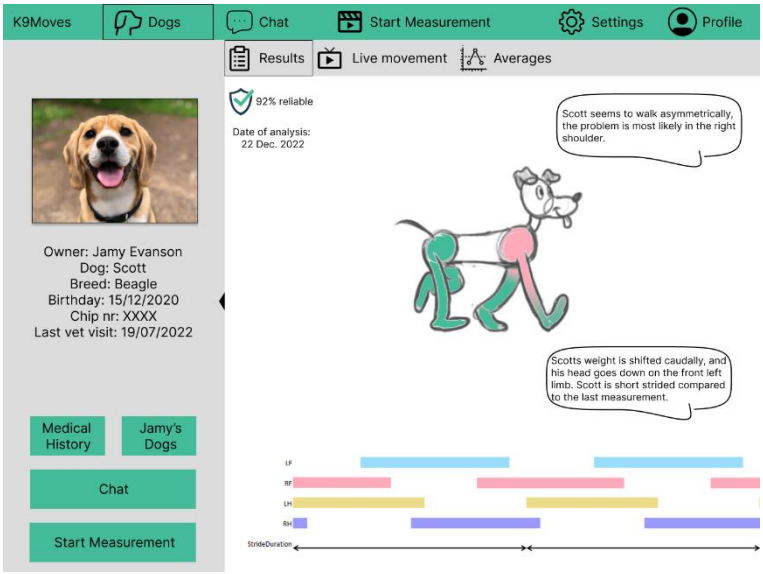



**Figure 49: Veterinarian Results**

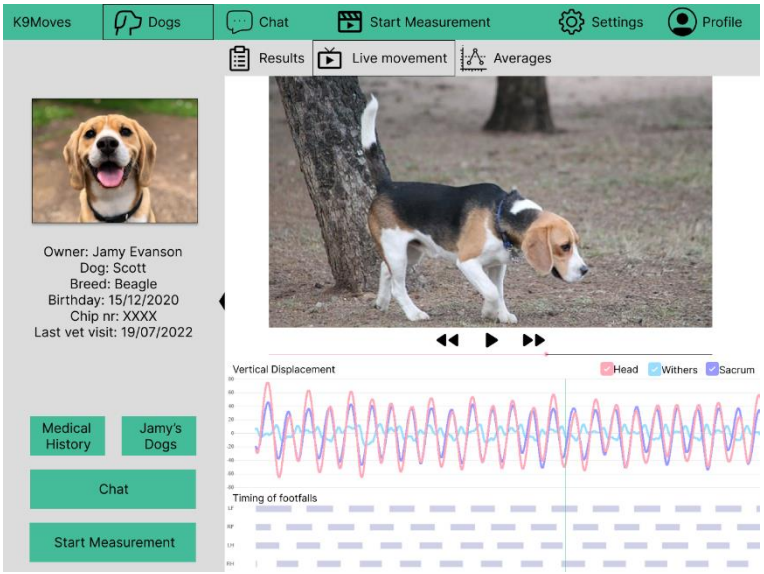



**Figure 48: Veterinarian live results**

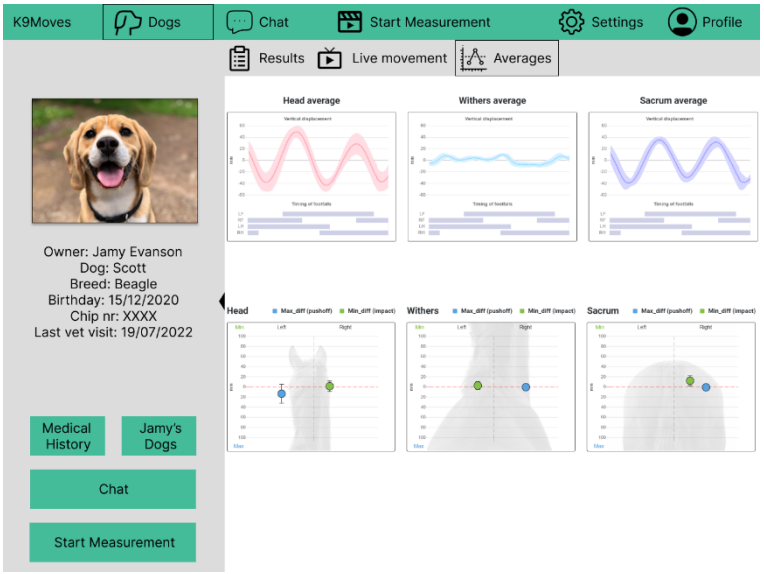



**Figure 47: Veterinarian Averages Results**

# Chapter 6 – The second Iteration

In the second iteration, two dog owners, of which one was also a graphical designer, and three first line veterinarians were interviewed and afterwards usability tests were done. The dog owners did now little to nothing about lameness, which was a great revelation, because the interface was not suitable for them yet.

## Feedback from dog owners and a graphical designer on the second prototype

Two dog owners were interviewed separately. They are called speaker 1 and speaker 2. Speaker 1 is also a graphical designer. Both new little to nothing about lameness, let alone the different walking patterns a dog can walk in, like walking, trotting, cantering, and galloping. Because of this, it was hard to them to understand the usage of the application.

Speaker 2 raised the suggestion to implement notifications for medication, deworming and vaccinations. This dog owner told us that the application was easy to understand, however from the usability tests the interviewers noted that speaker 2 was not completely understanding the usage off the application. Speaker 2 could tell us without problems what each icon would lead to; however the recording process and results were unclear to the speaker.

Speaker 1 however did seem to understand the concept of the application. Speaker 1 said a monthly interval of recording a video of the dog would be acceptable. Daily or weekly would be too much. The Graphical designer also had some nice comments about the design, first of all the icons used in the menu were very clear. Secondly, in the recording view, the instructions must be easy and clear, maybe a bit bigger to stand out more. The overall view of the application is good; however, the coherency could be better, some parts have more angular details and others are curved.

## Updated requirements

The red colour represents requirements that need to be updated, as they do not fit with the received feedback. Blue coloured represents new requirements based on the feedback from the dog owners and graphical designer. When the text is highlighted with yellow, the requirement was adjusted.

| **Functional requirement** | **MoSCoW** |
|---|---|
| The application visualises the gait of a dog | Must |
| The veterinarian must be able to interpret the visualized gait correctly | Must |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) -> another form of communication should either be avoided or there must be an import/export function in order to keep track of it in the main system -> A support system with FAQ section and a protective layer with a set of pre-existing questions or problems must prevent | Must |

| | |
|---|---|
| veterinarians from being overloaded with questions. | |
| The application must collect data about dogs | Must |
| The dog-owner must be able to interpret the visualisations without much explanation | Must |
| The expert must be able to switch to different dogs from different owners | Must |
| The application must include a diary function to keep track of the gait over time | Must |
| The application must include a pre-visit survey for screening | Must |
| The application must include a reminder and notification system | Must |
| The output of the analysis must be simple and easy to see at a glance | Must |
| the instructions to record a video must be clear | Must |
| the application must provide feedback about the reliability of the recording and whether it should be retaken | must |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a researcher | Should |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a veterinarian | could |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a dog owner | Won't |
| A notification should pop up in the expert interface if an analysis result shows an atypical pattern in the dog | should |
| A chip scanner should be included | Should |
| The user should not be able to compare values that are incomparable | Should |
| The recording interface should include a timer to show how much longer the video needs to be | Should |
| the communication function should include a button to request an e-consult | Should |
| A colour coded risk assessment should be used as a quick overview of the results | Should |
| The application consists of three different interfaces, one for experts, one for non-experts and one for researchers | Should |
| The owner should be able to switch between their different owned dogs | Should |
| The details corresponding to the dog should be visible to both the owner, the researchers and the veterinarian (name, chip nr, sex, breed, etc) | Should |
| The side view should be prioritized over the front and hind view | Should |
| There should be a silhouette in the frame to let the owner know the dog is right in view when recording | Should |
| the application can be used to monitor the gait of a dog before, during and after treatment | Should |
| the application should draw a correct diagnosis to lame dogs | Should |
| The results section should have a layer with a clickable skeleton of the dog, which can show magnified motion of a certain joint | Should |
| The results should be split up in different tabs, one for real time motion and one for averages | Should |
| Notifications could be implemented for medication, deworming and vaccinations | Could |
| The real time motion tab could include a video recording parallel to the results, including a slider bar to highlight the current timestamp | Could |
| The recording interface could have controls to pause a recording etc. | Could |
| include the option to disapprove a non-reliable analysis | Could |
| Slow motion can be used to show the gait to the user | Could |
| Medical history can be visible for the non-expert | Could |
| A tutorial that guides the first-time user though the interface | Could |

| **Non-functional requirements** | **MoSCoW** |
|---|---|

| | |
|---|---|
| The data collected by the application must be stored and shared with regard to the user's privacy | Must |
| The buttons used must have natural functionality | Must |
| The application could have a step-by-step guide (help) | must |
| the navigation in the application should be intuitive | Should |
| the interval of recording a healthy dog should be once a month | Should |
| the design of the application should be coherent | Should |
| The estimated time the veterinarian spends in the application would be up to 5 minutes, but most likely just opening and closing the application | should |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a setting for a zoom factor (magnification) | Could |

## Feedback from first line veterinarians on the second prototype

Three first line veterinarians are speakers 4, 6 and 8. The interviewers are speakers 1 and 3. A few things the veterinarians mentioned that would be helpful is including a recording of a dog standing up after a nap in the application, as this is a symptom often seen, for example in arthritis, and keeping track of both the weight and the body condition score of the dog. What the first line veterinarians also want to know is whether de dog is a highly active dog, and moreover if the dog is a working dog or not

Including daily habits tracking or activity tracking would be helpful to confirm the story of the dog owner. Currently, the first line veterinarians give a form to the dog owner when it comes in with a lame dog. On the from, they can keep track of the dog's pain medication, eating habits, number of times they went for a walk, the total amount of minutes they walked and whether it was a green, orange, or red day. The green, orange, and red stand for the colours of a traffic light, and represent symptoms related to whether the dog has any trouble walking. A green day means that the dog has a good appetite, sleeps well, does not signal pain and can keep its balance well. An orange day means that the dog may have been less playful than usual, had trouble finding a comfortable position, wants to walk less far or goes lame along the way, sometimes licks joints, and sometimes eats a little less than normal. A red day means a dog is withdrawn or just irritable, wakes often and has trouble getting up, walks very lame or will not walk at all, squeaks, whines, or licks joints and has no interest in eating. Speaker 8 however thinks that it is *"helpful if owners got it in like an app instead of this, because yeah, it motivates way more to fill it out."* Activity tracking should be done daily, according to the veterinarians. After an injury, also a daily recording would be nice, however once a week should be the minimum.

About the usage of the application, speaker 4 said the following: "*it can be helpful for the more subtle lameness, especially in the chronic ones like the young dog that's sprained. Wait, correction, you can do this, but you already know where it is, and just give them a couple of pills and it's done. But especially like the dogs from 10 years or older, sometimes*

*it's a bit vague, sometimes it's not even the same joint every time."* Then speaker 6 reacted with another idea, *"Or it can be used for the dogs that are not treatable in here, like aggressive dogs or the dogs where we cannot do clinical examination on."* Also, the veterinarians insisted that they can schedule some time in in advance to see the graphs before the visits.

Speaker 6 raised the question about the recording of the video, because dogs are sometimes all over the place, so the question was, is it not too difficult to take a recording, does it need to be in a straight line? But because the owner can take the video by them self, this would not cause any extra stress on the dog and the dog will not behave differently as he possibly would at the veterinarian's office. Besides, the application should give clear instructions if the video is not good, on what they need to change. Also, the video only needs to be 15 seconds of length, so that is usually not too long for a dog to walk.

The application would cause a problem in the veterinarian's eye when everyone is able to download the application and could sent in movies for analysation. The veterinarians would rather see it as treatment protocol, where they initiate the usage of the application. Then also, they could get the sensor at the veterinarian's office. The veterinarians where then asked if this would cost them extra time, and speaker 6 responded the following: "*for now we have those 20 minutes appointments most of the time when the dog comes in and 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"* the veterinarians also think that it would be helpful if they could add a custom question to the pre-visit questionnaire, which can be related to the health problem. However, they would also like to see a limit on the word count of the answer, as they don't need a very detailed time-consuming story. Also, a question that fits in the pre-visit questionnaire is: on which limb or body part to you think the dog is lame?

Another suggestion the veterinarians had was to have a decision tree with standardized questions instead of the chat, and when there is no answer for their problem that the user will be redirected to a contact form in the application which can be send to the main info mail address of the clinic.

## Updated requirements

The red colour represents requirements that need to be updated, as they do not fit with the received feedback. Blue coloured represents new requirements based on the feedback from the first line veterinarians. When the text is highlighted with yellow, the existing requirement was adjusted. The table is slightly reordered compared to the last updated requirements section.

| Functional requirement | Moscow |
|---|---|
| The application visualises the gait of a dog | Must |
| The veterinarian must be able to interpret the visualized gait correctly | Must |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) -><br>another form of communication should either be avoided or there must be an import/export function in order to keep track of it in the main system -><br>A support system with FAQ section and a protective layer with a set of pre-existing questions or problems must prevent veterinarians from being overloaded with questions. | Must<br>Must<br>Must |
| The application must collect data about dogs | Must |
| The dog-owner must be able to interpret the visualisations without much explanation | Must |
| The expert must be able to switch to different dogs from different owners | Must |
| The application must include a diary function to keep track of the gait over time | Must |
| The application must include a pre-visit survey for screening | Must |
| The application must include a reminder and notification system | Must |
| The output of the analysis must be simple and easy to see at a glance | Must |
| The instructions to record a video must be clear | Must |
| The application must provide feedback about the reliability of the recording and whether it should be retaken | Must |
| The application can be used to monitor the gait of a dog before, during and after treatment | Should |
| The application should draw a correct diagnosis to lame dogs | Should |
| The diary function should include (pain) medication, eating habits, walks (amount and total time) and the overall rating of the day, e.g. With the traffic light system. | Should |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a researcher | Should |
| the owner should be asked in the pre-visit questionnaire on what leg they think the dog is lame | Should |
| the word count on the pre-visit questionnaire must be limited to prevent unnecessary long stories | Should |
| Add the possibility for the veterinarian to add a custom question to the pre-visit questionnaire | Should |
| A notification should pop up in the expert interface if an analysis result shows an atypical pattern in the dog | Should |
| A chip scanner should be included | Should |
| The user should not be able to compare values that are incomparable | Should |
| The recording interface should include a timer to show how much longer the video needs to be | Should |
| The communication function should include a button to request an e-consult | Should |
| A colour coded risk assessment should be used as a quick overview of the results | Should |
| The application consists of three different interfaces, one for experts, one for non-experts and one for researchers | Should |
| The owner should be able to switch between their different owned dogs | Should |
| The details corresponding to the dog should be visible to both the owner, the researchers and the veterinarian (name, chip nr, sex, breed, etc) | Should |
| The side view should be prioritized over the front and hind view when recording | Should |
| Recording of dog standing up after a nap should be included | Should |
| There should be a silhouette in the frame to let the owner know the dog is right | Should |

| | |
|---|---|
| in view when recording | |
| The results section should have a layer with a clickable skeleton of the dog, which can show magnified motion of a certain joint | Should |
| The results should be split up in different tabs, one for real time motion and one for averages | Should |
| The dog owner is able to indicate whether a dog is a working dog or not | Could |
| Notifications could be implemented for medication, deworming and vaccinations | Could |
| The real time motion tab could include a video recording parallel to the results, including a slider bar to highlight the current timestamp | Could |
| The recording interface could have controls to pause a recording etc. | Could |
| Include the option to disapprove a non-reliable analysis | Could |
| Slow motion can be used to show the gait to the user | Could |
| Medical history can be visible for the non-expert | Could |
| A tutorial that guides the first-time user though the interface | Could |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a veterinarian | Could |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a dog owner | Won't |

| **Non-functional requirements** | **Moscow** |
|---|---|
| The data collected by the application must be stored and shared with regard to the user's privacy | Must |
| The buttons used must have natural functionality | Must |
| The application could have a step-by-step guide (help) | Should |
| The navigation in the application should be intuitive | Should |
| The interval of recording a healthy dog should be once a month | Should |
| The interval of recording a dog after injury should be daily, minimum weekly | Should |
| The design of the application should be coherent | Should |
| The estimated time the veterinarian spends in the application would be up to 5 minutes, but most likely just opening and closing the application | Should |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a setting for a zoom factor (magnification) | Could |

# Chapter 7 – The final design of the application

## The final set of requirements

The final set of functional requirements is ordered by functionality. The categories of functionalities are general functional requirements, communication, pre-visit, and diary, recording and results. A new column is added, which indicates whether a functional requirement was implemented in the final prototype.

| **General functional requirements** | **Moscow** | **Implemented** |
|---|---|---|
| The application visualises the gait of a dog | Must | Yes |
| The application must collect data about dogs | Must | Yes |
| The expert must be able to switch to different dogs from different owners | Must | Yes |
| The application must include a reminder and notification system | Must | Yes |
| The application can be used to monitor the gait of a dog before, during and after treatment | Should | Yes |
| The application should draw a correct diagnosis to lame dogs | Should | Depends on the AI to be implemented |
| A chip scanner should be included | Should | Yes |
| The application consists of three different interfaces, one for veterinarians, one for dog owners and one for researchers | Should | Two: dog owners and expert, including veterinarians and researchers |
| The owner should be able to switch between their different owned dogs | Should | Yes |
| The details corresponding to the dog should be visible to both the owner, the researchers and the veterinarian (name, chip nr, sex, breed, etc) | Should | Yes |
| The dog owner is able to indicate whether a dog is a working dog or not | Could | Yes |
| Notifications could be implemented for e.g., medication, deworming and vaccinations | Could | Yes |
| A tutorial that guides the first-time user though the interface | Could | Due to limited time, not included |
| | | |
| **Communication** | | |
| Through the application, veterinarians and dog-owners must be able to communicate with each other (chat function) | Must | Yes |
| Free communication should either be avoided or there must be an import/export function in order to keep track of it in the main system | Must | Yes |
| A support system with FAQ section and a protective layer with a set of pre-existing questions or problems must prevent veterinarians from being overloaded with questions. | Must | Yes |
| The communication function should include a button to request | Should | Yes |

| | | |
|---|---|---|
| an e-consult | | |
| | | |
| **Pre-visit and Diary** | | |
| The application must include a diary function to keep track of the gait over time | Must | Yes |
| The application must include a pre-visit survey for screening | Must | Yes |
| the owner should be asked in the pre-visit questionnaire on what leg they think the dog is lame | Should | Yes |
| the word count on the pre-visit questionnaire must be limited to prevent unnecessary long stories | Should | Yes |
| Add the possibility for the veterinarian to add a custom question to the pre-visit questionnaire | Should | Yes |
| The diary function should include (pain) medication, eating habits, walks (amount and total time) and the overall rating of the day, e.g. With the traffic light system. | Should | Yes |
| | | |
| **Recording** | | |
| The instructions to record a video must be clear | Must | Yes |
| The application must provide feedback about the reliability of the recording and whether it should be retaken | Must | Yes |
| The recording interface should include a timer to show how much longer the video needs to be | Should | Yes |
| The side view should be prioritized over the front and hind view when recording | Should | Yes |
| Recording of dog standing up after a nap should be included | Should | Yes |
| There should be a silhouette in the frame to let the owner know the dog is right in view when recording | Should | Yes |
| The recording interface could have controls to pause a recording etc. | Could | Yes |
| | | |
| **Results** | | |
| The output of the analysis must be simple and easy to see at a glance | Must | Yes |
| The veterinarian must be able to interpret the visualized gait correctly | Must | Yes |
| The dog-owner must be able to interpret the visualisations without much explanation | Must | Yes |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a researcher | Should | Yes |
| A notification should pop up in the expert interface if an analysis result shows an atypical pattern in the dog | Should | Yes |
| The user should not be able to compare values that are incomparable | Should | Yes |
| A colour coded risk assessment should be used as a quick overview of the results | Should | Yes |
| The results section should have a layer with a clickable skeleton of the dog, which can show magnified motion of a certain joint | Should | Due to limited time, not included |
| The results should be split up in different tabs, one for real time motion and one for averages | Should | Yes |
| The real time motion tab could include a video recording parallel to the results, including a slider bar to highlight the | Could | Yes |

| | | |
|---|---|---|
| current timestamp | | |
| Include the option to disapprove a non-reliable analysis | Could | Yes |
| Slow motion can be used to show the gait to the user | Could | Yes |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a veterinarian | Could | Yes |
| Tables, boxplots, line graphs and synchronised video recordings or motion comparison to desired motion are ways to visualise gait to a dog owner | Won't | Yes |
| | | |

| **Non-functional requirements** | **Moscow** |
|---|---|
| The data collected by the application must be stored and shared with regard to the user's privacy | Must |
| The buttons used must have natural functionality | Must |
| The application could have a step-by-step guide (help) | Should |
| The navigation in the application should be intuitive | Should |
| The interval of recording a healthy dog should be once a month | Should |
| The interval of recording a dog after injury should be daily, minimum weekly | Should |
| The design of the application should be coherent | Should |
| The estimated time the veterinarian spends in the application would be up to 5 minutes, but most likely just opening and closing the application | Should |
| Often used features should be placed in recognizable locations | Should |
| The application contains a toggle button for colourblind-mode | Should |
| The application could have a setting for a zoom factor (magnification) | Could |

## The expert interface

When the expert interface is opened, the first thing visible is a list of dogs, sorted by next visit. The dogs profile picture is visible, for easy recognition when calling them in from the waiting room. Then the part of the metadata is also visible, like their name, breed, sex, and birthday. When the dog comes in, it is possible to scan his chip and the application will select the right dog based on chip number. A new dog can easily be added by clicking on the button.

The menu can be found in the bar on top, and consists of the main screen, the communication channel, and the measurement function. Also, the settings of the application and the profile can be accessed from the menu.

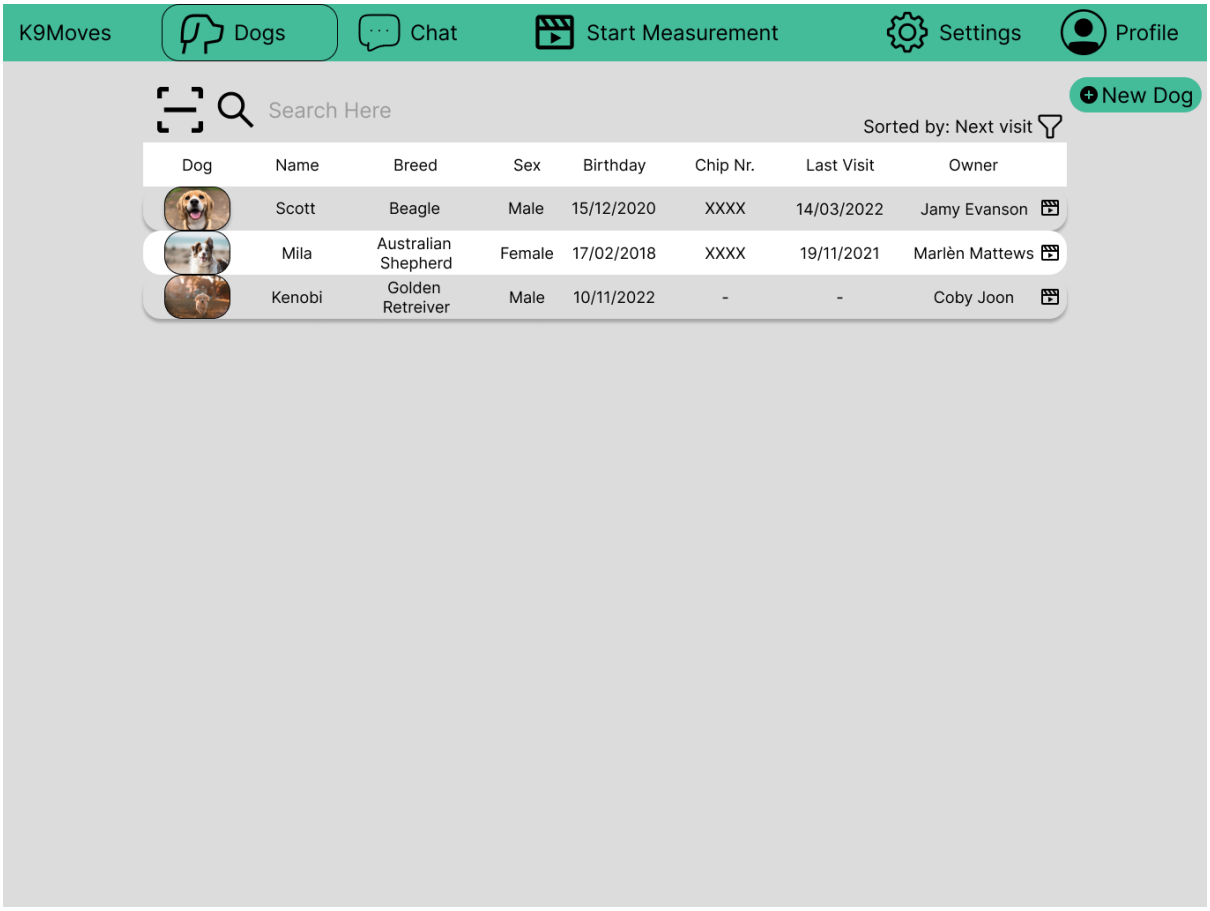



**Figure 51: Expert Main**

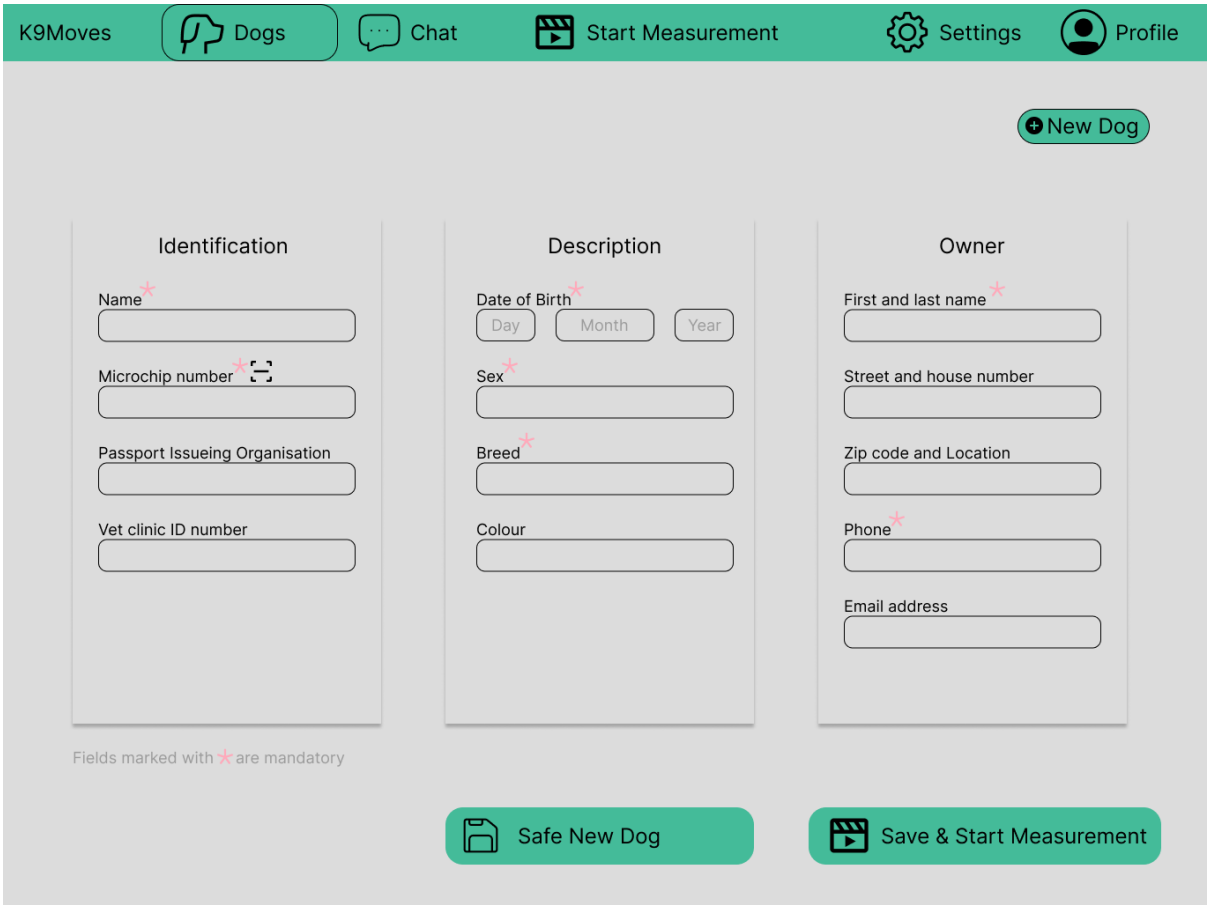



**Figure 50: Expert add new dog**

The veterinarian can add a new dog by clicking the button and filling in its details. Afterwards, a measurement can immediately be started, but this is not necessary. When starting a measurement, you first get to check whether the collar sensor is being connected. The collar sensor adds to the reliability to the total measurement. As researchers might want to connect more sensors to the dog, these sensors can be checked by folding the ‘advanced’ tray.

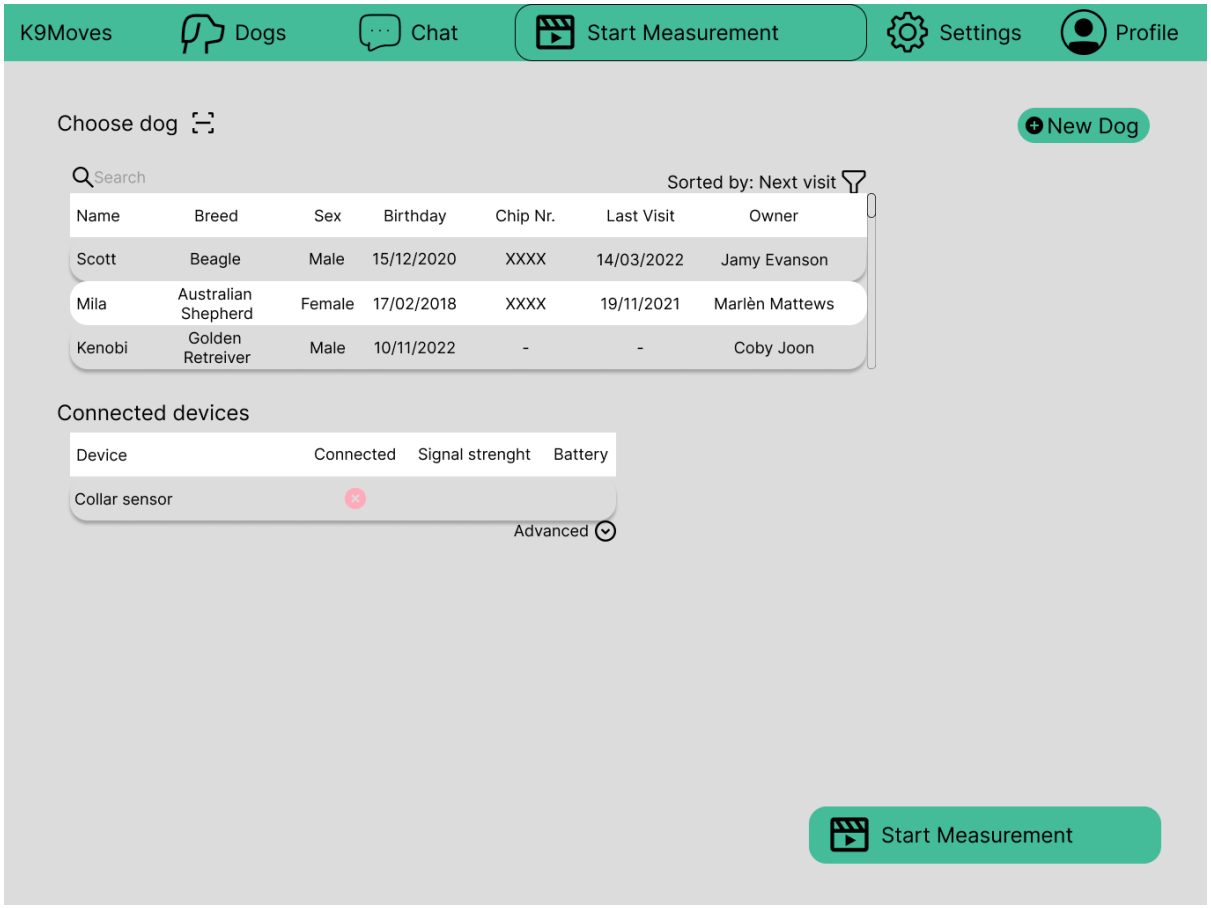



**Figure 52: Expert: start measurement**

When the measurement starts, the camera of the device will open, and an overlay will be visible in the recording interface. As the timer in the top left corner counts down, the silhouette of the dog moves from the left to the right in the screen, setting the pace on which the recorded dog must follow along. There is one clear direction in the bottom of the screen. When the dog does not follow the right pace, a notification with feedback will pop up.

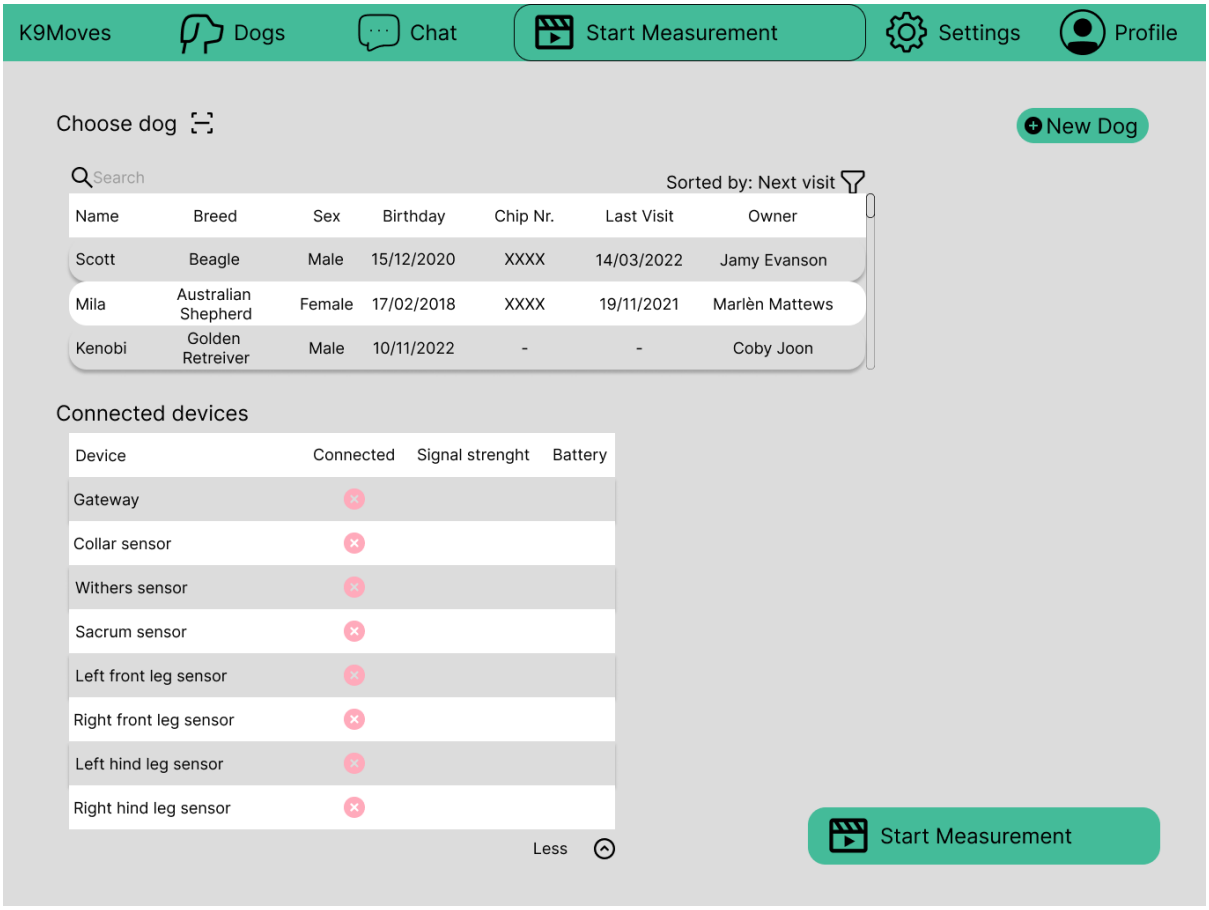



**Figure 54: Expert: Recording measurement**

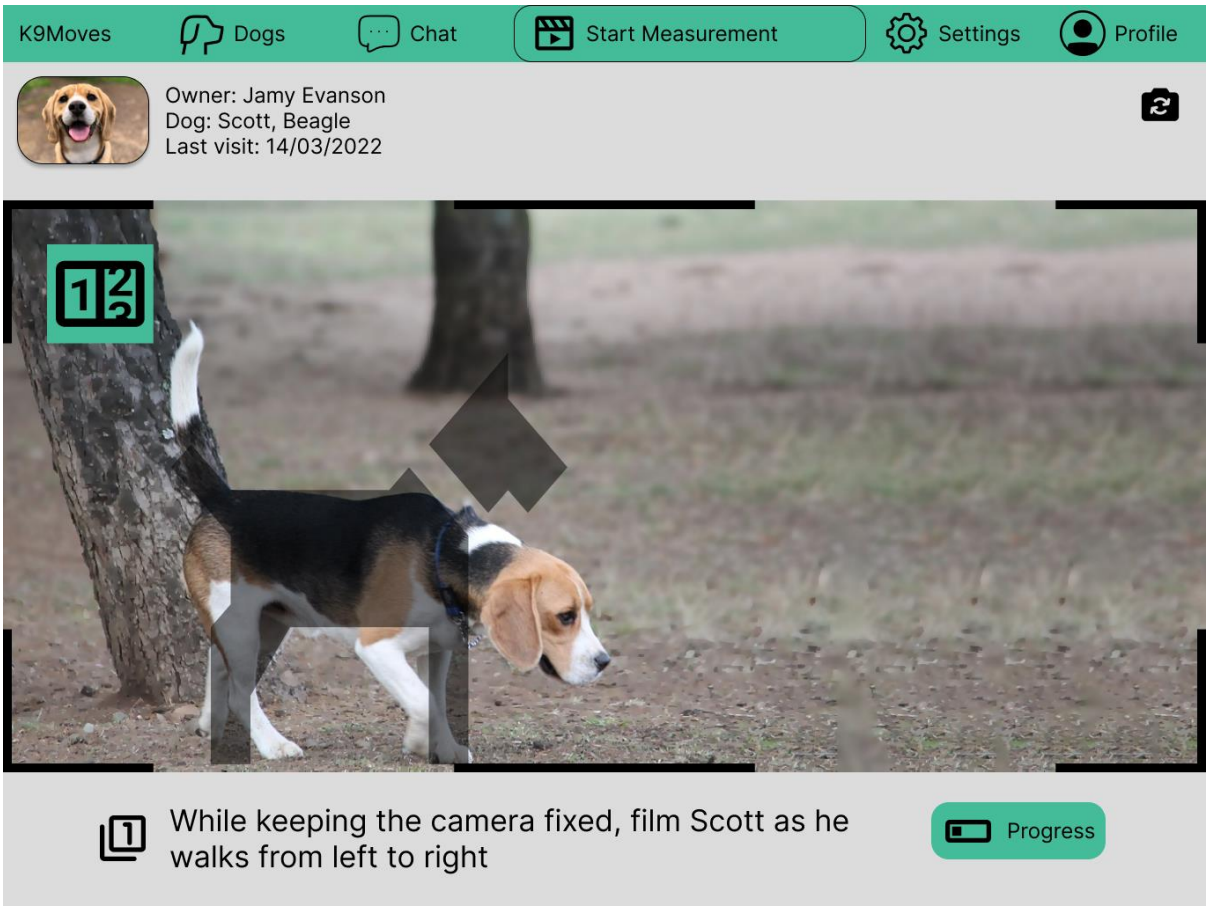



**Figure 53: Expert start measurement advanced**

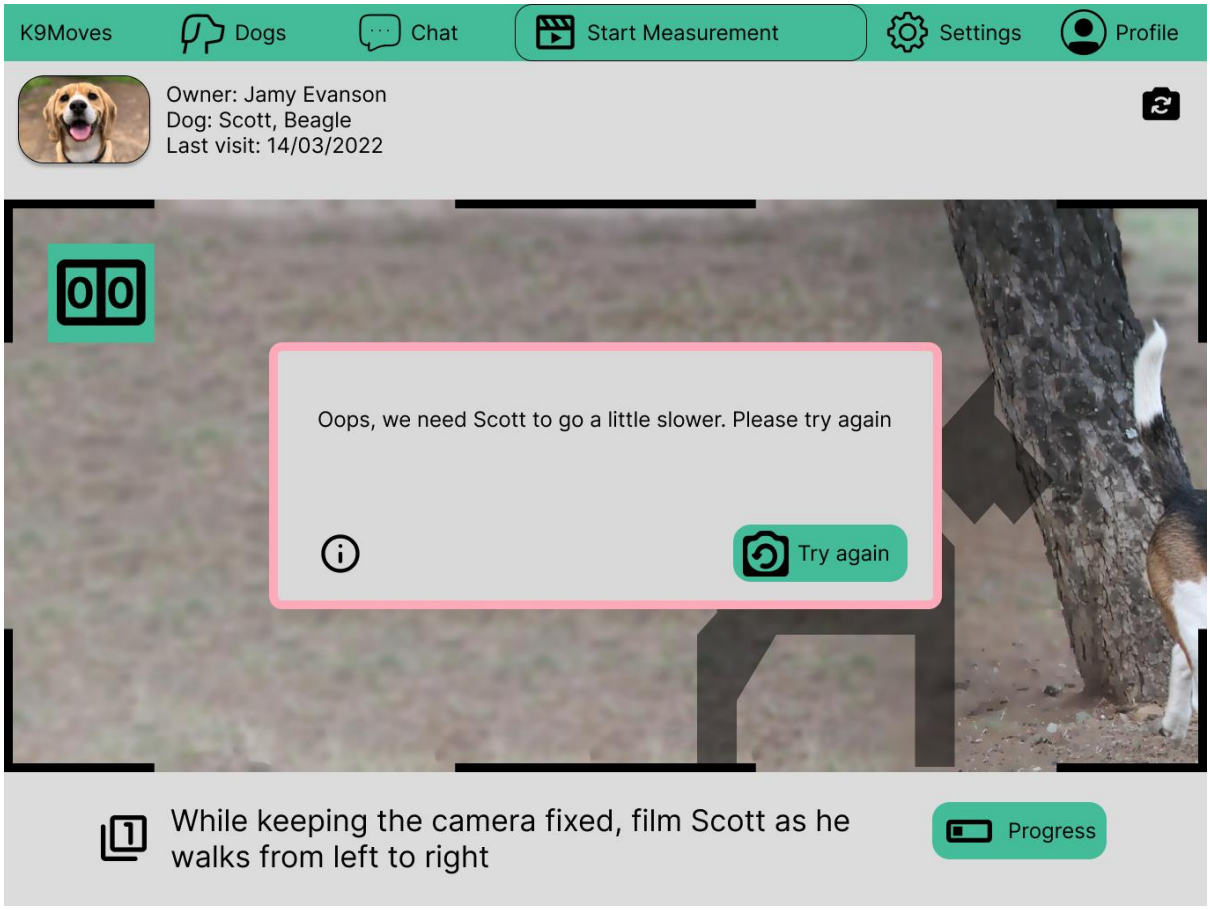



**Figure 55: Expert: Measurement feedback**

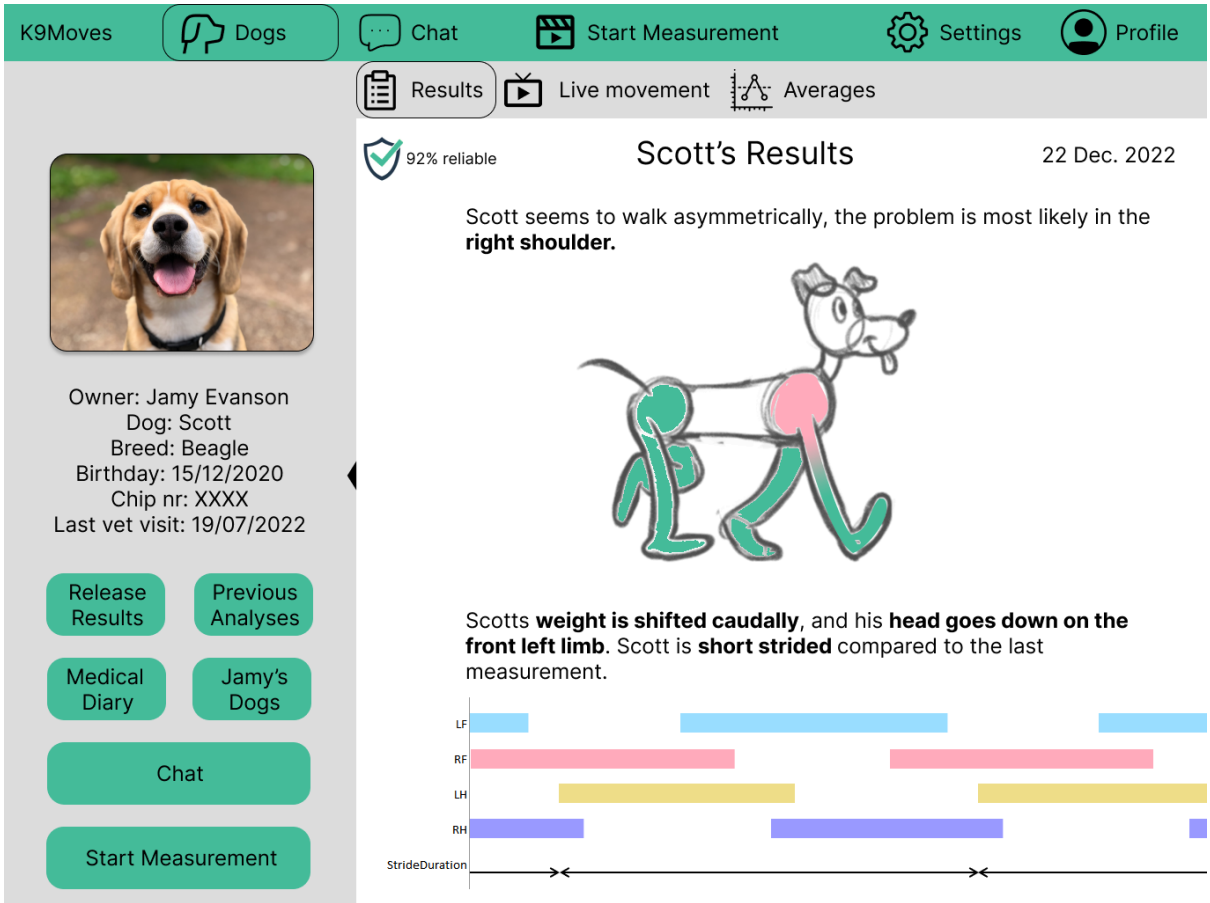



**Figure 56: Expert: results 1**

After the recording is done and the AI is finished with the analysis, the veterinarian can view the results of the analysis in the dog its patient card. It shows an overview of a colour-coded risk assessment done by the algorithm, so the veterinarian is able to see at a glance what the cause is of the dog its lameness. In a few lines, the most obvious rationale for this conclusion is stated. In the top left of the results section, the veterinarian can see how reliable the measurement data is. When the analysis is in line with the veterinarians' thoughts, he can release the results so the owner can see what causes their dog to limp. The visualisation of the dog and the stride pattern underneath are both moving visualisations. If the veterinarian wants to, he can access the more detailed reasoning behind the output of the analysis by going to the 'live movement' tab or the 'averages' tab.

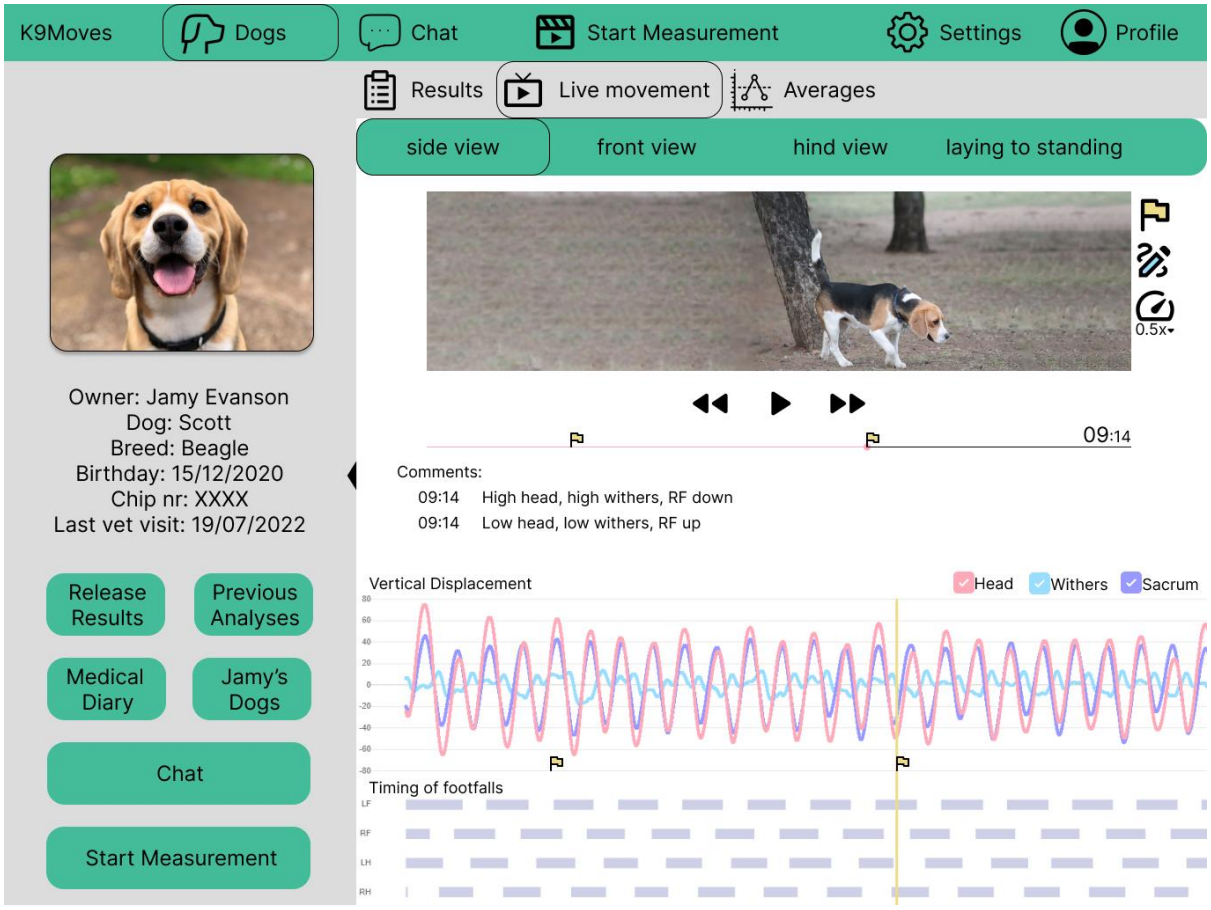



**Figure 57: Expert: Live movement**

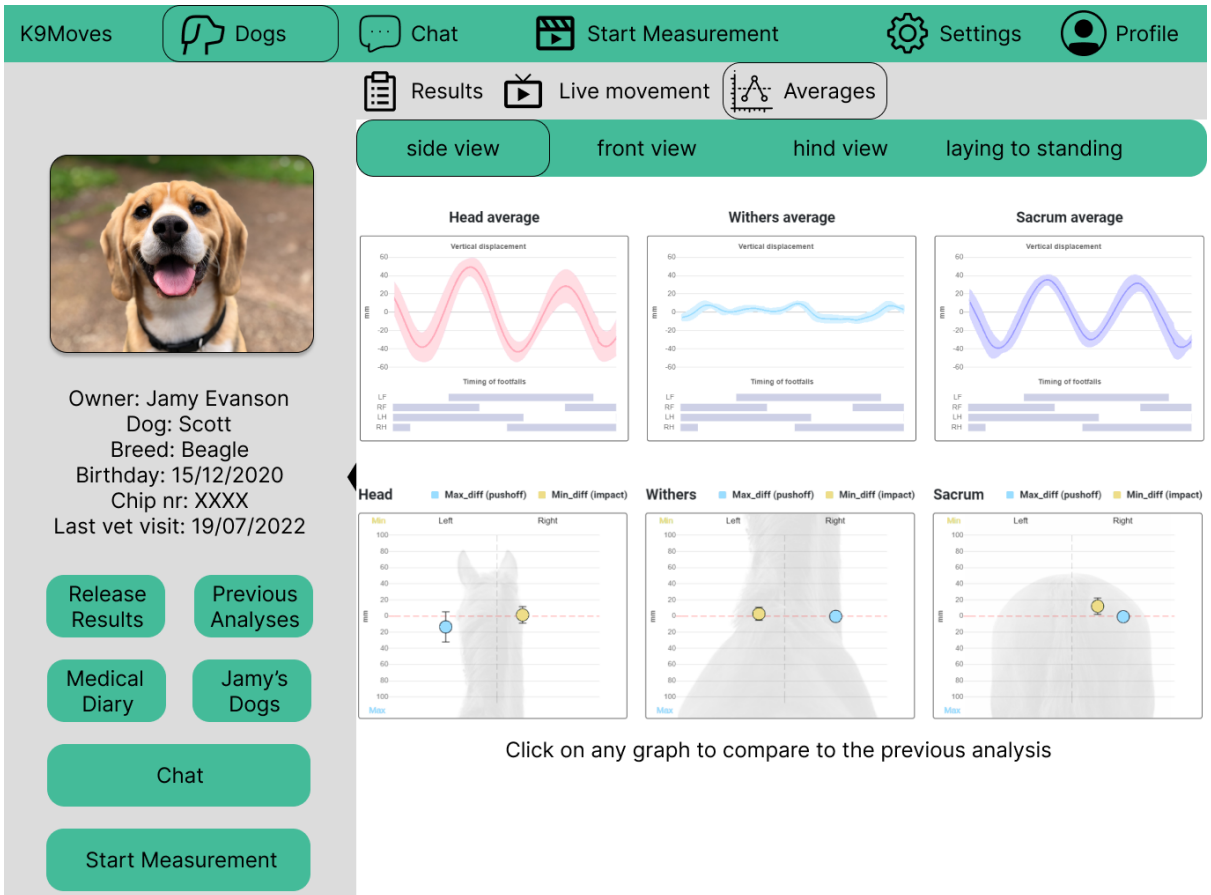



**Figure 59: Expert: Averages**

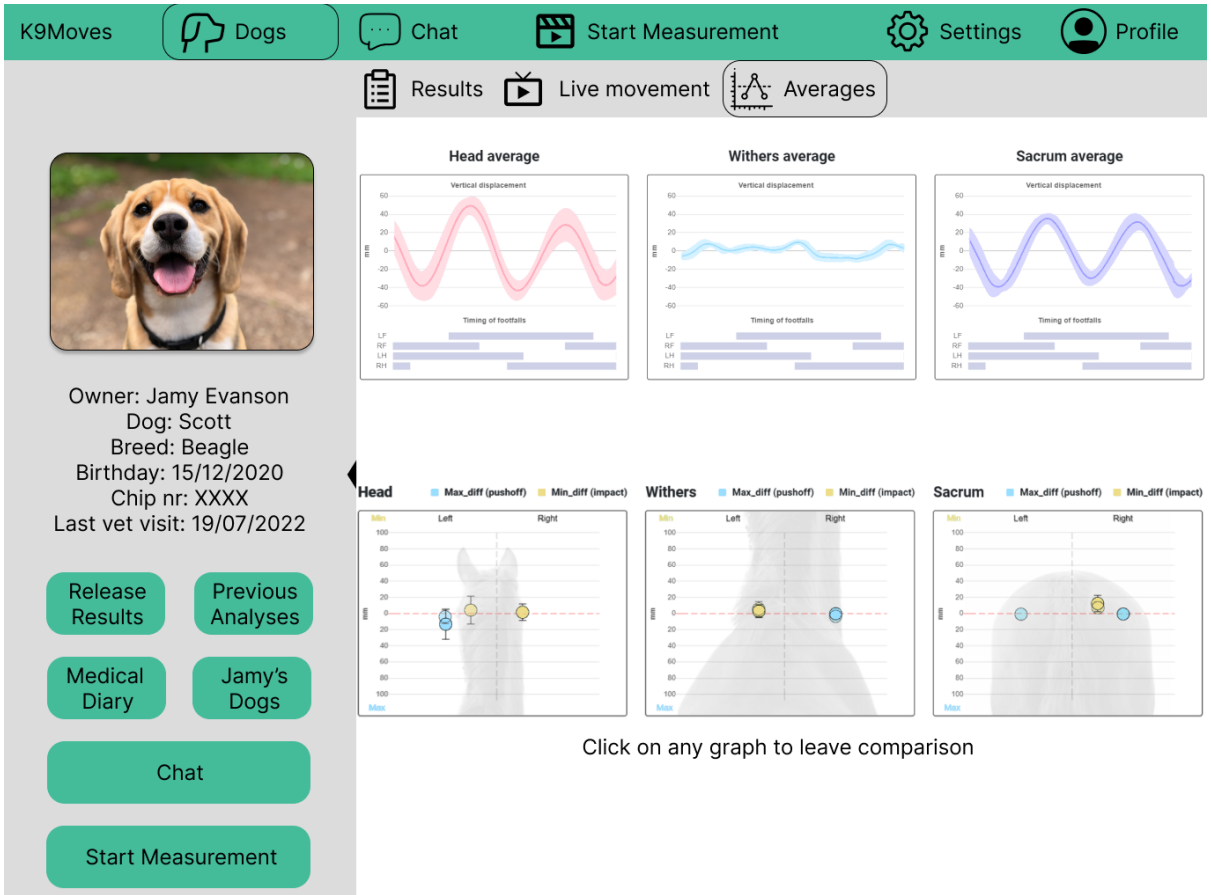



**Figure 58: Expert: Averages compare boxplots**

In the live movement tab, the videos of the recording are synchronized with line graphs of the vertical displacement and the timing of the footfalls is shown. This can be viewed in side view, front view and hind view. The video of standing up after taking a nap can also be accessed from the menu. On the videos and graphs, annotations can be made, and flag points can be set to find certain moments easily back. Besides, comments can be added to explain or emphasis what is happening at that certain point in time. The speed of the video can be controlled, and the video can be paused.

In the averages tab, the averages of the measurements are shown. This includes the average vertical displacement of the head, withers, and sacrum. There can also be found a graph with signed means of boxplots of the displacement of the impact and push off of the head, withers and sacrum. The graphs can be compared to the graphs of the previous measurement by clicking on the graphs. The boxplots of the previous will show up with 50 percent opacity.

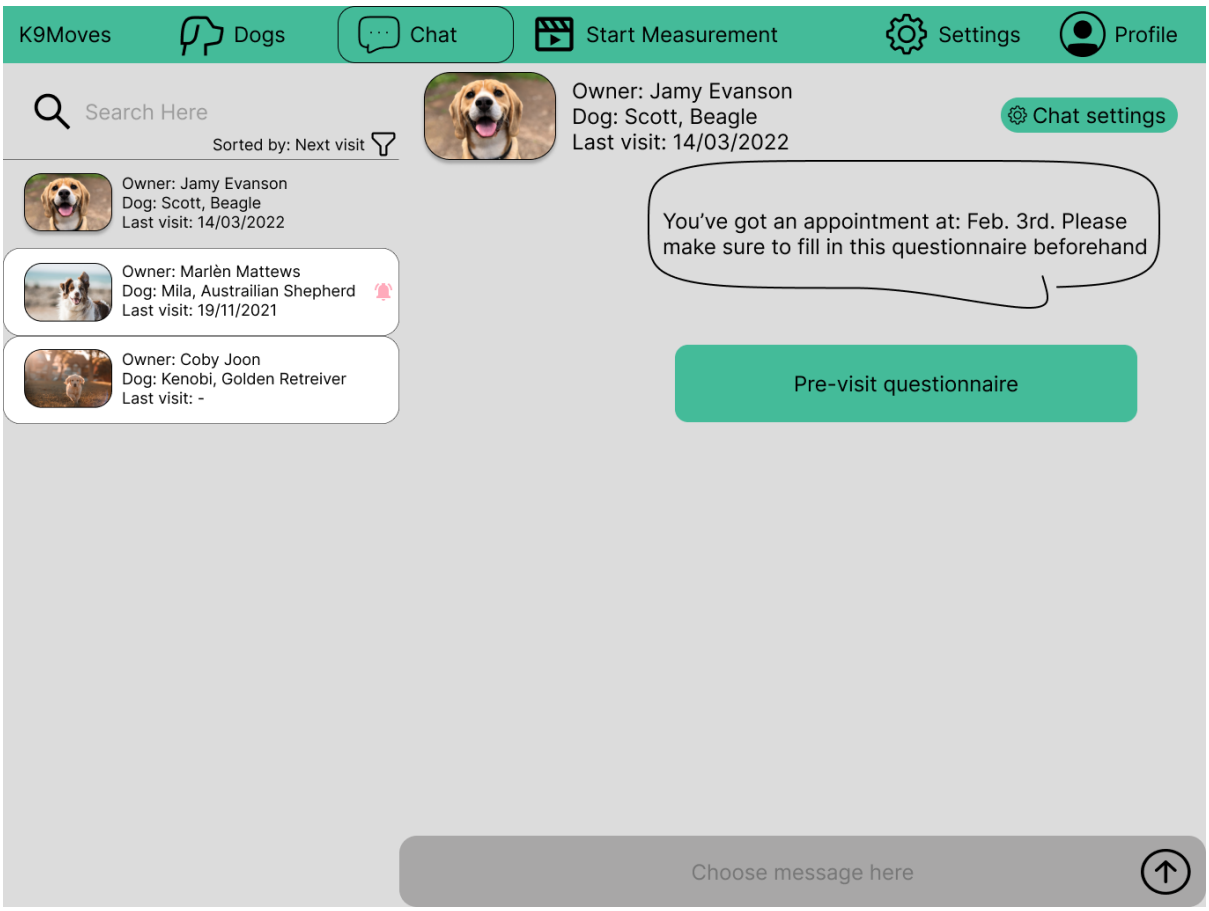



**Figure 60: Expert: Chat 1**

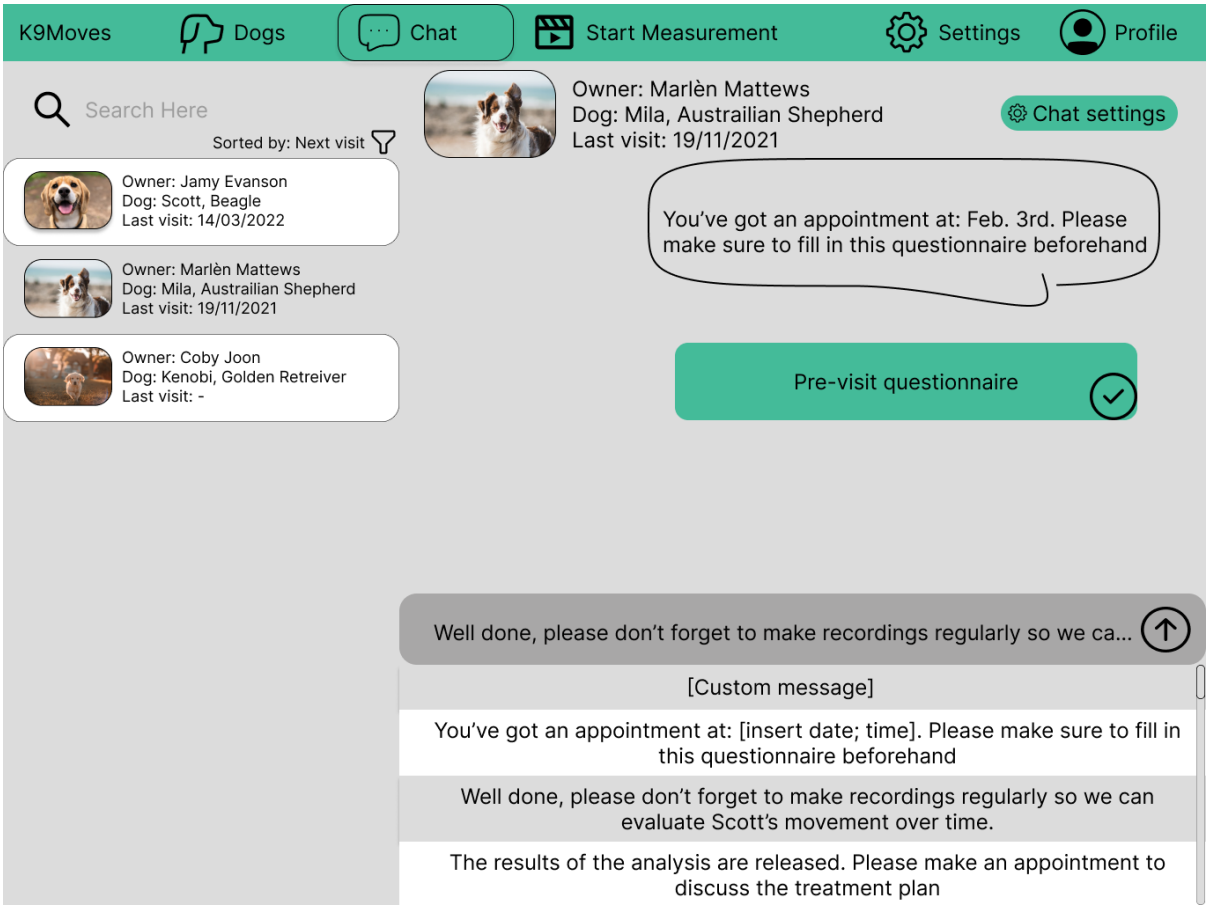



**Figure 61: Expert chat 2**

The last two figures showed are from the communication channel. The list of chats is depicted on the left side of the screen. On the right, the selected chat is shown. The veterinarian is free to customize his messages to the dog owner but can also choose from pre-set messages. In the chat settings, a veterinarian can choose to implement a reminder system in the chat or ask the dog owner to fill out a pre-visit questionnaire, which he can tailor to the needs of the next appointment.

To conclude the expert interface, there is the interface of the medical diary function. A dog owner can fill out the diary and choose to share certain parts with the veterinarian. Depending on what the owner chooses to share, the diary function includes different graphs of for example the amount of food the dog has eaten over the past days and the total time the dog walked.

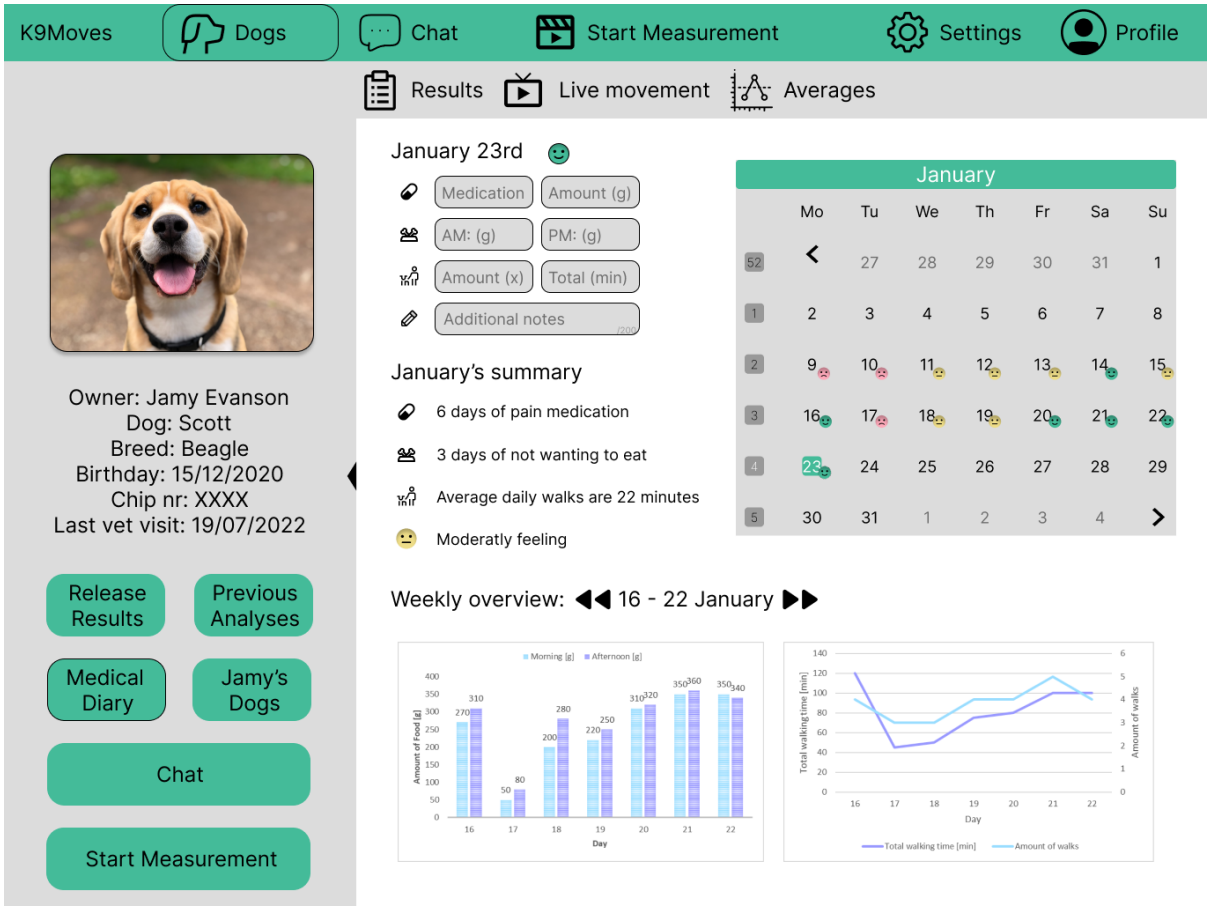



**Figure 62: Expert: Diary**

## The dog owner interface

The dog owner will see the profile of their dog upon opening the application. In case of more than one dog, a list of dogs will show up. A new dog can simply be added by clicking the add dog button on the tab with the list of dogs. In the list of dogs, an owner can also see if there is a new message from the veterinarian, to be recognized by the symbol of a bell.

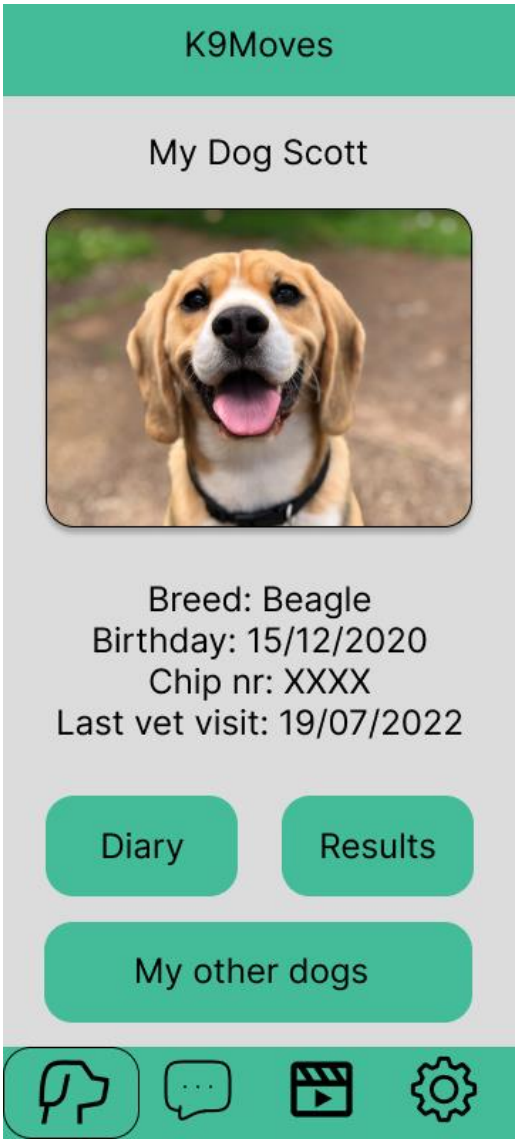



**Figure 64: Owner: Main**

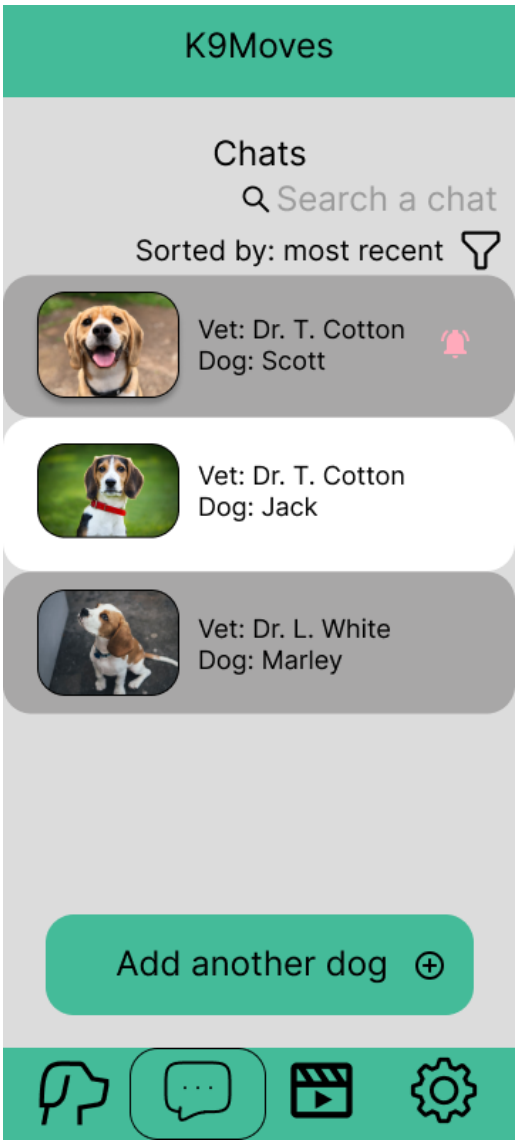
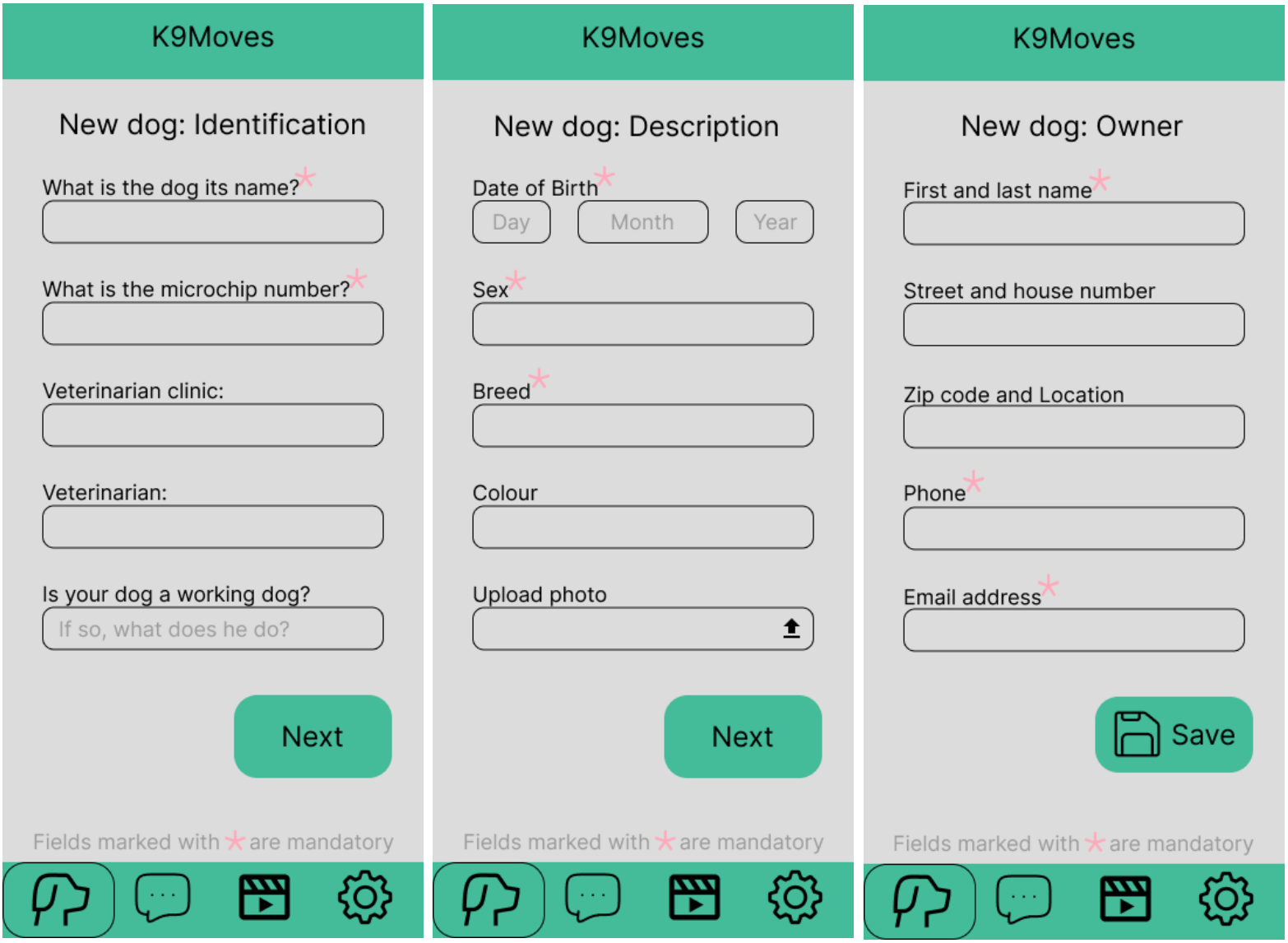



**Figure 63: Owner: Dogs overview**

To add a dog, a three-page form has to be filled in. It includes the metadata of the dog, a description of what he looks like and the owner details.




To apply for a chat with the veterinarian, the specific dog has to be selected and the corresponding veterinarian clinic and veterinarian must be selected. When the veterinarian accepts the opening of the chat the owner is able to choose a question from the list of frequently asked questions or if their question cannot be found they can request an e-consult.

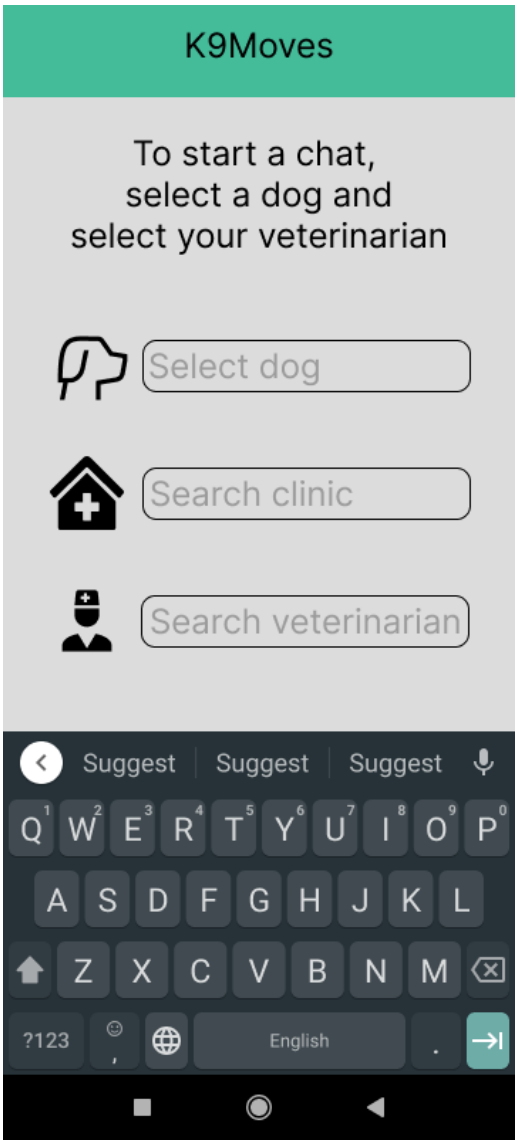



Figure 65: Owner: Start chat

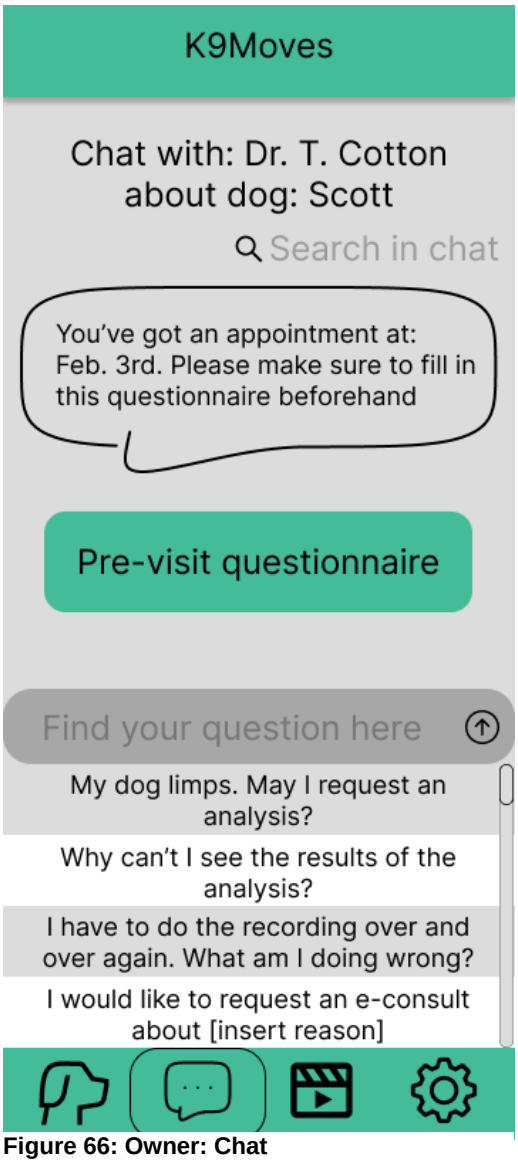



Figure 66: Owner: Chat

The veterinarian may ask the owner to fill in a pre-visit questionnaire. This will pop up in the chat and can be accessed from the chat. The pre-visit questionnaire is designed so the appointment at the office can be as efficient as possible. A few questions may be asked during the visit to check whether it is reliable what the owner tells, as this should be in line with the pre-visit questionnaire.

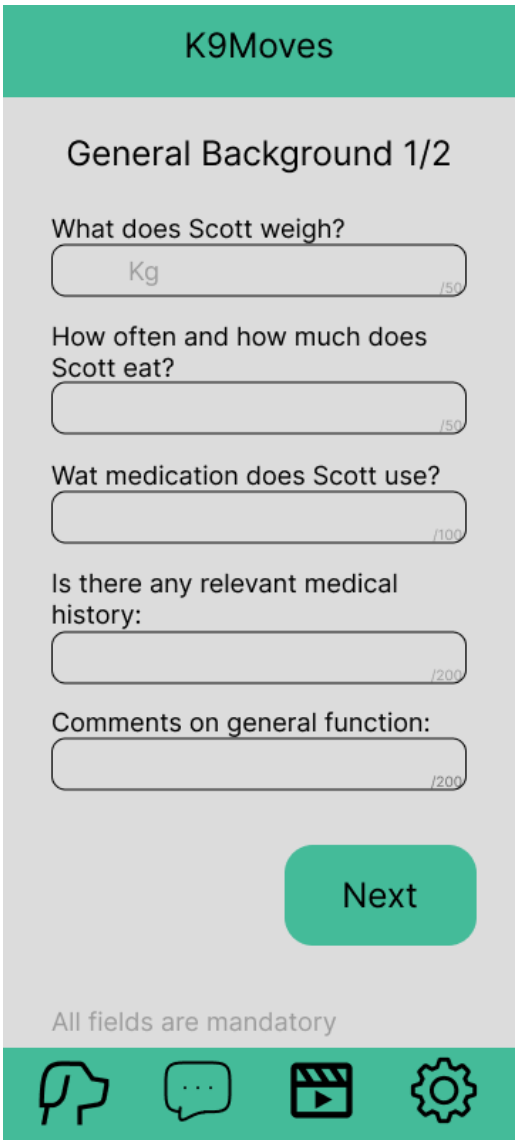



Figure 69: Owner: pre-visit 1

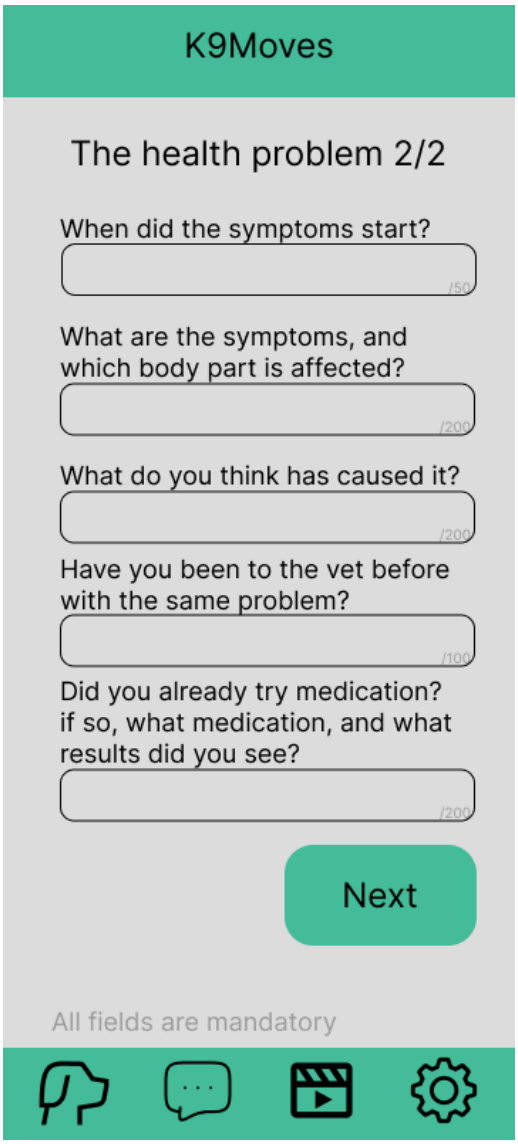



Figure 68: Owner: pre-visit 2

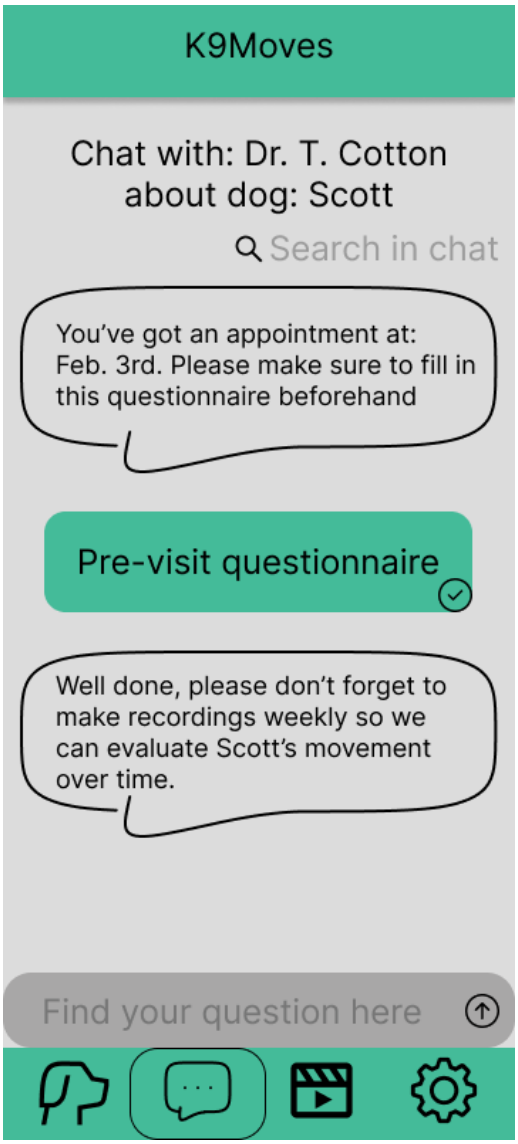



Figure 67: Owner: Chat 2

After the pre-visit questionnaire is done, the veterinarian will send an automatic reply to remind the dog owner to make the recordings for the analysis.

For recording a dog, the user is required to flip the device horizontally. A frame will show up and a silhouette of a dog will set the pace. There is one instruction at the bottom of the frame which tells the user exactly what to do. In the top left corner, a countdown timer will indicate how much time is left to complete the recording. When the recording fails, a pop-up will show up with feedback on how to do better next try. An overview of the data collection process can be accessed by clicking on the progress button. By clicking on the info button, a trouble shooting page can be found.


**Figure 71: Owner: Recording**

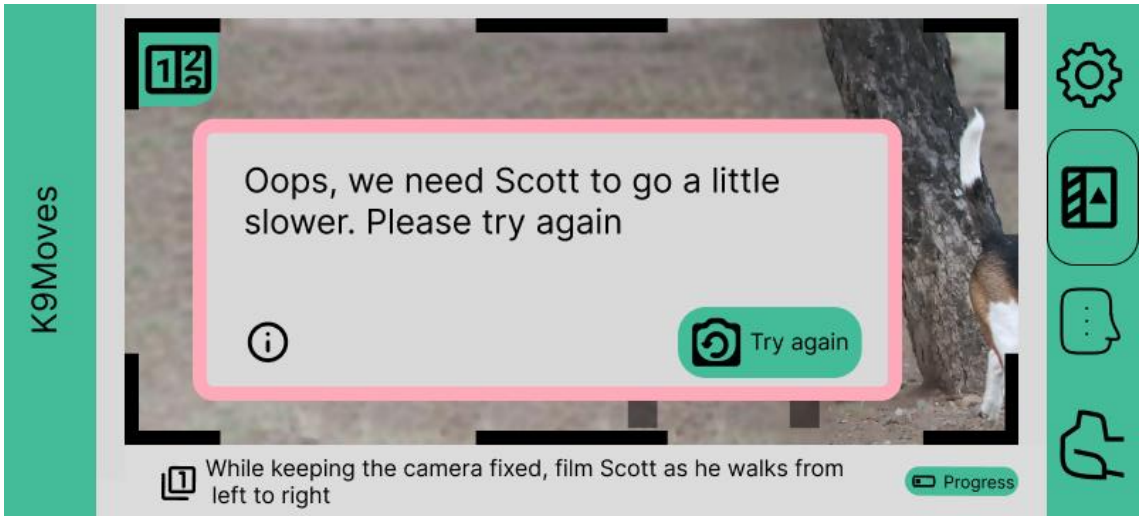



**Figure 70: Owner: Feedback failed recording**


**Figure 73: Owner: Recording progress**

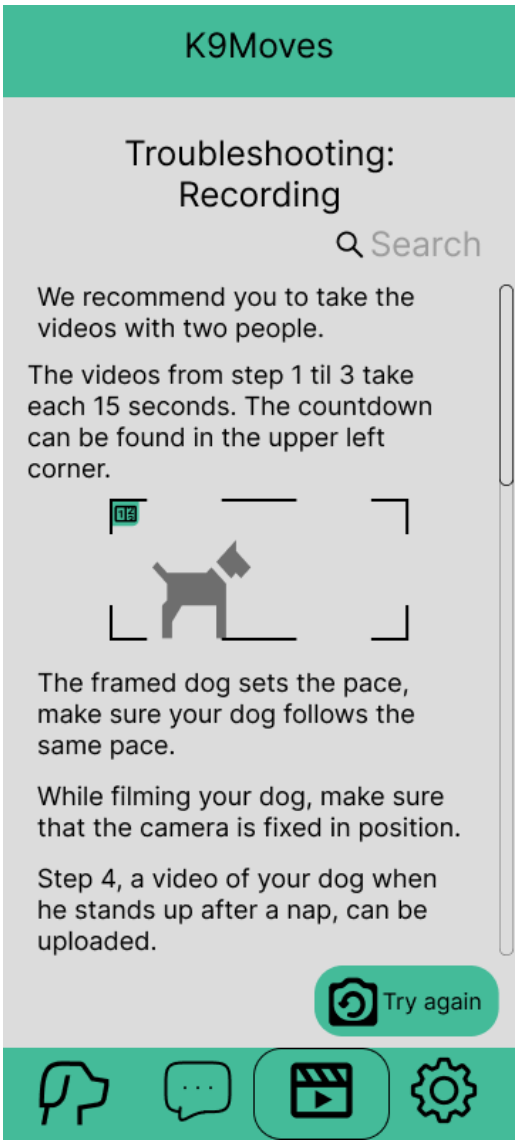



**Figure 72: Owner: Recording troubleshooting**

When the recording is analysed, it is sent to the veterinarian. Once the veterinarian releases the results for the owner, it will tell the owner where the lameness is based, and it redirects towards the next appointment.

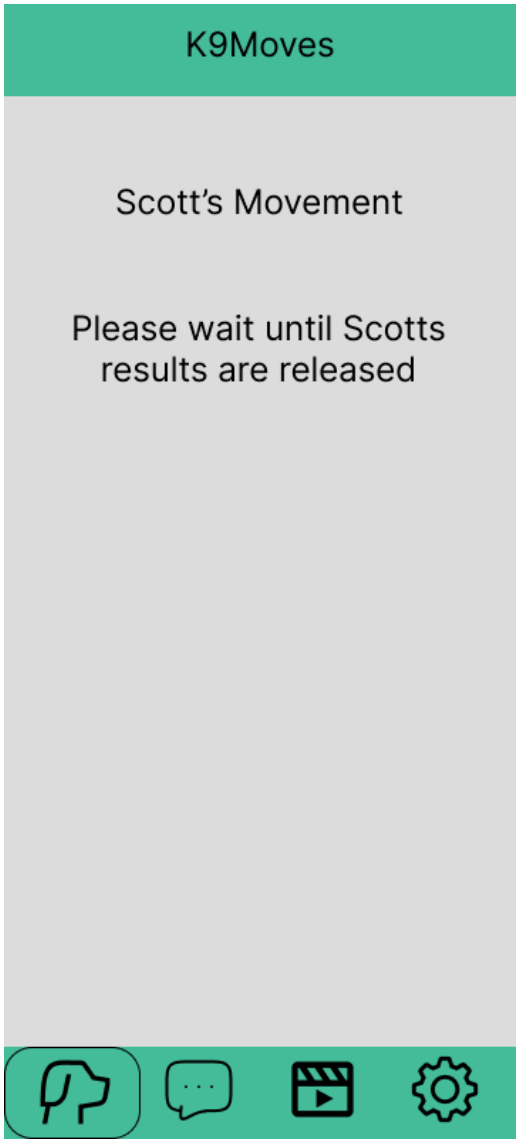



Figure 75: Owner: wait for results

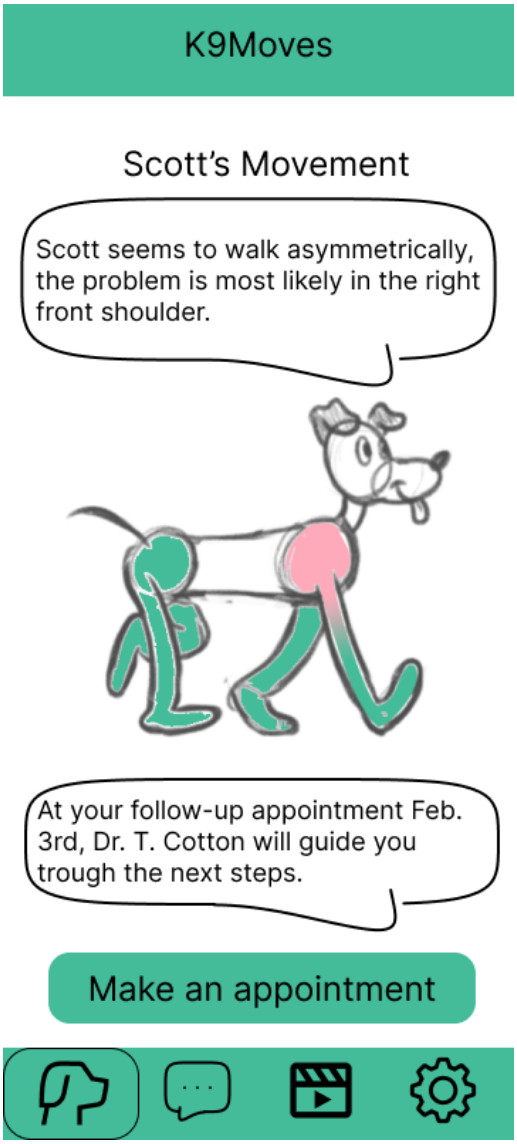



Figure 75: Owner: Results

There is one more function included in the prototype, which is the diary function. In the dog owners' interface, this can be accessed from the main by clicking on diary. Then, a calendar pops up with the current day selected. The dog owner can fill in the details about the dog's health of this day.

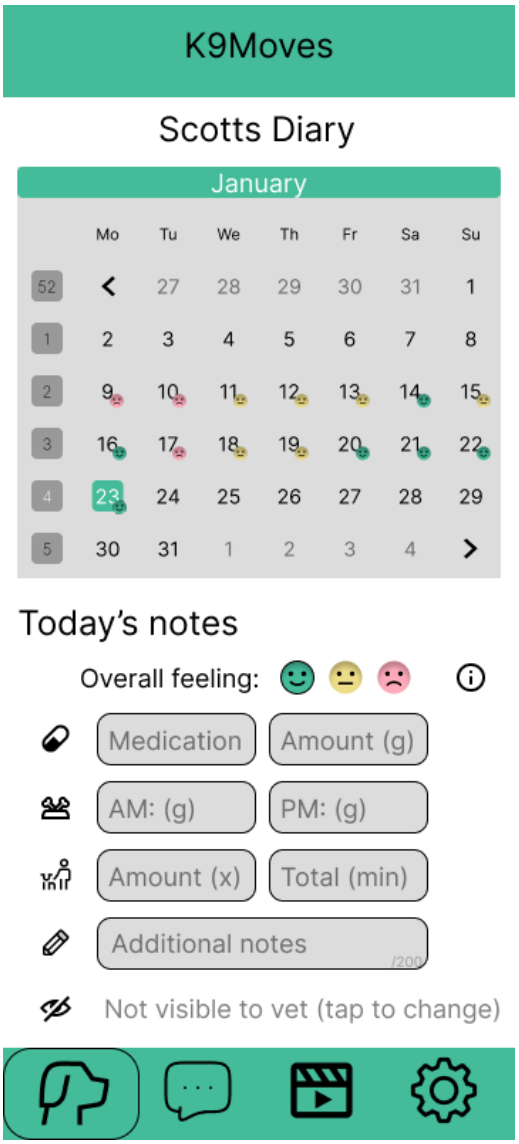



**Figure 76: Owner: Diary**

# CHAPTER 8 – DISCUSSION & FUTURE WORK

## Drivers of change

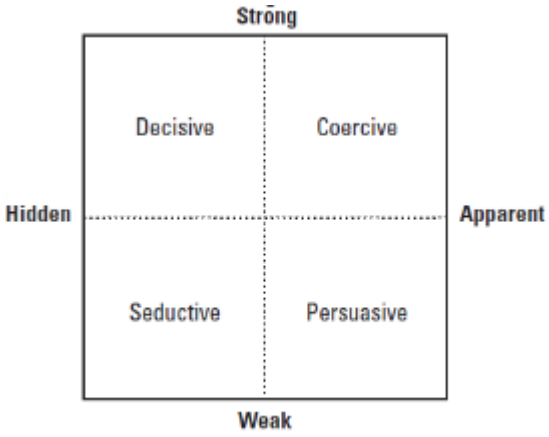



**Figure 77: four types of influence based on the dimensions of force and salience. From: [26]**

The project changes the way veterinarians evaluate a dog's gait. This could influence the decision on which treatment plan will be executed. According to [26], a design can influence someone strongly or weakly, and a design can influence someone in an implicit or explicit manner. Based on these two dimensions, one can find four diverse types of influence. A design can coerce, persuade, seduce, or decide for someone (see figure 4). The application which will be designed in the project, is both strong and explicit in its influence. The veterinarians using the application will experience their decision as externally regulated, and they are aware this regulation is a deliberate influence of the application. Moreover, they use the application in order to choose the right treatment plan, as they are aware that the application is more accurate than their own visual evaluation. The change in behaviour is regarded as a reaction to the influence (where, in this case, the veterinarian chooses for the influence because he wants a certain behaviour: taking the right decision), so this is coercive design.

## Contribution to the UN Sustainable Development Goals

Within the user groups of the application, we might find working canine owners, such as service dog handlers and police dog handlers. By keeping those animals healthy and preventing them or helping recover them from gait related injuries with help of the application, the project contributes to both number 3, Good health & wellbeing and number 16, Peace, justice and strong institutions of the UN Sustainable Development Goals. [27]

Goal number 3 is to ensure healthy lives and promote wellbeing for all at all ages. A service dog is a dog that has been trained to assist a person who has a disability. A service dog gives its owner back his independence and freedom, and hence supports in the wellbeing of his owner. Goal number 16 is to Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels. A police dog aligns with this because it is trained and deployed to ensure security and peace.

# Ethical Reflection

## The ethical cycle applied

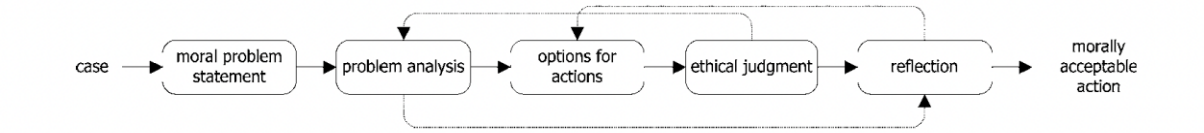



**Figure 78: The Ethical Cycle by Van de Poel & Royakkers [8]**

The ethical cycle from Van de Poel and Royakkers [28] consists of 7 iterations, including a case scenario, the moral problem statement, a problem analysis, options for actions, ethical judgement, reflection and finally a morally acceptable action. The background scenario or case summary for this project is as follows: The problem is that veterinarians do not agree on visual evaluation of the gait analysis of a dog. Hence, a gait analysis module was developed. Now, a design for a user interface is needed. To address the problem, the app should visualize exactly what is wrong in the dog its gait.

The Moral problem statement is the issue that is at the core of the project. The issue for the project is as follows: The application, which visualizes a gait analysis, should be accessible for the colourblind people. If it is not, this is a problem for the users who are colourblind. These contain both veterinarians and dog owners. The moral issue is that it is not fair towards the colourblind that they cannot make use of the app, and thus they will not be able to analyse their dog's gait before it is too late. Including this group might be a trade-off between equality of access and an appealing look.

For the problem analysis, we need to know the stakeholders and their interests. For this project, stakeholders are both veterinarians and dog owners, either colourblind or not. Both stakeholders want to know what is wrong with their dog. The veterinarians need to know this exactly, in order to draw a diagnosis and choose a treatment plan. Core moral values related to the application are inclusivity and equality of access.

Options for actions could be implementing a toggle button to enable a colourblind friendly palette or make the whole design already in a colourblind friendly palette. For an ethical judgement, intuition says the last option, make the design already in a colourblind friendly palette, is preferred, as people might feel left out if they need a button to be able to see the results of the analysis.

Both Nichols and Goedhart [17], [18] suggest different Colour-blind friendly palettes. It is recommended to use a colour-blind friendly palette by default and to use a maximum of 8 different colours of labelling of different categories[19]. Additionally, it is suggested to use patterns or labels to distinguish categories.

The researcher ideated colour palettes with 5 colours. One colour could function as a main colour for the application, and the four remaining can be used in visualizations. Because a dog has usually four legs, this should be sufficient to display different values in a graph. All palettes were checked for colour-blindness using David Nichols's [17] colour palette tool. The results can be found in figure 2.

Reflecting on the preferred option, this is well manageable and working out. With one of these colourblind friendly colour palettes, the colourblind stakeholders are able to use the application just as non-colourblind would do. The morally acceptable action is to design the application with a colourblind friendly colour palette.

## Expanding the moral circle applied

The moral circle is the supposed boundary, drawn around entities which are deemed worthy of moral consideration. When expanding the moral circle, one is increasing the number and type of entities given moral consideration over time and potentially into the future. This tool is used to mitigate common errors in the field of ethical negligence, as it prevents designers to ignore or exclude key stakeholder interests. [29]

The tool includes 7 key questions, which are answered in the scope of the project.

1. Whose interests, desires, skills, experiences, and values have we simply *assumed*, rather than actually *consulted*? *Why* have we done this, and with what justification? Are they protected?

   It was assumed the colourblind do want to be included. The justification is that it is better to include than to exclude and be sorry.
2. Who are all the stakeholders who will be directly affected by the product? How have their interests been protected? How do we know what their interests *really* are—have we *asked*?

   Stakeholders that are directly affected by the design are the users of the application, both veterinarians and dog owners, whether colourblind or not. Their interests were investigated using interviews. Different stakeholders were asked to make sure their interests were in line with each other.
3. Who/which groups and individuals will be *indirectly* affected in significant ways?

   Indirectly affected groups and individuals are the dogs concerned, as the diagnosis and treatment plan of the problem might be based on the application. Also, maybe specialist for example working with radiation technology and specialists who perform keyhole surgeries might be affected indirectly, as they might have less work to do as the application analyses the problem.

4. Who might use this product that we did not *expect* to use it, or for purposes we did not initially *intend*? How does this expand/change the stakeholder picture?
   The product might be used by researchers on the topic of lameness in dogs. The researchers might want to know more detail than the veterinarian, as they might want to see the reasoning behind the results of the analysis. Also, they might be interested in the reliability of the analysis.
5. Who is at *substantial* risk of harm from the product, and how? How have we justified and mitigated this risk, and what have we done to procure the *informed and meaningful* consent of those at risk?
   A risk of the application is that it is trained for the usual cases of lameness, but it might fail to see a less common lameness. Hence, it was chosen not to suggest treatment plans and the analysis must be seen by a professional or specialist before the results are released to the dog owners. This also prevents confusion by the dog owner, as the results might not be what they expected.
6. Who are the people who will be least likely to purchase or use this product, but might have strong opinions about it anyway? Can those opinions be heard/evaluated by us?
   It is unlikely that people who do not own dogs themselves purchase or use the product. They might have an opinion about the part where dog owners are asked to take a video of their dog for the analysis. People might not want to be in the frame. This can be prevented by suggesting a quiet area for filming.
7. How does expanding your moral circle help to counter the three classic biases that can occur in design?
   According to [29], [30], the three classic biases are: GroupThink, The Bubble Mentality and Friedman Fallacy. GroupThink happens for example when a tight-knit community denies climate change because they all doubt the science. In the current study, there is need to take into account that groups of dog owners or even groups of veterinarians can have a strong opinion about certain aspects of the application. To prevent this, all steps need to be clearly explained and there should be reasoning available in a FAQ section. E.g., why do I need to take a video of my dog?

   Similar to GroupThink, but cause by demographic and cognitive similarities to one another is The Bubble Mentality. Important for this project is that the designers, who are not disabled, consider that users might be disabled. The group of colourblind people is already included in the design, as described above, but it also needs to take into account that there, for example, might be users with muscular diseases who could have trouble holding their phone up to take the video.

The economist Milton Friedman held the strong view that corporations, and employees acting on their behalf, are morally obligated only to maximize shareholder profits, and are in no way responsible for the consequences of their actions on the public good. That would mean that if there was not used a colourblind friendly colour palette, it would not be liable on the fact that someone who is colourblind cannot use the application. This line of thinking would certainly make designing the app easier; however, it can be assumed that this will make the target audience smaller and therefore the usage less. I believe this will ultimately be to our disadvantage.

By expanding the moral circle, the designers can find out that there may be more or different audiences than they expected. By thinking about this, they can make the application more inclusive, possibly resulting in the application being used more. Firstly, the moral circle included dog owners and veterinarians, then the colourblind were added and lastly specialists and researchers where added.

## Limitations and looking forward

The background research provided several suggestions to visualise gait. They include tables, boxplots, line graphs and synchronised video recordings, motion comparison to desired motion, real time dial visualization and visualization of individual leg time variation. They [8]–[10] stated that these are easy to understand. However, from the interviews conducted, it is found that both veterinarians and dog owners have a tough time interpreting the results this way. The best option this project found was a color-coded risk assessment. Using this visualisation, it is easy to see at a glance where the dog its lameness is coming from. Visualisations like boxplots and line graphs with synchronised video recordings are also used in the expert interface, however, those are not necessarily needed in order to know where the problem is based. In future work, it is advised to keep the end user in mind and ask them for feedback. Something that might look easy for researchers, might be on another level for the end user.

When the application is in beta phase, it is recommended to do some more research on the recording interval. Dog owners mentioned to us that, when the dog does not show any signs of lameness, they are willing to record once a month. The veterinarians however said that they would like to see more videos, especially when the dog is injured. They suggest recording daily, but minimum weekly. Daily monitoring of a dog is genuinely nice for research, however it might cause extra workload on the veterinarian, as in the current state they have to release the results.

The ethical reflection on the project is incomplete. There was only time to discuss the ethical issue of the colourblind, however, other concerns were also raised. For example, the question how to manage personal data. Nowadays, it is particularly important to ensure the privacy of the users of the application. If we fail, the safety of the users cannot be guaranteed as their personal data might be used against them by malicious third parties. Another concern raised was algorithmic bias. More research about this must be done before implementing the option to film a dog for analysis. Bias within the software can lead to wrong diagnoses.

# Chapter 9 – Conclusion

Lameness in dogs can be evaluated with help of an application. Currently, a similar application is existing for horses, but they have a different target group. As the target group includes both experts and non-experts, each with unique needs, there was decided to use two interfaces tailored to the needs of the corresponding user. While designing the application, a few challenges arose. The directions for the recording must be truly clear, and the data visualisations must be easy to interpret. Moreover, the veterinarian must be able to see the output easily at a glance. Hence, an overview of a colour coded risk assessment was used.

Additional functionalities that should be included in the application are a communication channel, a pre-visit questionnaire, and a diary to keep track of medical or unusual events. Implementing a communication channel is incredibly challenging because the veterinarian does not want to receive lots of unwanted messages. Hence it was chosen to include a set of frequently asked questions and no opportunity to freely ask questions, other than requesting an (online) appointment.

Another challenge that arose was whether or not to include the colourblind. A code of ethics was created to guide the project, and the moral principal inclusivity was considered relevant to the project. When applying the Ethical Cycle by Van de Poel & Royakkers [28], the moral problem statement was described as follows: The application, which visualizes a gait analysis, should be accessible for the colourblind people. If it is not, this is a problem for the users who are colourblind. These contain both veterinarians and dog owners. The moral issue was that it is not fair towards the colourblind that they cannot make use of the app, and thus they will not be able to analyse their dog's gait before it is too late. Including this group might be a trade-off between equality of access and an appealing look. The option to make the design already in a colourblind friendly palette was preferred, as people might feel left out if they need a toggle button to be able to see the results of the analysis. Also, different tools for ethical analysis were used to apply ethics to the problem. the following tools were discussed: the graphic line drawing analysis by Fledderman [31] (appendix VII), expanding the moral circle by Vallor, Green and Raicu [29] and the ethical theories by Fledderman [31] (appendix VII). All of them resulted in the same right action: including the colourblind by using a colourblind friendly colour palette.

The full prototype can be accessed via:
https://www.figma.com/file/ApUpjzWIQe7jeTRAj6huyt/K9Moves?node-id=0%3A1&t=zEujHuQ0p6CLxfy7-1

# APPENDIX I: CONSENT FORM

## Information letter for consent for: Graphical user interface for gait analysis in dogs based on sensor fusion

The purpose of the research is to design an interface which visualises the gait analysis of dogs. The purpose of the interview is to find out whether the proposed interface is intuitive and appealing. During the interview, the participant will be asked questions about the draft interface and the participant will be asked to tinker with the draft interface. The researcher conducting the interview will take written notes and record audio. The research project has been reviewed by the Ethics Committee Information and Computer Science by the University of Twente. The participant may withdraw anytime before publication, by contacting the researcher mentioned below. Personal information of the participant collected will be whether they are a veterinarian or not, because we need to evaluate both the expert and the non-expert interface. The participant has the right to request access to and rectification or erasure of personal data. All data will be stored on Yoda, and will be deleted after 3 years. If any questions arise about Yoda, please feel free to reach out to the researcher listed below.

## Consent Form for: Graphical user interface for gait analysis in dogs based on sensor fusion

**YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM**

| ***Please tick the appropriate boxes*** | **Yes** | **No** |
|---|---|---|
| **Taking part in the study** | | |
| I have read and understood the study information dated .. / .. / …. [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction. | ○ | ○ |
| I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason. | ○ | ○ |
| I understand that taking part in the study involves an audio-recorded interview, while the interviewer also takes written notes. The recording will be destroyed within 3 years after the research is published. | ○ | ○ |
| **Use of the information in the study** | | |
| I understand that information I provide will be used for publications. | ○ | ○ |
| I understand that personal information collected about me that can identify me, such my contact details, will not be shared beyond the study team. | ○ | ○ |
| I agree that my information can be quoted in research outputs | ○ | ○ |
| I agree that my real name can be used for quotes | ○ | ○ |
| **Consent to be Audio/video Recorded** | | |
| I agree to be audio recorded. | ○ | ○ |
| **Future use and reuse of the information by others** | | |
| I give permission for the audio recording and written notes that I provide to be archived for three years in Yoda so it can be used for future research and learning. | ○ | ○ |

**Signatures**

| _____ | _____ | _____ |
|---|---|---|
| Name of participant [printed] | Signature | Date |

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

| _____ | _____ | _____ |
|---|---|---|
| Researcher name [printed] | Signature | Date |

**Study contact details for further information:**
**Researcher: Monique de Waal,** m.dewaal@student.utwente.nl
**under supervision of: dr. Duc le Viet,** v.d.le@utwente.nl **and dr. Filipe M. Serra Bragança,** f.m.serrabraganca@uu.nl

**Contact Information for Questions about Your Rights as a Research Participant**

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee Information & Computer Science: ethicscommittee-CIS@utwente.nl

# APPENDIX II: INTERVIEW QUESTIONS

If interviewees strongly prefer Dutch, I (Monique) could conduct the interview in Dutch and afterwards translate the results

Green = modified question

Orange = explanation / discussion

**Veterinarian**

General questions

What are the usual questions you ask the dog owner when they bring a dog presenting lameness? -> Are these questions standardized for the clinical examination process?
What exactly are you looking for if you are checking a dog for lameness? ->When visually evaluating a dog for lameness, what are key factors that tell you what causes the dog to limp?
Do you ask for additional information if during a clinical evaluation for a different issue you discover lameness? -> If a dog is brought in for a different issue, but during the examination you notice lameness, how do you further proceed in this case?
How often do you find the information about the dog's health, habits and possible accident history given by the dog owner reliable?
Do you trust some dog owners more than others? -> could cut from lack of time, next one is more important
What makes a dog owner trustworthy with the information they provide about the dog's lifestyle/wellbeing?
What kind of information would you like to have access to about the dog's private life?
Would daily habits tracking, such as walking times and activity recording in those time be helpful?
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?
What are the most important parameters you would want to see in the visualisations to facilitate lameness diagnosis?
What functionalities should the app include? -> what should the application be able to do?
Weight issues lead often to lameness. Do you think the app should also have weight related features, such as monitoring weight, diet, exercise regime?

**Application questions, after interacting with the app (think out loud)**

Would you consider the design appealing?

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

**Gait researcher**

-What exactly are you looking for if you are checking a dog for lameness? -> what are important key factors when evaluating a dog for lameness?

-What functionalities should the app have ~~to enhance the data collection process~~? -> not only for data collection, but in general. E.g., chat function, search dog / owner function…

-What are important parameters that show lameness and hence may not lack from the app / visualisations?

-What kind of graph or visualization would you use for analysing gait? Why?

-What kind of graph or visualization would you consider as most useful? Why?

-Do you think any veterinarian is able to interpret the results of a gait analysis if we use this format?

**Application questions, after interacting with the app (think out loud)**

See above ^

**Draft questions sent to researchers:**

~~-What exactly are you looking for if you are checking a dog for lameness? -> what are important key factors when evaluating a dog for lameness?~~

**-Is it correct that you are familiar with the application EquiMoves?**

**-What do you think is different in examining a dog for lameness compared to a horse?**

**-What are important key factors when evaluating a horse for lameness?**

**-Which of the important key factors could possibly be used in dogs? Why?**

**-Are there key factors that are important for dogs, (and not for horses)?**

-What functionalities should the application have?
-What functionalities should the app have to enhance the data collection process?

-What are important parameters that show lameness and hence may not lack from the app / visualizations?
-What kind of graph or visualization would you use for analysing gait? Why?
-What kind of graph or visualization would you consider as most useful? Why?
-Do you think any veterinarian is able to interpret the results of a gait analysis if we use this format?

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

**Dog owner**

-Have you ever seen your dog limping? If so, did you know what caused the limping? What did you do about it?

-Are you aware that your dog's walking pattern is important for monitoring his wellbeing?

-(If you went to your vet with your limping dog,) Were you able to understand the veterinarian's diagnosis and the reasoning behind it?

- Did the veterinarian show you the limping of the dog and explained the cause of it to you?

- Do you use health monitoring devices and/or mobile applications for yourself? -> I think this question may show a difference in interest, depending on the interviewee experience. Could help in analysing quantitative data

-Would you use an application to monitor your dog's gait? What would be your expectations from this application?

-If you could monitor your dog with this application, how would you like to see your dog's gait? -> what type of visualization would you find appealing/be able to understand?

**Questions for after they interact with the app**

How did you like the design of the app?
Would you consider the design appealing? -> these are the same questions -> maybe use it as a follow up question when the reply is heading in a strange direction, otherwise cut it
How did you find the navigation system of the app?
Where the buttons/illustrations clear enough?

What kind of graph or visualization would you consider as most useful? Why?
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?
Based on the short interaction you had with the prototype, what changes/ additions/ advice would you have to improve the application?

# APPENDIX 3: INTERVIEW ORTHOPEADIC SPECIALISTS

Audio file: 2022_12_05_09_07_50_interview vet Sarah & Björn.mp3

Speaker 1: Dr. S.J. (Sarah) van Rijn
Speaker 2: Monique
Speaker 3: Alexandra
Speaker 4: Michelle
Speaker 5: Prof. dr. B.P. (Bjorn) Meij, Sometimes Alexandra

There is an issue, sometimes speaker 5 is alexandra or bjorn

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 aslo have a book about it 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
Movementlameness 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.
00:09:30 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?
00:21:38 Speaker 4
Would you like to see numbers or would you like to get like an “we think it's
00:21:41 Speaker 4
The right front.

00:21:42 Speaker 4
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.
00:23:03 Speaker 3
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.
00:23:20 Speaker 5
Surgery before your dog is.
00:23:25 Speaker 5
In the correct weight range.
00:23:28 Speaker 5
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.
00:23:33 Speaker 5
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.
00:23:40 Speaker 3
It yeah.
00:23:42 Speaker 2
I think you would really like to go.
00:23:44 Speaker 2
We have just a very quick view.
00:23:47 Speaker 2
You can maybe say it'what is the first things that pop in your mind just to.
00:23:53 Speaker 2
Maybe we can then turn.
00:23:54 Speaker 2

Over to you for some more questions about the application.
00:23:56 Speaker 2
This is the veterinarian side.
00:23:57 Speaker 2
Yes, it's currently on the Start Measurement tab where you can choose your list of dogs.
00:24:06 Speaker 2
Which are sorted by next visit.
00:24:11 Speaker 2
This is just from the horse's application.
00:24:14 Speaker 2
A little bit copied.
00:24:16 Speaker 2
I think we can go to the main where we can.
00:24:19 Speaker 2
See the dogs.
00:24:21 Speaker 2
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.
00:24:36 Speaker 2
And it's not really readable currently, but it's about how much time they're standing on the floor and how much not.
00:24:45 Speaker 2
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.
00:24:57 Speaker 2
So again the stands of the stride duration and the angle of the limbs which are currently.
00:25:06 Speaker 2
Ticked on for the front, right and left.
00:25:09 Speaker 2
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.
00:25:17 Speaker 2
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, yeah?
00:25:33 Speaker 5
That will may work.
00:25:34 Speaker 5
I think you were talking about angle, limb angle.
00:25:39 Speaker 5
So then my question would be what is the limb angle?
00:25:44 Speaker 5
Because we define angles around the joints.
00:25:48 Speaker 5
OK, is it the shoulder angle or the te 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.
[dutch part, Bjorn is leaving]:
*00:27:17 Speaker 4*
*Het is echt tijd, ik moet echt gaan*
*[time's up for me, I should really go]*
*00:27:22 Speaker 2*
*Ja, ja, is goed [Yeah, yeah yeah, that's alright.]*
*00:27:24 Speaker 3*
*Thank you very much for the time.*
*00:27:24*
*00:27:25 Speaker 2*
*Zou u mij misschien een foto willen sturen van de toestemmingsformulieren?*
*[could you maybe send me a photo of the consent forms?*
*00:27:27 Speaker 2*
*Als u het heft ingevuld? [When you have filled it in?]*
*00:27:28 Speaker 5*
*Ja, ja ik stuur het naar Michelle [yes i'll sent it to Michelle]*
*00:27:30 Speaker 2*
*Graag dank u wel, heel erg bedankt*
*[Perfect, thank you very much]*
*00:27:30 Speaker 3*
*Yeah, thank you so much.*
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.
00:27:52 Speaker 2
We start with our main screen.
00:27:55 Speaker 2
Where we just have our dogs list that is sorted by next visit.
00:28:00 Speaker 2
Uh, you can add a new dog.
00:28:03 Speaker 2
Have identification things.
00:28:08 Speaker 2
You can quickly read through.
00:28:09 Speaker 2
Maybe we are missing something or.
00:28:11 Speaker 2
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.
00:28:33 Speaker 2
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.
00:28:44 Speaker 2
It's not yet.
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.
00:30:15 Speaker 1
On the positive side.
00:30:17 Speaker 1
So you have these very obese.
00:30:19 Speaker 1
Dog and they say.
00:30:19 Speaker 1
Oh, it's a 5 out of nine you're like oh I was seven out of nine maybe?
00:30:24 Speaker 1
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.
00:30:37 Speaker 2
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.
00:30:48 Speaker 2
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 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.
00:31:11 Speaker 3
So we thought it may improve a bit the privacy of the technical 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.
00:31:22 Speaker 1
The dogs are still in our normal patient system.
00:31:27 Speaker 1
Yeah, I think it would be
00:31:29 Speaker 1
Confusing to have another form of communication parallel to our normal patient registration system.
00:31:38 Speaker 1
I mean we are obligated by the law to keep track of all the communication.
00:31:44 Speaker 1
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.
00:31:52 Speaker 1
No, I would not be that enthusiastic.
00:31:55 Speaker 1
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.
00:32:05 Speaker 1
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.
00:32:20 Speaker 3
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 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 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.
00:33:15 Speaker 4
And then maybe it would be nice.
00:33:17 Speaker 4
If you have.

00:33:17 Speaker 4
Like a mini dog silhouette or something that you can.
00:33:21 Speaker 4
Put over the.
00:33:22 Speaker 4
Dog so you know it's the right size in the right frame.
00:33:24 Speaker 4
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.
00:33:40 Speaker 1
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.
00:33:47
OK.
00:33:48 Speaker 1
Then it opens.
00:33:49 Speaker 2
Well, that's mainly for photos is it?
00:33:51 Speaker 2
It's 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.
00:34:12 Speaker 1
I think when you're.
00:34:15 Speaker 1
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.
00:34:32 Speaker 2
Instructions yes, I did include already a few.
00:34:35 Speaker 2
functions, but those are just not there.
00:34:38 Speaker 2
They're not based on anything so.
00:34:39
Yeah, yeah.
00:34:41 Speaker 3
Still mock-up
00:34:42 Speaker 2
It's still the mock up indeed, and and I also put in little icons if you did it, or like this one is done.
00:34:50 Speaker 2
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
00:35:03 Speaker 2
To and then afterwards you can send it to the vet for analysis.
00:35:08 Speaker 2
Or you could actually.
00:35:13 Speaker 2
Also take a video at the veterinarian's office, maybe.
00:35:18 Speaker 2
do it there.
00:35:18
Right?
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.
00:35:31 Speaker 2
So well, then the results page again.
00:35:35 Speaker 2
I think it would be nice.
00:35:40 Speaker 2
Be able to compare to previous analyses.
00:35:49 Speaker 2
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?
00:36:02 Speaker 2
Like again, imagine you also have this in your own system.
00:36:05 Speaker 2
Yeah, yeah.
00:36:07 Speaker 1
It depends a bit, I think on how you.
00:36:09 Speaker 1
Want to use this app?
00:36:11 Speaker 1
I, I mean, I can imagine that.
00:36:14 Speaker 1
You sort of when when.
00:36:17 Speaker 1
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.
00:36:23 Speaker 1
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.
00:36:33 Speaker 1
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.
00:36:50 Speaker 1
Say for example we we perform surgery on the knee.
00:36:55 Speaker 1
Then you can add that like on December 5 we.
00:37:01 Speaker 1
And then then maybe the app can also say like OK today we are four weeks after surgery.
00:37:07 Speaker 1
Please record new videos or something yeah?
00:37:10 Speaker 3
But we are also working on this like a notification system.
00:37:13 Speaker 3
A reminder to just keep the owner engaged with the app and be like hey you didn't take your dog on a walk.
00:37:19 Speaker 3
Hey maybe take a video so they can also create this database.
00:37:22 Speaker 3
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.
00:37:44 Speaker 1
Maybe when they make the appointment.
00:37:45 Speaker 1
But yeah, at least before they come.
00:37:48 Speaker 1
I think it would be nice to.
00:37:49 Speaker 1
Have sort of.
00:37:51 Speaker 1
I mean dogs here.
00:37:52 Speaker 1
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 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
But do they?
00:38:39 Speaker 1
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.
00:38:48 Speaker 2
For the owner, right?
00:38:49 Speaker 2
Yes, that's the idea.
00:38:51 Speaker 2
So we would like to have the owners to wait until a veterinarian did see the analysis and maybe made some comments.
00:39:01 Speaker 2
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 disaprove 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 there went something wrong, I think especially in the beginning it will be the case, right?
00:39:39 Speaker 4
That's the wrong interpretation of the program.
00:39:41 Speaker 4
You see that if you watch new video yourself that you see like, OK, this is clearly this is the problem.
00:39:48 Speaker 4
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.
00:39:55 Speaker 4
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.
00:40:12 Speaker 1
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 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.
00:40:30
I don't understand this.
00:40:31 Speaker 1
Let's go.
00:40:32
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.
00:42:57 Speaker 1
I I don't know.
00:42:59 Speaker 1
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.
00:43:07 Speaker 1
I I have trouble watching it all the way through so.
00:43:13 Speaker 1
Yes, exactly, yeah, you're like, oh that's an interesting living room.
00:43:17 Speaker 1
You just forget to focus on the door.
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.
00:43:29 Speaker 3
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.
00:44:15 Speaker 3
Yeah yeah, yeah.
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
OK.
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?
00:44:52 Speaker 2
Should it be different or?
00:44:54 Speaker 2
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?
00:45:11 Speaker 2
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.
00:45:19 Speaker 1
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.
00:45:35 Speaker 3
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?
00:45:45 Speaker 4
Or maybe just with monitoring therapy?
00:45:46 Speaker 1
I think it's just.
00:45:48 Speaker 1
Yeah, I mean.
00:45:50 Speaker 1
Seeing on which limp a dog is, lame is still not.
00:45:52 Speaker 1
A diagnosis of.
00:45:53 Speaker 1
Course, and I think you still I mean.
00:45:57 Speaker 1
Yeah, you still need to palpate the joints too.
00:46:00 Speaker 1
Yeah, I I don't think.
00:46:02 Speaker 1
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.
00:46:15 Speaker 4
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.
00:46:21 Speaker 1
Phase unless the app is.
00:46:25 Speaker 1
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.
00:46:50 Speaker 1
Evaluates your therapy.
00:46:52 Speaker 1
I mean in the follow up phase.
00:46:55 Speaker 1
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.
00:47:08 Speaker 1
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.
00:47:17 Speaker 4
Because sometimes you don't want a dog to walk to March right after treatment and.
00:47:22 Speaker 4
The owner completely ignores your.
00:47:25 Speaker 4
Advise and then they go for a beach walk.
00:47:28 Speaker 4
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.
00:47:36 Speaker 1
If you could.
00:47:38 Speaker 1
Have like access to videos 2 weeks after surgery with an analysis and you see like this symmetry index improving.
00:47:48 Speaker 1
Yeah, then maybe owners don't have to come in.
00:47:52 Speaker 1
That often, I mean, if you you may want to make X-rays or something that you cannot do but.
00:47:58 Speaker 1
These things some owners come here.
00:48:00 Speaker 1
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.
00:48:05 Speaker 4
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.
00:48:17 Speaker 2
Have an overview of symmetry index.
00:48:20 Speaker 2
For example.
00:48:23 Speaker 2
But also more in depth about the upper body.
00:48:28 Speaker 2
Here's the same graph with the stride duration.
00:48:33 Speaker 2
And the vertical displacement.
00:48:36 Speaker 2
Of the head.
00:48:37 Speaker 2
The withers and sacrum of a horse.
00:48:42 Speaker 2
And then there's.
00:48:44 Speaker 2
the Foot falls on the average of the vertical displacement.
00:48:50 Speaker 2
So there's quite an extended.
00:48:55 Speaker 2
Analysis over here.
00:48:57 Speaker 2
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.

00:49:08 Speaker 1
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?
00:49:16 Speaker 4
It's most likely tutorial in depth to interpret these data.
00:49:21 Speaker 4
Like it would be optional to view this data and then, but if you want to, there's also a.
00:49:25 Speaker 4
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.
00:49:42 Speaker 2
Yeah, like.
00:49:42
Well, I.
00:49:44 Speaker 2
It is not that interesting, I think currently.
00:49:46 Speaker 3
No, but the one of the symmetry.
00:49:48 Speaker 3
I think would be nice.
00:49:52 Speaker 2
Yes, that's
00:49:54 Speaker 2
Just the overview, so maybe this might be helpful.
00:49:59 Speaker 2
You can see for instance that the head falls on the left side.
00:50:05 Speaker 2
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.
00:50:14 Speaker 2
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.
00:50:32 Speaker 2
Certain patterns.
00:50:34 Speaker 2
Pattern is happening in a horse.
00:50:36 Speaker 2
They know exactly it should be.
00:50:38 Speaker 2
This leg or that joined or.
00:50:43 Speaker 2
That that certain place that.
00:50:45 Speaker 4
But that's something we still have to establish.
00:50:47 Speaker 4
Then for dogs.
00:50:48 Speaker 2
Yes, the the the.
00:50:49 Speaker 1
I don't know.
00:50:50 Speaker 1
I mean there is.
00:50:51 Speaker 1
There are publications about these kinds of.
00:50:55 Speaker 1
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 painting.
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.
00:51:32 Speaker 2
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.
00:51:48 Speaker 2
Well, that's very helpful indeed.
00:51:49 Speaker 2
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.
00:52:12 Speaker 2
That's very good, yes.
00:52:14 Speaker 2
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.
00:52:28 Speaker 4
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.
00:53:24 Speaker 1
For yeah, I don't know.
00:53:26 Speaker 1
We usually we now leave it at the dog owner.
00:53:29 Speaker 1
I mean we can give advise, but what they do with it?
00:53:31 Speaker 1
It's their their business.
00:53:33 Speaker 1
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.
00:53:53 Speaker 3
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.
00:54:08 Speaker 3
Follow your advice.
00:54:09 Speaker 3
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 different.
00:54:22 Speaker 1
way of using the app?
00:54:25 Speaker 1
I mean, it could be interesting, but I.
00:54:30 Speaker 1
I think it could be interesting for.
00:54:32 Speaker 1
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.
00:55:15 Speaker 3
Mind that maybe would.
00:55:16 Speaker 3
Be differently answered after you.
00:55:18 Speaker 3
So 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.
00:55:37 Speaker 2
Think about like the weight issues.
00:55:40 Speaker 2
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.
00:56:03 Speaker 1
It's difficult to have a dog on you.
00:56:05 Speaker 1
I mean with small dogs, yeah, lift.
00:56:07 Speaker 1

So usually.
00:56:08 Speaker 1
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.
00:56:27 Speaker 1
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.
00:56:54 Speaker 1
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.
00:57:07 Speaker 3
OK.
00:57:08 Speaker 4
I'm really sorry.
00:57:09 Speaker 4
But I'm now.
00:57:10 Speaker 4
I have to leave, I'm not late.
00:57:14 Speaker 3
But thank you so much.
00:57:16 Speaker 1
Sorry 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.

[Sarah gets a call in dutch, while michelle is talking about a possible interview with fist line practice 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.
01:00:04 Speaker 1
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 IV: INTERVIEW GAIT RESEARCHERS

Interview 2: gait researchers
Speaker 1: Rhana
Speaker 2: Monique
Speaker 3: Ineke
Speaker 4: Jeanne
Speaker 5: alexandra
Speaker 6: alexandra (apparently im getting to be 2 people again);
There were also Speaker 7 and 8 due to misunderstanding on the software side; I have deleted that and attributed the right speakers

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 2

So, 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 4

I 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 3

Oh 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

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 V: INTERVIEW FIRST LINE VETERINARIANS

**Audio file**

2022_12_22_13_06_14_first_line_vets.mp3
Speaker 1: Monique
Speaker 3: Alex
Speaker 4: Dennis
Speaker 6: Romy
Speaker 8: Goudje
**Transcript**

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.
[Showing a booklet with pain score and stuff for a diary after acute lameness happened, in dutch]:
*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 VI: INTERVIEWS DOG OWNERS AND GRAPHICAL DESIGNER

**Audio file**

2022_12_22_11_04_51 dog owner 1.5 lab .mp3
Speaker 1: dog owner
Speaker 2: Monique
Speaker 3: Alex
**Transcript:**

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.

**Audio file**

2022_12_22_10_15_05_dog_owner_no lameness.mp3
Speaker 1: Alex
Speaker 2: Monique
Speaker 3: Dog Owner
**Transcript**

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.

# APPENDIX VII: ETHICAL ANALYSES

## Graphic line drawing analysis

Utizlizing Fledderman's Ethical Design Problem Solving Techniques [31], one can complete a graphic line drawing analysis of the problem. With this analysis the considered ethical requirements and moral principles in the assessment can be demonstrated. The line goes from a negative paradigm to a positive paradigm, and hypothetical examples considered are placed on the line relatively to the negative an positive paradigm. As the project also is placed on the line, one can see how it is placed among the hypothetical examples.


Figure 79: Line drawing analysis. NP: Negative paradigm, PP: Positive paradigm, GP: the current project

**Hypothetical examples for consideration:**

An application that shows the veterinarian where the IMU measured lameness

A second opinion for visual evaluation

An application that suggests a treatment plan after measuring lameness with an IMU

An application that shows both the veterinarian and the dog owner where the IMU measured lameness in two different interfaces corresponding to the needs of the target group

An application that shows the analysis in extended detail so the veterinarian and the dog owner can see exactly every weak step of the dog

Steps one and two are placed before the project because they are not complete enough to what the client wants. The second opinion even isn't an application, but a very simple solution if the owner does not agree with the vet on the analysis of their dog. The fifth and the third steps are placed between the project and the positive paradigm. both are giving the user to much information, which might be misleading or hard to interpret. Creating two interfaces results in a better overview tailoring each of the target group its needs. Moreover, by suggesting a treatment plan the application is more prone to be unreliable, as the best treatment may differ per animal and veterinarian concerned.

## Utilitarian, Deontology & Virtue Ethics.

Utilitarianism, Deontology and Virtue Ethics are ethical theories suggested by Fledderman [31]. Utilitarianism is the theory where the right action is that what results in the most happy people, all things considered. For this project that means that we should include colourblind people rather than choosing a non-colourblind friendly colour palette. This small action of including them will result in more people being able to use the application, and thus is it considered the right action.

Deontology seeks to ensure that everyone in the world is treated according to a certain standard or rule of behaviour that they see as morally right. Thus, with inclusivity as a norm, again the outcome will be that it is good to choose the colour palette which is colourblind friendly.

In Virtue Ethics, the focus is not just on actions but also on having a good character and living well. We could ask ourselves the question “would a good designer include the colourblind by choosing a colourblind friendly colour palette?” well, I think a good designer will.

# REFERENCES


[1] P. Figueirinhas *et al.*, 'Development of an Artificial Neural Network for the Detection of Supporting Hindlimb Lameness: A Pilot Study in Working Dogs', *Animals*, vol. 12, no. 14, Jul. 2022, doi: 10.3390/ani12141755.

[2] S. Bosch *et al.*, 'EquiMoves: A Wireless Networked Inertial Measurement System for Objective Examination of Horse Gait', 2018, doi: 10.3390/s18030850.

[3] A. Mohsina *et al.*, 'A retrospective study on incidence of lameness in domestic animals', *Vet World*, vol. 7, no. 8, pp. 601–604, Aug. 2014, doi: 10.14202/vetworld.2014.601-604.

[4] C. Ladha, J. O'sullivan, Z. Belshaw, and L. Asher, 'GaitKeeper: A System for Measuring Canine Gait', 2017, doi: 10.3390/s17020309.

[5] M. Ghazal, M. Alhalabi, L. Fraiwan, M. Yaghi, and L. Alkhatib, 'Assessment of motion quality using an iot-based wearable and mobile joint flexion sensors', in *Proceedings - 2019 International Conference on Future Internet of Things and Cloud Workshops, FiCloudW 2019*, Aug. 2019, pp. 44–48. doi: 10.1109/FiCloudW.2019.00021.

[6] M. Rhodin, A. Bergh, P. Gustås, and C. B. Gómez Álvarez, 'Inertial sensor-based system for lameness detection in trotting dogs with induced lameness', *Veterinary Journal*, vol. 222, pp. 54–59, Apr. 2017, doi: 10.1016/J.TVJL.2017.02.004.

[7] C. B. Gómez Álvarez, P. Gustås, A. Bergh, and M. Rhodin, 'Vertical head and pelvic movement symmetry at the trot in dogs with induced supporting limb lameness', *The Veterinary Journal*, vol. 229, pp. 13–18, Nov. 2017, doi: 10.1016/j.tvjl.2017.10.011.

[8] A. R. Anwary, H. Yu, and M. Vassallo, 'Wearable Sensor Based Gait Asymmetry Visualization Tool', *Twenty-fourth Americas Conference on Information Systems, New Orleans*, 2018.

[9] A. R. Anwary, H. Yu, and M. Vassallo, 'Gait Evaluation Using Procrustes and Euclidean Distance Matrix Analysis', *IEEE J Biomed Health Inform*, vol. 23, no. 5, pp. 2021–2029, Sep. 2019, doi: 10.1109/JBHI.2018.2875812.

[10] A. R. Anwary, H. Yu, and M. Vassallo, 'Gait quantification and visualization for digital healthcare', *Health Policy Technol*, vol. 9, no. 2, pp. 204–212, Jun. 2020, doi: 10.1016/J.HLPT.2019.12.004.

[11] H. Darbandi *et al.*, ‘Using different combinations of body-mounted IMU sensors to estimate speed of horses-A machine learning approach’, *Sensors (Switzerland)*, vol. 21, no. 3, pp. 1–12, Feb. 2021, doi: 10.3390/s21030798.

[12] G. Lawton, ‘Rooting out racism in AI systems -- there’s no time to lose’, *TechTarget*, Aug. 28, 2020. Accessed: Oct. 21, 2022. [Online]. Available: https://www.techtarget.com/searchcio/feature/Rooting-out-racism-in-AI-systems-theres-no-time-to-lose

[13] A. Olson, ‘Authoring a Code of Ethics Observations on Process and Organization’, 1998. http://ethicscodescollection.org/authoringcode (accessed Jan. 01, 2023).

[14] F. Allhoff and A. Henschke, ‘The Internet of Things: Foundational ethical issues’, *Internet of Things (Netherlands)*, vol. 1–2, pp. 55–66, Sep. 2018, doi: 10.1016/j.iot.2018.08.005.

[15] ‘Colour vision deficiency (colour blindness)’, *NHS*, Apr. 01, 2019. https://www.nhs.uk/conditions/colour-vision-deficiency/#:~:text=It’s%20a%20common%20problem%20that,to%20someone%20with%20normal%20vision (accessed Oct. 21, 2022).

[16] D. Berman, ‘Code of Ethics and Professional Conduct for Graphic Designers’.

[17] D. Nichols, ‘Coloring for Colorblindness’. https://davidmathlogic.com/colorblind/#%23332288-%23117733-%2344AA99-%2388CCEE-%23DDCC77-%23CC6677-%23AA4499-%23882255 (accessed Nov. 09, 2022).

[18] J. Goedhart, ‘Data Visualization with Flying Colors’, *The Company of Biologist, The Node*, Aug. 29, 2019. https://thenode.biologists.com/data-visualization-with-flying-colors/research/ (accessed Nov. 09, 2022).

[19] C. O. Wilke, *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures*, 1st edition. O’Reilly Media, 2019. Accessed: Nov. 09, 2022. [Online]. Available: https://clauswilke.com/dataviz/color-pitfalls.html

[20] A. Mader and W. Eggink, ‘A Design Process for Creative Technology’, *DS 78: Proceedings of the 16th International conference on Engineering and Product Design Education (E&PDE14), Design Education and Human Technology Relations, University of Twente, The Netherlands, 04-05.09.2014*, pp. 568–573, 2014, Accessed: Dec. 02, 2022. [Online]. Available:

https://www.designsociety.org/publication/35942/A+Design+Process+for+Creative+Technology

[21] K. Rose, ‘Unstructured and semi-structured interviewing’, *Nurse Res*, vol. 1, no. 3, pp. 23–32, Apr. 1994, doi: 10.7748/nr.1.3.23.s4.

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

[23] 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).

[24] A. Stellman and J. Greene, *Applied Software Project Management*. 2005.

[25] D. Clegg and R. Barker, *Case Method Fast-Track: A Rad Approach*. USA: Addison-Wesley Longman Publishing Co., Inc., 1994.

[26] N. Tromp, P. Hekkert, and P. P. Verbeek, ‘Design for socially responsible behavior: A classification of influence based on intended user experience’, *Design Issues*, vol. 27, no. 3, pp. 3–19, 2011, doi: 10.1162/DESI_a_00087.

[27] UN General Assembly, ‘Transforming our world: the 2030 Agenda for Sustainable Development’, Oct. 2015. Accessed: Jan. 12, 2023. [Online]. Available: https://www.refworld.org/docid/57b6e3e44.html

[28] I. van de Poel and L. Royakkers, ‘The ethical cycle’, *Journal of Business Ethics*, vol. 71, no. 1, pp. 1–13, Mar. 2007, doi: 10.1007/s10551-006-9121-6.

[29] S. Vallor, D. Mckenna, and B. Green, ‘ETHICS IN TECHNOLOGY PRACTICE’, 2018. Accessed: Jan. 02, 2023. [Online]. Available: https://www.scu.edu/ethics/

[30] A. K. Poole and M. Bourban, ‘Reflection II: Designing for overlooked aspects of ethical problems’, *ReflectionII_MarkullaTools2022_Final.pptx*. University of Twente, p. 24, Dec. 06, 2022.

[31] C. B. Fleddermann, *Engineering ethics*, Fourth Edition. University of New Mexico: Pearson Education, Inc., publishing as Prentice Hall,.