

## Introduction

This is the final report developed for Coursework 3 of User Interfaces.

Before the development started, the team performed a PACT Analysis and created a Persona and two distinct Scenarios, so that we could better understand the target audience and the main goals of the product. The team decided that the target platform for the application is the personal computer (desktop or laptop).

The development was done in four distinct cycles. Cycles one and two were run in parallel by splitting the team into two groups; cycle three merged the development of the two previous cycles and fixed any implementation and usability problems that arose; and cycle four was mainly focused on improving the usability of the developed functionalities by following good interactive design principles and guidelines.

## PACT Analysis

“People Conducting Activities in Context Using Technology”

The primary users for this application can be classified as outdoor enthusiasts, travellers, campers, hikers, climbers, birdwatchers and outdoor sports practitioners. Among secondary users, we may mention friends and family (from the primary users) and video editors.

The main activities that users may perform with the application include organizing a video library by location and activity, organizing a video library by collaborating with other members of the group, sharing videos, and watching videos. These activities can be done on a daily basis and can be interrupted - they might need cooperation between members of the groups for exploration and organization of multimedia (video) content.

These activities can be done in a variety of contexts: indoors and outdoors environments, at home, resting, travelling, at any time of the day, to share videos with friends or to rewatch videos.

The user input is done with mouse and keyboard and the output is displayed on the computer screen.

## Persona

Catherine is a 16 year old female student who enjoys going on a hike every Sunday with her school hiking group. She is very extroverted, adventurous and prefers to be out of the house as much as possible. She is currently taking a BTEC in Media Production, after being inspired by her love of animal/ nature documentaries and she aspires to become the next Attenborough. In her free time, she likes to record and edit TikTok videos with her friends. Every Christmas, her and her family travel to France for their annual skiing trip. Recently, she has started to record vlogs of these trips, which she sends to her grandparents back home. She is not the most organised person, so her videos and photos all get uploaded to the same folder on her laptop. She finds it frustrating having to scroll through the whole folder, in order to find a specific video.

## **Scenario 1**

A family consisting of father (Bob), mother (Karen), son (Felix) and daughter (Abby). Abby loves to film her family - to collect memories which they can look back on. Whether they are on a trip playing volleyball, on the beach, or just lounging around with her pet cat in the living room, she always has her camera (which her mother Karen bought for her 15th birthday). The problem however is that Abby is not keen on using the file explorer or the already existing media player on her Windows laptop computer and would rather have a software which allows her to: import the videos from her memory card; choose which video to playback; and provide a file management system which is similar to the photo application on iOS which has an album feature (called category on our program). Tomeo fixes these issues for Abby as it is user friendly and comes with the features required to satisfy her user needs.

## **Scenario 2**

Matthew and his friends Thomas and William have just arrived back after one month of interrailing across Europe. The trio thoroughly enjoy the outdoors and love to participate in adventurous activities. During their month of travel they: swam with dolphins in Portugal; climbed Mont Blanc in the Alps; went rock climbing in the Dolomites; set out on a skiing adventure in Norway and explored Bulgaria via a hiking tour. Matthew managed to capture all these thrilling activities with his GoPro and stored the videos on his SD card. Matthew would like to import the videos somewhere that both Thomas and William can view them whenever they want, however he doesn't want the videos to be on a public domain such as Youtube. The Tomeo application allows Matthew to import his videos, categorise them according to his preference (by activity or by country) and watch and share these videos with Thomas and William.

# Cycle 1

## 1) Prototype

### Goal of cycle

The goal of cycle one is to increase the usability of the prototype. Currently, all the videos stored play in a random order and the user cannot see the duration of each video, nor can they pause the video or adjust the volume settings. We aim to increase the basic functionality of the prototype by adding a play/pause button; a skip button; a volume slider and a video progress bar to the interface. We also intend to adjust the current video player settings in order to allow the user to choose which video they ought to watch, rather than the videos being randomly shuffled through the playlist. These features will optimise the interactions between the user and the system and enable them to use the prototype more easily and effectively.

### Prototyping technique and motivation for the design shown

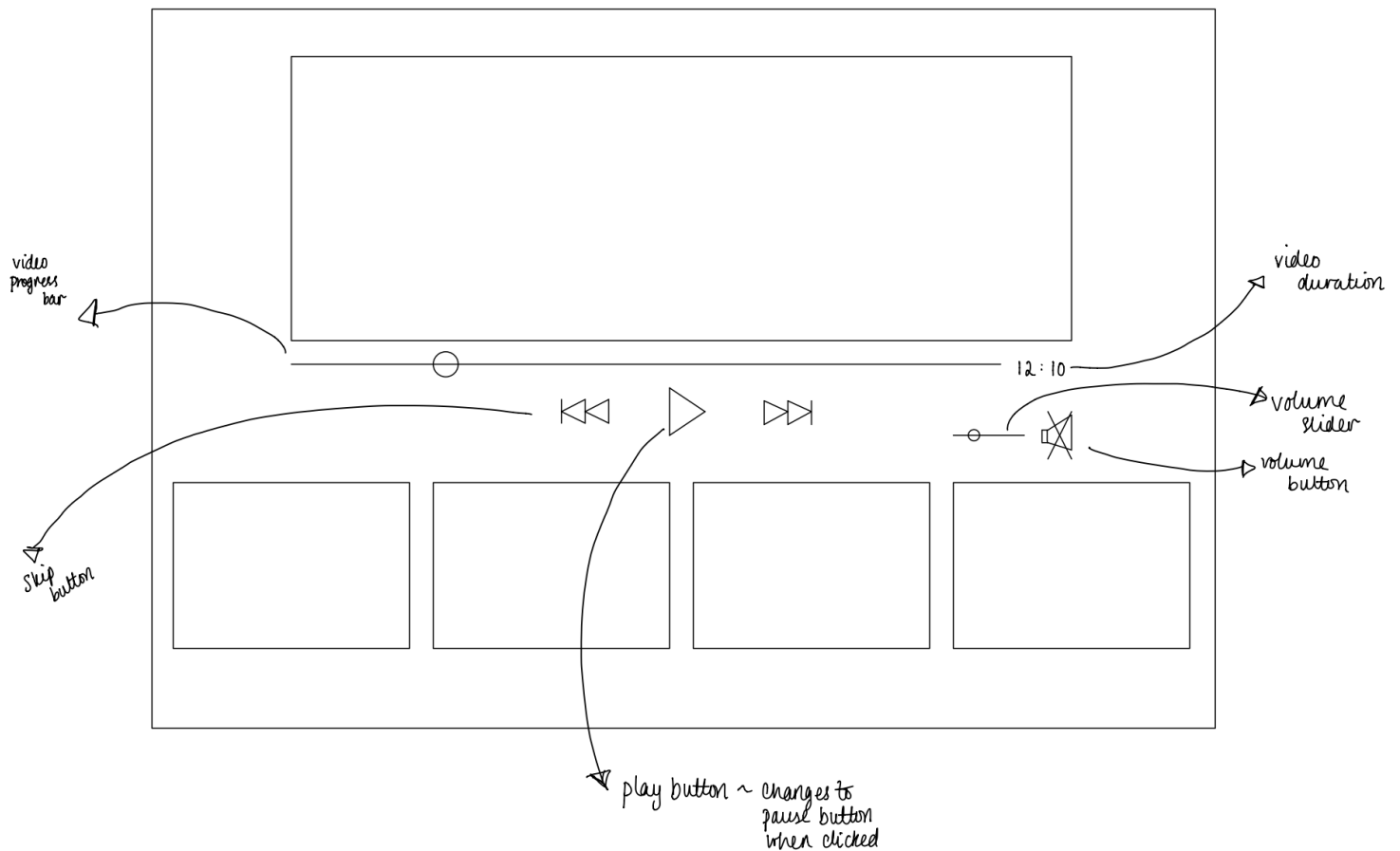
The prototype is designed on paper using a low-fidelity approach.

The sketch shows the main layout of the proposed design idea for this cycle which will consist of different UI widgets to represent the volume, duration and video buttons. These widgets will be stored inside various layouts which will then be stored within a main window. The motivation behind this design came from the many popular media players today and in the past such as Youtube and Windows Media Player. Taking inspiration from these designs has its benefits for the user, as the prototype will be easy to remember how to use, due to its similarity with other media players. Additionally, the layout of the design focuses on simplicity, which will add to the usability and memorability of the prototype.

### Reason for chosen technique

This approach is best suited for our first prototype, as it is likely that our layout design may change in the later phases when additional functionalities are implemented. Therefore, we felt it was important to choose a technique that was not too time consuming and could also be adapted in the future if necessary. Additionally, sketching a design has very low development costs and requires little effort. Using this technique allowed us to redirect our energy into implementing the code and meeting the deadlines set for each cycle, whilst still producing a decent design guide for our prototype.

## Evidence of the design - A sketch showing the prototype layout for cycle 1



## 2) Evaluation

### Technique used

The evaluation technique used is Cognitive Walkthrough which involves imitating a user's interaction with the prototype through a series of steps. During the walkthrough, critical information will be recorded such as a list of potential problems along with any difficulties a user may face.

### Reason for technique chosen

This technique was chosen because it allows for the evaluation of a prototype from a user's perspective. Using this technique means the principles of good interaction design can be investigated with a firsthand approach. These principles may include checking: the learnability of the design to ensure it is easy for the user to learn how to use; the memorability of the design to ensure the prototype is easy to remember for the user or the efficiency of the design to ensure that everything does what it is supposed to do. Additionally, there are very few practical and ethical issues that need to be taken into consideration due to the absence of a user. Therefore, little effort and preparation is needed for this evaluation to go ahead.

### Outcomes of the evaluation

The evaluation showed that the main functionalities of the prototype were implemented, however, some adjustments need to be made to improve the general usability of the prototype. Namely, incorrect backward/forward skipping of the videos can cause confusion for the users. Additionally, constantly having to manually drag the duration slider back to the beginning, when wanting to replay a video, can prove tiresome for the users.

### **Evidence of the Evaluation**

#### Task:

Find the video of the cars and carriages on the road and skip to 5 seconds.

#### Users:

Tourist users

#### Context:

Desktop PC

#### Cognitive walkthrough results table

Steps	<i>Correct action?</i>	<i>Perform?</i>	<i>Associate and interpret?</i>
1. Open the application	✓ - clear button to press	✓ - loads	✓ - totemo prototype shown
2. Skip video to road video	✗ – pressing the skip button does not skip in order shown (low severity)	✓ - video skips	✓ - another video displays
3. Press play button	✓ - video footage appears	✓ - button works as expected	✓ - video plays
4. Drag slider to 5 seconds	✓ – use is likely to be familiar with other media players	✓ - duration point slides across	✓ - we are taken to the 5 second point in the video
5. Press pause	✓ - clear button to press	✗ – user may try to use space bar (low severity)	✓ - clicking pause stops the video

### 3) Code

#### **Video illustrating changes**

[cycle 1 video](#)

#### **Code Repository**

[cycle 1: media buttons, video and volume slider](#)

#### **Differences between prototype and implementation**

When comparing the implementation of the design and the prototype, it is evident that there are some differences. Namely, the prototype shows a separate pause and play button whilst the implementation shows a combined button. The decision was made to have separate buttons in this cycle, due to difficulties we faced in trying to merge the two. Additionally, we decided it was more aesthetically pleasing to position the volume slider on a different row to the functionality buttons, preventing an overcrowded effect. Currently, the implementation shows a different design for the volume, as a signal/slot was added to display the number that corresponds to the slider position. Thirdly, our skip button only skips through the displayed videos, rather than all the videos in the library, due to the absence of the browsing field. This difference we hope to rectify once the second cycle is implemented. Lastly, once a video is clicked from the row of videos, the order in which the videos are skipped is incorrect; this was due to a technical difficulty we faced.

## Cycle 2

### 1) Prototype

#### Goal of cycle

The goal of cycle 2 is to keep on increasing the usability of the prototype. The program should be used by multiple people in a group and should accommodate videos of different lengths, activities and locations. However, there is still no way of organizing the videos by the aforementioned categories, which can be confusing with large amounts of videos. We aim to improve these use cases by: adding a grid layout (which allows users to browse through the videos); two new layouts to filter videos by activity and location (which allows the user to organize the library and browse more efficiently); two buttons to add new categories in both activity and location layouts; and a “drag and drop” feature to add videos to categories. These features will allow the program to maintain good usability standards even when the number of videos increases.

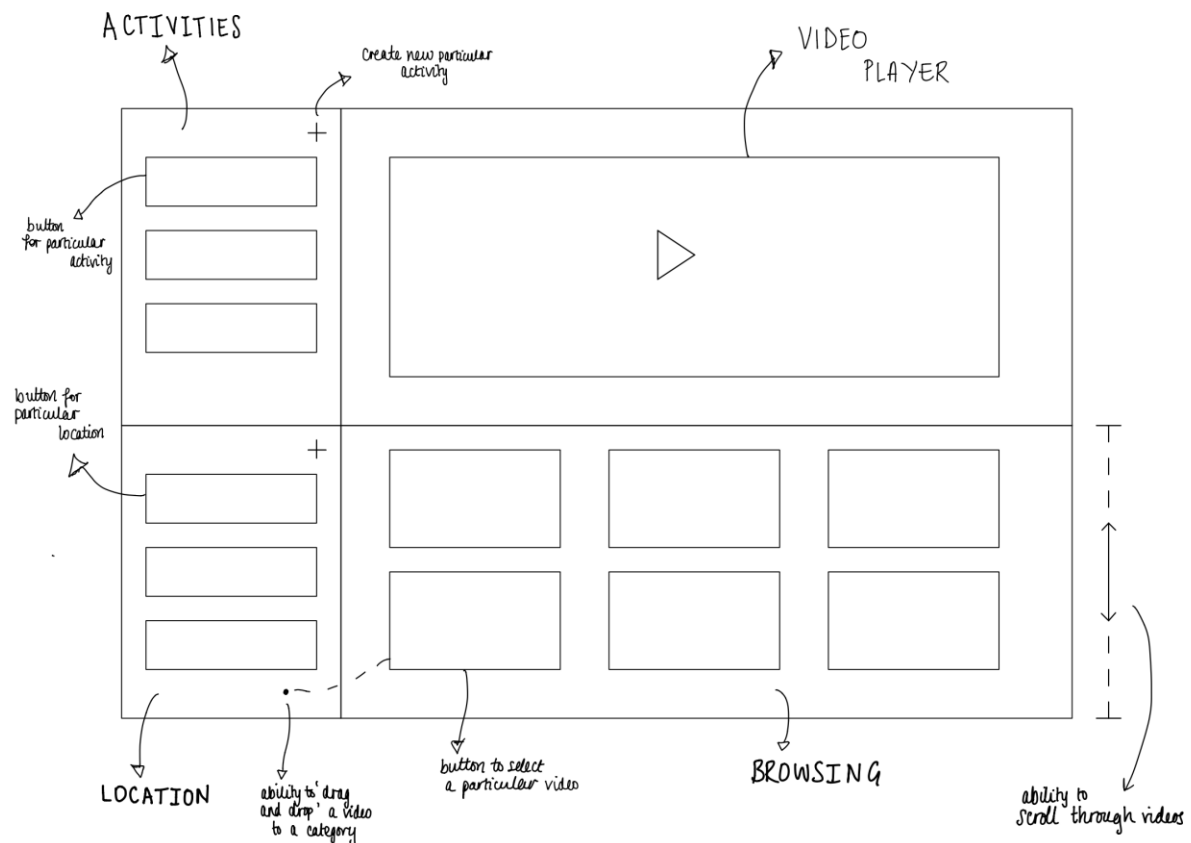
#### Prototyping technique, Reason for chosen technique, Motivation for the design shown

The prototype technique used was sketching on paper, a low-fidelity approach.

This is the best approach for this prototype since we started the cycle with some uncertainty about how feasible some features would be, and a sketch can easily be changed, improved, updated. Sketching has low development costs regarding time and effort, which allows us to go through the cycle quickly enough to meet the deadline set for the cycle, but without losing any quality of information.

The sketch represents the UI widgets of the main layout with an emphasis on the changes proposed for this particular cycle. The sketch also provides a high-level view of the functionalities that should be provided in the implementation. The design shown is greatly based on structuring groups in an ‘F’ shape (which is based on assumptions of how people read in the occidental world) - this should allow the user to quickly understand how the layout is structured. Furthermore, the design is focused on simplicity, but without hurting utility, and makes use of standard practices for this type of programme. This should allow the users to have a low learning curve when starting to use the program. The proposed functionalities focus on providing straightforward approaches to basic use cases.

## Evidence of the design - Sketch



## 2) Evaluation

### Technique used

The evaluation technique used is Heuristics Evaluation, which involves doing a review guided by a set of heuristics (usability guidelines). The heuristics chosen for the evaluation are Norman's ID design principles.

### Reason for technique chosen

We chose this technique since it allows us to evaluate the usability of the design using a set of standard, verified guidelines and disclose a prioritized list of issues to developers' attention. This list may be used in the next cycles as a guideline on which design improvements should be made. Furthermore, even though we do not have an expert to perform the evaluation, the fact that we can use Norman's design principles allows us to pay attention and raise questions on all the main design concerns.



## Outcomes of the evaluation

The evaluation showed that all the main functionalities are implemented, but also that most of them need some small improvement so that they meet good usability standards. Namely, lack of feedback from the system to the user, can make it hard for some users to assess the current state of the system. In addition, incomplete conceptual models like being able to add a video to a category but not removing it, may cause some confusion to the user.

### Evidence of the Evaluation (table of results)

#	Issue	Heuristics Violated	Severity (1-5, low to high)
1	currently not possible to see which video button is selected	Feedback	4
2	even though it's a standard practice already, users may not be aware of the "drag & drop" feature to add a video to a category	Signifiers	2
3	currently not possible to remove a video from a category after we added it	Conceptual Models	4
4	currently not possible to see which category button is selected	Feedback	4

### 3) Code

#### **Video illustrating changes**

[cycle 2 video](#)

#### **Code Repository**

[cycle 2: category and browsing](#)

#### **Differences between the prototype and the implementation**

The implementation of the design has some differences when compared to the prototype. Namely, technical/development difficulties caused a simplification of the two layouts - reducing the filtering by "Location" and/or "Activity", to just one layout called "Categories". Therefore, the user can still add a new filter for any location or activity they might need, but this will be applied under the one "Categories" layout. Secondly, when filtered by some category, the grid that holds the video buttons does not always have the desired layout; this was also due to a technical difficulty.

No major changes were made due to the evaluation process, instead, the outcomes from the evaluation will be used for improvements in the next cycle's design.

## Cycle 3

### 1) Prototype

#### Goal of the cycle

The goal of cycle three is to merge the prototype for cycle one and two and improve its overall layout. By merging the two cycles, we are combining the functionalities of cycle one which includes playing, skipping, pausing, volume adjusting and duration sliding, with the functionalities of cycle two, which includes browsing capabilities and categorisation of videos by activity or location. Due to the increase in features, we will ensure to label all the layouts added, in order to make the prototype clear and easy to use. In addition, we intend to improve the structure of the prototype by adding a scroll bar for the video library, in order for all the videos to be displayed on the interface. Small changes will also be made to the volume slider to make it wider and easier to adjust. Lastly, as cycle one and two were run in parallel (at the same time), we must ensure when merging the two, that the design of the interface is consistent. Particularly, similar design choices and similar elements should be used to achieve consistency, which is important because it allows for the maintenance of usability standards.

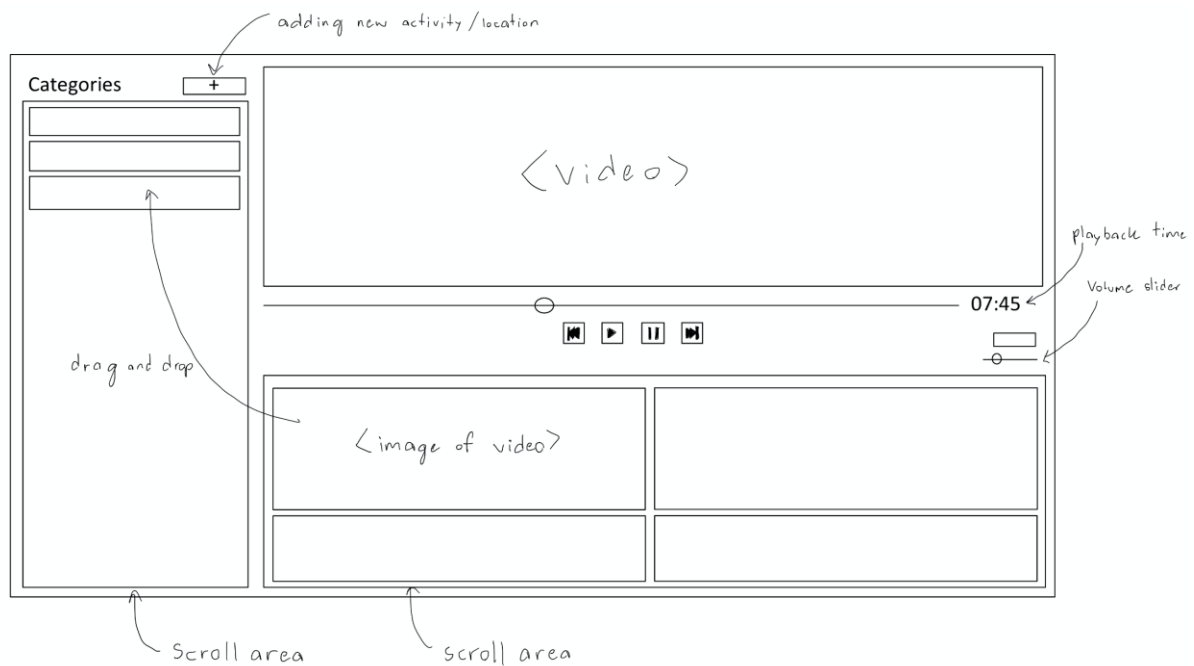
#### Prototyping technique, Reason for chosen technique, Motivation for the design shown

The prototype is designed on paper using a low-fidelity approach.

This is the best approach for this prototype since merging the two cycles could prove difficult, meaning the implementation may differ from the prototype. Additionally, a sketch can easily be adapted, improved and updated. The technique also has low development costs regarding time and effort, which allows us to go through the cycle quickly but without losing any quality of information.

The sketch we have created delivers a high-level view of the different functionalities that will be implemented. The design shows different group structures: categories, video player and video library groups. These groups are structured in an 'F' shape which is theorised how we read webpages and applications in the modern world. Organising the interface in this manner will increase the memorability of the prototype which is a key factor in achieving successful design. Additionally, the design is centred around simplicity in order to ensure a user-friendly experience and to increase productivity in our users. The end user should not have to spend more time figuring out how to use the prototype than actually using it, therefore it is important to ensure clarity in our designs.

## Evidence of the design - A sketch showing the prototype layout for cycle 3



## 2) Evaluation

### Technique used

The evaluation technique used is Cognitive Walkthrough which involves following a series of steps for a scenario in order to observe how a user will respond to the prototype. It also allows us to figure out potential problems we may have overlooked beforehand. In addition, it also helps us to identify user needs and assess the current user experience.

### Reason for technique chosen

This technique was chosen because it allows for the evaluation of a prototype from a user's perspective. Through this technique we are able to focus specifically on a certain part of our prototype, particularly, the drag and drop feature. This allows us to analyse how the user will respond to this feature in depth. This evaluation requires less effort and preparation to perform, meaning the implementation of cycle 4 can be carried out sooner.

### Outcomes of the evaluation

The evaluation showed that the main functionalities: filtering and categorisation features were implemented, however, some adjustments need to be made. Currently, it is not clear to the user which video has been selected once pressed, nor is it clear which category has been selected when pressed. Nonetheless, the potential problems discovered were fewer than expected and will be improved upon in the next phase of the implementation.

## Evidence of the Evaluation

### Task:

Create a new category called 'Animals'.

Use the scroll bar to find the video of the panda then drag and drop it to the newly created category.

### Users:

Teenage users

### Context:

Desktop PC

### Cognitive walkthrough results table

Steps	<i>Correct action?</i>	<i>Perform?</i>	<i>Associate and interpret?</i>
1. Open the application	✓ - clear button to press	✓ - loads	✓ - totemo prototype shown
2. Click the button to add a new category	✓ - clear button to press	✓ - button works as expected	✓ - message box appears
3. Type in new category name	✓ - clear text field to type in with instructions	✓ - typing works as expected	✓ - new category is shown
4. Use scroll bar to find panda video	✓ - use is likely to be familiar with other media players	✓ - user expected to be able to use scroll on mouse	✓ - page scrolls
5. Click the video	✓ - it is clear to click the video	✓ - clicking works as expected	✗ - currently not possible to see if the video button has been selected (medium severity)
6. Drag and drop video to the new category	✓ - use is likely to be familiar with other media players	✗ - user might not know of this functionality (high severity)	✓ - clicking on the new category shows the video
7. Click category to see the video inside it	✓ - clear button to press	✓ - clicking works as expected	✗ - currently not possible to see if the category button has been selected (medium severity)

### 3) Code

#### **Video illustrating changes**

[cycle 3 video](#)

#### **Code Repository**

[cycle 3: merging design](#)

#### **Differences between prototype and implementation**

This cycle was dedicated to merging the code. After the finished code was run, it was easier to notice a particular problem in the user interface, namely the volume slider. Due to the original position and size of the volume slider, it appeared to be too small and placed in an odd position. This led the team to reconsider the position and size and to deliberate whether or not to remove the digits showing the volume. There were 4 proposed solutions in total, with all 4 resolving to have the slider size enlarged:

- 1) move the volume slider next to the skip button and remove the digits.
- 2) move the volume slider next to the skip button and move the digits to the end of the slider.
- 3) Keep the volume slider in the same position and remove the digits.
- 4) move the volume slider on the right hand side of the window, on the same line as the video interaction buttons, and remove the digits

In the end, the team decided to go with the 4th option as that was the most visually appealing. This was the only difference between the prototype and the implementation.

## Cycle 4

### 1) Prototype

#### Goal of the cycle

After evaluating cycle three, we decided that one of the goals of this cycle should be to implement feedback from the system, in order to make the prototype clearer to the user. For instance, to highlight the video and category buttons when they are selected. Furthermore, we will add a signifier to clarify the use of the drag and drop feature. Another goal is to fix any problems incurred in the last cycle: the crashing of the skip button; the inability to press a specific point on the duration slider and for the video to play from that point. Finally, we will make small improvements, based on increasing the usability of the product. This includes widening the category buttons and adding a group sign in button so that the application can be shared with friends and family. The implementation of the sharing feature aligns with our chosen prototype scenario which stated that our end user Matthew would be able to share his videos amongst his friend group. The group sign in feature supports the feasibility of this scenario.

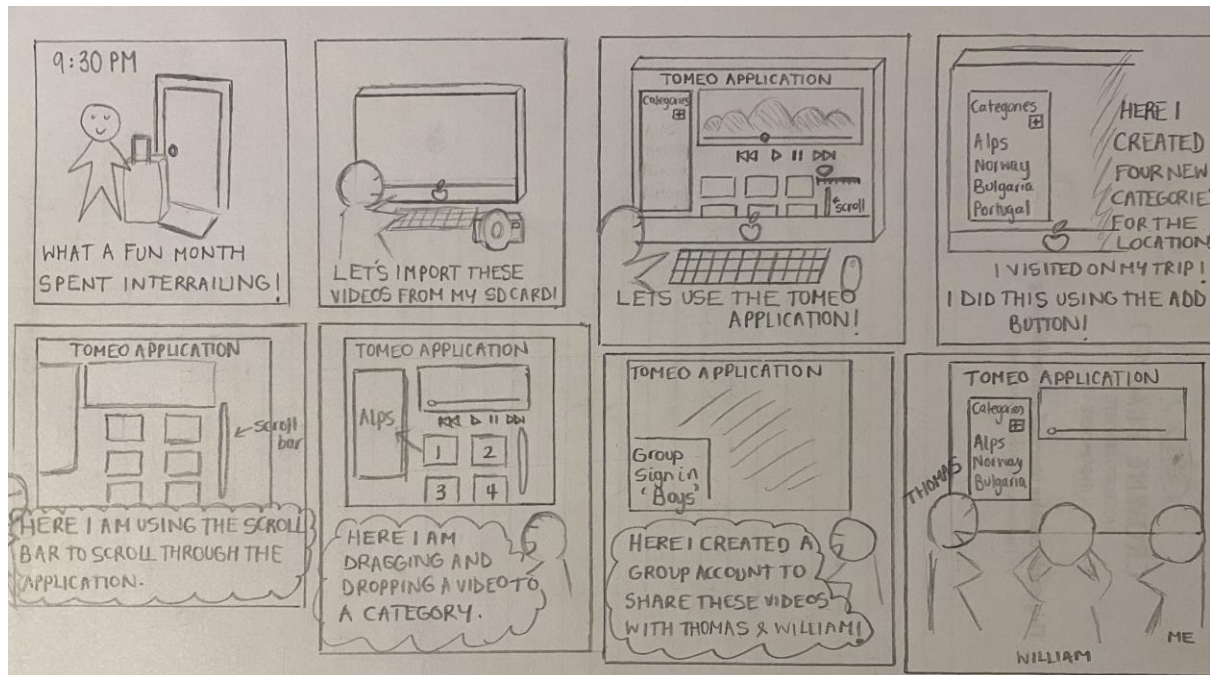
#### Prototyping technique, Reason for chosen technique, Motivation for the design shown

We chose to create a storyboard as the prototyping technique for cycle four. A storyboard is a display of sketches that show how a user may advance through a task. Our storyboard will be used along with a scenario.

Using this low-fidelity approach helped in the process of visualising the interaction that would take place between the user and the prototype. The storyboarding technique also allowed us to see if our prototype met the users' needs. In previous cycles we used sketch, however a storyboard is more detailed than a sketch as it shows how a user performs each task and the process through the scenario depicted.

The prototype for this cycle was designed to improve the functionality of the video player as opposed to focusing on the layout as we did in previous cycles. Our prototype from cycle three did not make it clear to the user how to add a video to a category, which we noticed in our cognitive walkthrough. This was of high severity as it affected the ease of use of the prototype. Therefore, a signifier indicating how to use the add category feature was added into the design, to enable greater clarification of the prototype.

## Evidence of the design - A storyboard showing the prototype functionality and layout for cycle 4



## 2) Evaluation

### Technique used

The evaluation technique used is a questionnaire. Using a questionnaire allows us to gather a collection of information about our prototype through a series of questions. The questionnaire will consist of a variety of open-ended and yes/no based questions, with both qualitative and quantitative data being collected.

### Reason for technique chosen

This technique was chosen because it is a good way to get answers to specific questions about our prototype. Additionally, a questionnaire allows for us to acquire multiple different views, gain feedback from a range of users from different demographics along with obtaining an insight into the usability of our prototype and how users may react to it. Originally, we wanted to conduct interviews for our evaluation technique, however with the current COVID-19 restrictions, we decided that it would be safer to send out digital questionnaires and get participant feedback remotely.

### Outcomes of the Evaluation

Our digital questionnaire was created with Google Forms. This application allowed us to view and analyse the data we received from our participants. We tried to produce an even distribution of participants by sending the questionnaire to each of our families and friends.



The results showed most of our participants were aged 19-24 making up 53% of the total participants. 95% of participants felt the player seemed easy to use from the storyboard prototype. To measure user satisfaction, we used the Likert scale which is used widely by software developers to measure the opinions held about their products. From this we found out that around 30% of people stated that they either liked or loved the look of the video player based on the storyboard.

At the end of the questionnaire we asked participants how they would improve the prototype based on the storyboard's depiction. Some of these improvements included adding a feature that allows pausing and playing by pressing the spacebar, which is a common feature in video player applications like Youtube. Another improvement suggested adding the ability to adjust the gallery thumbnail sizes especially if a large number of videos are saved and also allowing snippets of videos to be played when the mouse is hovered over it. These improvements could be made in future cycles.

### Evidence of the Evaluation

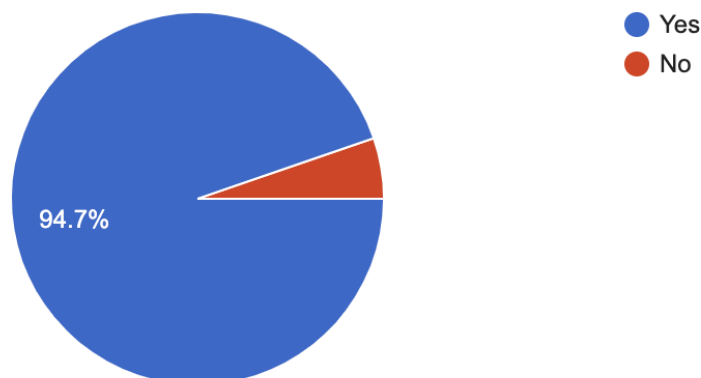
The link to our questionnaire:

<https://docs.google.com/forms/d/e/1FAIpQLScbbbeh4V7hGVwcQK4Hx8UcG3slea2GIDSH2z-2bf2wKi1Dw/viewform>

Questionnaire feedback:

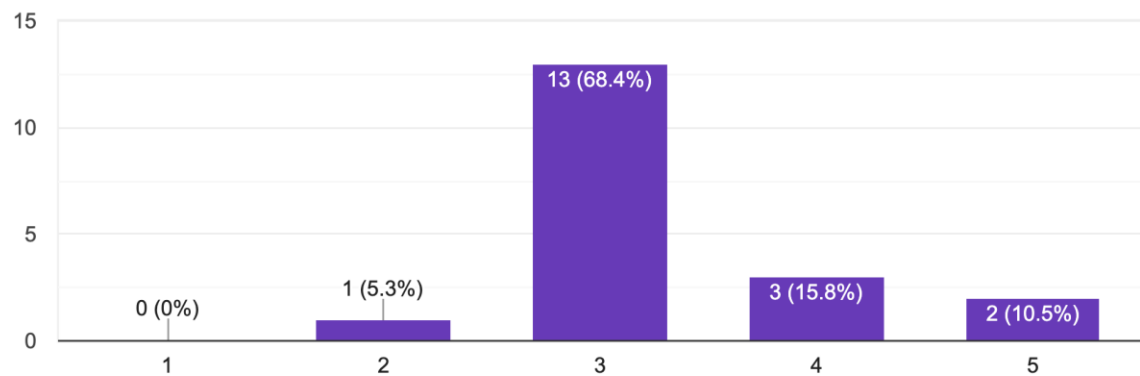
From the storyboard, does this player seem easy to use?

19 responses



### Do you like the look of the video player, based on the storyboard?

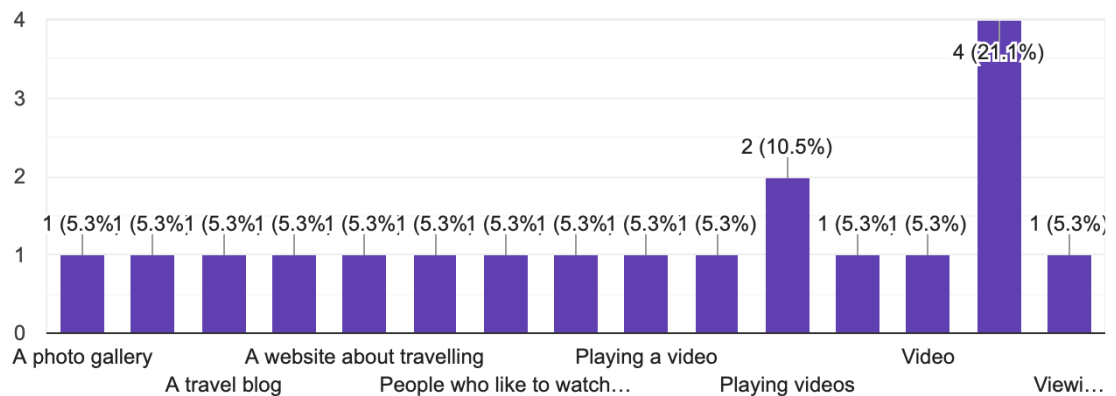
19 responses



This user satisfaction question gave users a scale from 1-5 to choose from, 1 being 'I hate it' and 5 being 'I love it'.

### At first glance, what did you think the storyboard was showing?

19 responses



How would you improve the prototype based on the storyboard you have seen?

14 responses

Adding a skip 10 secs functionality

Option to change the quality of the video

Display the time as you're dragging it.

Give video quality change

Make it more aesthetically pleasing

Skip time with buttons as well like in keyboard

The ability to adjust the gallery thumbnail sizes especially if a large number of photos/videos are saved

Have the play/pause button as same button where it changes depends if it's playing or paused

Allow animations for translations of videos

More improvements:

Show the played part in different colour on the drag and drop bar

If the volume bar is vertical instead of horizontal.

If the sections of video displayed on the side instead of below, bit like PowerPoint layout

Make it possible to add notes to photos/videos

Option to play video at different speed

### 3) Code

#### **Video illustrating changes**

[cycle 4 video](#)

#### **Code Repository**

[cycle 4: further improvements](#)

#### **Differences between prototype and implementation**

A difference is that in the implementation, the sharing functionality via signing into a group is not fully implemented. The user is able to sign in/out from a particular group, but that does not reflect any changes in the video content loaded into the application. However, in the storyboard, it depicts the product being shared remotely with friends. Another difference is that the signifier to clarify the drag and drop feature cannot be observed in the prototype.

#### **Ethics Statement**

During the full development period the team made sure to comply with the university regulations for ethical research on humans. This was done by asking all the participants in the evaluation process to fill a Participant Consent Form, by anonymising personal data as much as possible and by holding data only as long as we needed it.

You can find attached the Participant Information Sheet and the Template Participant Consent Form.