Development decisions

The application development process has required decisions regarding both hardware and software usage. The decisions that, to a larger extent, have had impact on the application will be discussed in this document.

Project purpose and vision

Longing for a best friend in a pet is very common by younger people. What is, on the other hand, more difficult to understand for our small fellows is the huge responsibility that follows with owning a pet. Therefore, an application has been created that aims to to evaluate the user's capability of taking care of an own pet. Since the thought of being a pet-owner might have appeared in almost every kid's mind, the application have a broad and young target group and requires to be easy to use and understand. Important aspects to consider have been navigation difficulty, user friendliness, effectiveness and consumption of battery and storage. These aspects are listed below.

- Broad target group
- Navigation difficulty
- User friendliness
- Effectiveness
- Battery consumption
- Storage requirements

User stories

The user stories, on which the project plan has been based, are presented in the appendix as an exported file from Pivotal Tracker. During the project process the user stories have been modified and reorganized as the application grew over time.

The first user stories were to implement the basic functionality required to take care of the pet; to eat, to walk and to play. Thereafter the most important requirements for making the game work were implemented, for example saving the game state when quitting the application and mood impact when playing. The last prioritization was further development of the existing functionalities and creation of new functionalities that are not critical for the application. This was made to improve the functionality and cover the project aspect of high user friendliness and easy navigation.

Development decisions based on user stories

During the project several decisions has been taken based on the earlier described user stories. The decisions and its consequenses are presented below.

API level

Minimum	**10** (Gingerbread)
Target	**17** (Jelly bean)

The main aspect for the decision of API target level has been to enable the application for as many users, and therefore as many devices, as possible. Since the main target group, children, might not have the newest device on the market, it has also been important to cover a few APIs back in time. Another important aspect has been that the minimum API target should not have impact, to a large extent, on the user experience and navigation difficulty. To make a good decision from these aspects the differences between the API-levels were looked up. The purpose was to explore the consequences in functionality limitedness by covering an added API level. Statistics over the use of different API levels on devices from this year was also studied to ensure that many devices should be able to handle the application. The decision of the minimum version, newest version of Gingerbread (2.3.3), was based on that the previous version had shown a decreasing trend and only covers a very small part of the market share. And since Gingerbread did contain several improvements in efficiency and user interface it was a motivated breaking point. The investigation together with the studies of statistics resulted in the chosen API target and minimum level, which cover 94,4% of the devices in use on the market and do not limit the functionality requirements.

Storage

Storage from the application, for example the pet with its name and mood, is stored in the device's internal storage. The internal storage has been chosen to use because saved items should only be available for the actual application. It is only necessary to save the latest game, which therefore only requires a small storage space and motivates the decision. The file is deleted from the internal memory when the pet dies.

GPS

To make the simulation of having a pet more realistic the GPS function was chosen to use while walking the pet. Since the GPS only works outdoors, this forces the user to go out even on a rainy day. For this feature the preinstalled transmitter in each phone has been used. Therefore the application requires the user to have a phone with a GPS transmitter. Without such functionality the application would not fulfill its purpose why it is necessary to require that the user has a GPS transmitter.

When implementing the GPS function and calculating the distance between two geopoints the user has walked, an already existing class was imported from another project with a method that calculates the distance between two geopoints as previously mentioned. In this class the distance has not been calculated with consideration to the curvature of the earth, and has also been calculated from the assumption that the crust is flat. This simplification has been motivated from the fact that the small difference of

accuracy is not affecting the application purpose or user experience since a dog walk generally is realtively short.

Camera

To increase the feeling of having an own pet and to improve the user experience features connected to the camera has been used in the development of the play function. The camera feature will also increase the user experience while playing because shooting photos can be considered to be exciting for children. Since the camera feature is relatively basic, do not have any major role in our application and also do not need any extra features, the existing camera functionality within Android has been used in the application.

Progress bar

The pet has a mood bar indicating its mood depending on the pet-owners taking-care performance. The mood bar is illustrated in a shape of the pre-defined widget progress bar. The progress bar is a visual indicator of the progress of a specific operation. This means that the main purpose of the progress bar is not the same as what it is used for in this application. On the other hand, the bar's logic is as requested for our application. This motivates the decision of using the progress bar even though it has another main purpose.

Application time

It has been needed to calculate and update time in the application in order to keep track of the pet's age and when the moodbar should decrease. To make this possible with lowest possible battery consumption the system time (unix time) has been chosen to use. Every time the user returns to the application the time since last use is calculated and all values are updated, making it possible to avoid having the application running at all times.

GUI

The target group, children in all ages, requires a user friendly and attractive GUI view. The application is presented, with this in consideration, with a lot of pictures and animation for easy understanding. The application is also generally limited to a few and short text lines since many children might not be able to read long and complicated sentences. For those that are not able to read, the application is possible to run by *learning by doing* because of the illustrative pictures and animations. To cover as many users as possible the language has chosen to be English to eliminate language barriers.

Project process

To be able to fulfill the purpose of the project, it has been divided in to smaller targets, expressed in user stories in the online project tracker Pivotal Tracker. Thereafter a weekly-based project plan has been setup from the user stories into sprints. The plan has, on purpose, been of an increasing shape with a larger workload at the end of the project. The reason for this was primarily that the project group has been working on another project during the same period and therefore has been balancing the projects with inverted workload share. Besides that also the fact that performance increases after working a while, which is illustrated in learning curve shown in figure 1. With the same effort the group has gotten a greater output in the end of the project. This also shows the reason for the greater number of user stories finished by the end of the project time.

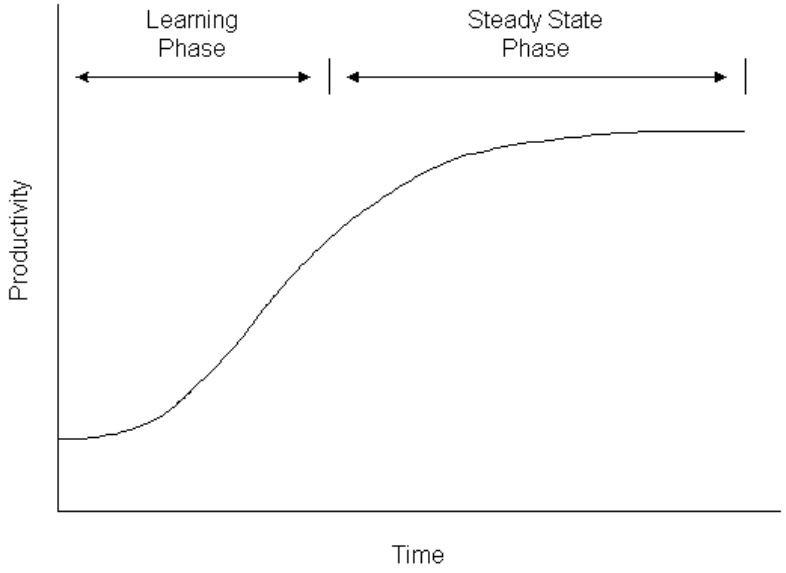

Figure 1: Illustration of the learning curve.

The user stories have been prioritized and categorized from two main aspects; the addition of new functionality to fulfill the application purpose and improvement of existing functionality. With these aspects in mind, the project has been built on a project structure as shown in figure 2. As the figure shows, smaller modules that solve the basic functionality have been implemented first. Thereafter the modules have progressively been improved to increase the value of each, already implemented functionality.

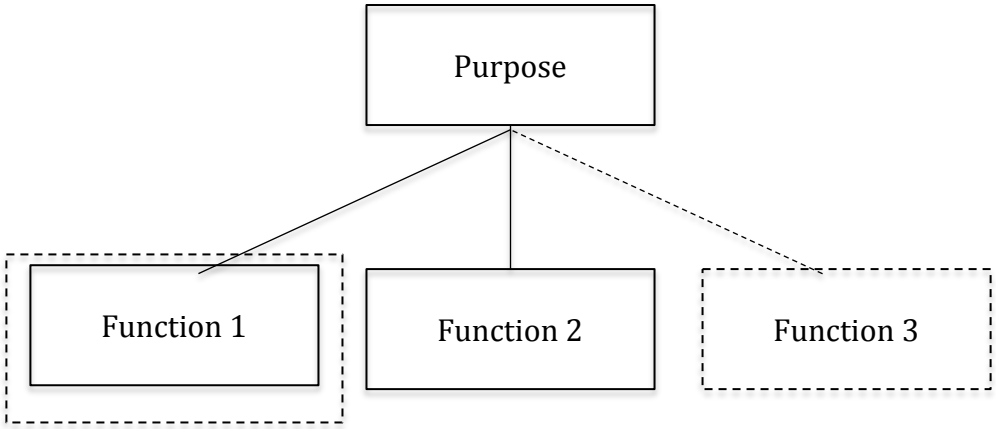

Figure 2: Illustrates how Function 1 and 2 was implemented at first and then the functionallity of funcion 1 was improved. Later if there was time Function 3 which is not critical for the application but adds value was made.

The selected project structure improves the possibilities for further development. To work in line with this aspect the code has a logical open structure that enables easy implementation for additional functionality, for example in adding different kinds of pets etc.

Architecture

The project architecture has been built on inspiration from the design model Model View Controller (MVC), which consists three components; model, view and controller. The design model has been modified for this unique project since the Activities in Android both consists the .xml files (views) and Java files (controllers, views, utils and models). The project therefore consists of the following three packages.

- ViewControllers
- Models
- Util

The decision of this design model has mainly been based on the advantage of separating the view from the model and the utils, although in the android projject the view cannot be separated from the controller as explained below. Another aspect while deciding design pattern has been the groups' earlier experiences of MVC which has enabled the group to have a larger focus on the implementation of the functionality and user experience. The definition of the three packages and their relations are explained below.

The viewcontroller package consists of all the direct interaction with the user in the .java files. In an Android project the view this is limited to all of the Activities. In this project all of the activitites are also controllers, which makes them ViewControllers. The ViewController therefore both represents the View and the Controller part in the application. The ViewController calls on methods in the component Model. The view also consists of the .xml files that are used by the ViewControllers to specify the user interface.

The model consists of the representation of all the information that is used in the application. It does not communicate, structurally, with any other package but is called by other packages, without knowing where the call is coming from.

The util package consist of utility classes. In this project the util package consists of a LocationHelper class that handle creation of the location manager and location listener and keeps track of geopoints. The project also consists of an imported util class from another project that is used to calculate the distance in meters between these geopoints. Methods in the package util are called by activities.

References

Figure 1:
http://pmbook.ce.cmu.edu/images/fig9_7.gif

User story	Current State	Created at	Accepted at	Description
Adapt presetting for the target group by decision of API-level	accepted	Apr 12, 2013	Apr 19, 2013	As a user I would like to have access to the application, even though my cell phone not is the newest on the market. At the same time I do want it to be a user friendly application.
Start menu	accepted	Apr 12, 2013	Apr 19, 2013	As a user I want to have a start menu where I can choose how to play, start and quit.
Create a pet with a name	accepted	Apr 12, 2013	Apr 23, 2013	As a user I want to get to a new decision point where I am able to create a pet and pick a name for it.
Start the game when a name is chosen	accepted	Apr 12, 2013	Apr 24, 2013	As a user I want to get to PetActivity after I've created a new pet or clicked "continue game".
Design application launcher icon	accepted	Apr 19, 2013	Apr 24, 2013	As a user I want a designed logotype when opening the application.
Improve mood when eating	accepted	Apr 12, 2013	May 11, 2013	As a user I want to be able to press a button so that the dog eat and feels better.which is shown in the
Improve mood when playing	accepted	Apr 12, 2013	May 11, 2013	As a user I want to be able to play with the dog and make it feel better which is shown in the moodbar.
Improve mood when walking	accepted	Apr 12, 2013	May 13, 2013	As a user I want to be able to walk with the dog and make it feel better which is shown in the moodbar.
Dialog shows if trying to continue game without	accepted	May 13, 2013	May 13, 2013	As a user I want to get a warning when I'm trying to continue a game without an existing pet.
Sound in the activity "PetActivity" which shows the gameview	accepted	Apr 12, 2013	May 14, 2013	As a user I want to hear some background music when I am in the view PetActivity.
Save Pet	accepted	May 1, 2013	May 17, 2013	As a user I want my dogs name and mood to be saved until the next time I play.
Background for the application	accepted	Apr 12, 2013	May 17, 2013	As a user I want a good-looking background in all existing views of the application.
Dialog when trying to create new pet, when a pet already	accepted	May 1, 2013	May 17, 2013	As a user I want to be warned before I create a new pet when I already have an existing pet.
Restart game and create a new dog	accepted	Apr 12, 2013	May 19, 2013	As a user I want to be able to create a new dog even though I already have an existing one
Length of walk	accepted	Apr 12, 2013	May 20, 2013	As a user I want that when pushing the walkbutton that the GPS will measure the length of the walk and inform about the length to me.

Quit walk	accepted	Apr 12, 2013	May 20, 2013	As a user I want to be able to quit the walk by pressing a button which says "stop walking".
Eat animation	accepted	Apr 12, 2013	May 21, 2013	As a user I want to see animations which shows that the dog is eating.
Walk animation	accepted	Apr 12, 2013	May 21, 2013	As a user I want to see some animation when I walk with my dog.
Increasing mood with length of walk for the pet	accepted	May 20, 2013	May 21, 2013	As a user I want the mood for the pet increasing with the length of the walk so that the moodbar increase.
Play animation	accepted	Apr 12, 2013	May 21, 2013	As a user I want to see animations when I play with my dog.
Sound limitation	accepted	Apr 12, 2013	May 21, 2013	As a user I only want the theme song of the application to be played in the PetActivity view.
Save mood of pet	accepted	May 21, 2013	May 22, 2013	As a user I want the mood of the dog to be saved.
Moodbar functions	accepted	Apr 12, 2013	May 22, 2013	As a user I want to see a mooodbar which shows the mood of the pet and shrinks when time pass.
Rotate phone	accepted	May 21, 2013	May 22, 2013	As a user I don't want the application to crash if I rotate my phone
Dog age	accepted	Apr 12, 2013	May 22, 2013	As a user I want to see how old my dog is.
Taking a photo when playing	accepted	May 22, 2013	May 23, 2013	As a user I can take a photo of my favourite dog and then watch it dance for me.
Dog dies	accepted	Apr 12, 2013	May 23, 2013	As a user I want the dog to die when the dog has not eaten or walked for two days.
Turn sound on/off	accepted	Apr 12, 2013	May 25, 2013	As a user I want to be able to turn the sound on and off in the petActivity view.
Improve the mood when sleeping	accepted	May 1, 2013	May 26, 2013	As a user I want to be able to make my dog sleep and by that make it feel better which is shown in the
Animation and sound for sleep	accepted	Apr 12, 2013	May 26, 2013	As a user I want to see an animation and hear snoring while my dog is
Incoming phonecall	accepted	Apr 12, 2013	May 26, 2013	As a user I want the application to return to the same state as I left it when the phone rang.
Language	accepted	May 26, 2013	May 26, 2013	As a user I want to understand the language in the application.
Internal storage	accepted	May 26, 2013	May 26, 2013	As a user I want the information that needs to be stored in the app to be stored in the internal storage.
Sound when playing	accepted	May 26, 2013	May 26, 2013	As a user I want to hear music when playing with the dog.
Animation die	accepted	May 26, 2013	May 26, 2013	As a user I want to see a nice animation when my dog dies.

Ready for a pet? sign when opening the app	unstarted	Apr 12, 2013		As a user I want a nice Ready for a pet? sign appear when I open the application.
Set different colors on Enabled&disabled buttons.	unstarted	Apr 12, 2013		As a user I want it to be obviouse when a button is enable and not.
Choose other pets	unstarted	May 26, 2013		As a user I want to be able to choose beetween different pets.
Push notifications	unstarted	Apr 12, 2013		As a user I want that the application sends me push notifications if the dog is close to dying.
Sound on/off in settings	unstarted	May 27, 2013		As a user I want to be able to choose sound on/off in the whole application in a view Settings.
See walk path on a map	unstarted	Apr 12, 2013		As a user I want to see a map where the path that I've walked is marked.
Total distance during one day	unstarted	Apr 12, 2013		As a user I want to be able to se how far I have walked during the day.
Game while playing	unstarted	Apr 12, 2013		As a user I want to play a funny game when I play with my dog.
Choose you own background picture	unstarted	Apr 12, 2013		As a user I want to be able to take a photo and then use it as background in the application.
Take walks and interact with other users	unstarted	Apr 12, 2013		As a user I want to be able to take a walk with other dogs that other users have created.