

eTryOn - Virtual try-ons of garments enabling novel human fashion interactions

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Abstract	Report describing the end user tests of trying the virtual garments in the apps. End user have to fill corresponding questionnaires. Evaluation of these questionnaires.
Keywords	Tests, pilots, end user, application, questionnaires evaluation, analysis

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List of abbreviations and Acronyms

Abbreviation	Meaning
KPI	Key Performance Indicator

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1. Executive summary

The deliverable D6.2 describes the process of detecting and recruiting the most suitable testers for all 3 applications. As each one targets a different end consumer, the goal for the pilots is to capture this diversity and find testers who match as close as possible. Further on, a questionnaire containing the most important questions, affecting future development of the apps, will be assembled. The selected target group for each app has to test thoroughly and fill in such a questionnaire in a form of google form, which finally gets analysed via different methods.

This document also shows the methodology for extracting the tester feedback, including the structure of the different questionnaires used for the different eTryOn apps. Testing and evaluation protocols and evaluation criteria are also part of this document.

The three different types of testers are:

- For the VR Designer App as the name already indicates, the target group are professional designers, artists and creatives. Simply individuals, who are used to presenting their creative work to an audience, which most of the time is less creative than themselves.
- For the DressMeUp App, the target group are influencers, fashion lovers and enthusiastic brand followers. To this selected group we simply give the chance to test and try virtually both usual and special garments. The final outcome of their testing can be shared in social media.
- For the MagicMirror App, the target group are regular end consumers, shoppers and public. This app should ease everybody's life during their shopping process. That's why anyone who shops clothing is welcomed to do the test. We decided to do some in-house testing with our internal employees.

2. Evaluation plan of the Designer App platform in pilot

The aim of the Designer app is to enhance the creative process of garment design and presentation. The designer can see in the virtual space their own designs dressed on real size avatars which can do different movements/ animations. This way one can see how the virtual garment on the avatar behaves while moving. This application can also help in presenting the design to stakeholders, decision makers and sales. It can give them a better view of the garment, how it looks, fits and behaves while moving.

2.1 Focus group/ Stakeholders

The target group for this application is very narrow, which makes it extremely difficult to get a lot of testers. During the pilot phase the app is not yet available on-line, which means it is physically bounded to the VR headset we have locally at Odlo HQ. That's why the radius of testers is very small. Due to these difficulties we decided to be more flexible in regards to space and time. We have offered to travel up to 1,5h one way from Odlo HQ with the full equipment in order to perform the test. The timing has also been prolonged. The originally planned 15.6.-6.7.2022 time frame has been adjusted according to individual needs. In general we would like to accommodate schools and universities and those do not start to function before the end of summer.

Since this application targets professional apparel designers, we have decided to reach out to 3 different groups of testers.

- 1st group are advanced students studying apparel design, who have already accomplished several years of their studies and have a clear vision of their workflow and future challenges. The following schools were invited to participate in the pilot:
 - HSLU Hochschule Luzern Bachelor Digital Ideation mit Fokus Design oder Informatik, contact person – Prof.Andreas Wanner/ course leader, <u>https://www.hslu.ch/de-ch/</u>
 - Zurich University of the Art https://www.zhdk.ch/
- 2nd group are already active professional apparel designers from all apparel segments (sportswear, fashion, underwear etc). This group knows already perfectly well where the biggest obstacles in their creative process lay and also what holds them back while presenting their work to their partners and managers. The following professionals were invited to participate in the pilot:
 - Blends The creative company (based in Baar CH), <u>https://www.blends.ch/</u>
 - VCR Design Studio (based in Zurich CH) https://vvccrr.com/
 - Intersport one of the biggest chain stores with sports apparel and sport equipment in EU, they also have their own brands and own design & development team (HQ is based in Bern CH) <u>https://www.intersport.ch/de/home</u>
 - Odlo internal design team https://www.odlo.com/ch/de/
- 3rd group are professionals from the 3D world & innovators. eTryOn participated in several innovation conferences, where this application has been presented and tested as well.
 - 25-26.4.2022 PI Apparel in Amsterdam <u>https://apparel.pi.tv/events/50</u>
 - o 27-29.5.2022 Future of retail, innovation & technology in Athens.

https://www.futureofretail.com.gr/en

 3.6.2022 Odlo held a conference with Browzwear (a leading 3D apparel software developer). Testing the VR Designer app was also part of that meeting.

https://help.browzwear.com/hc/en-us

2.2 Pilot operation requirements

- Hardware requirements
 - 2 Oculus Quest 2 headsets had to be purchased in order to execute the pilots in an efficient way. Oculus Quest 2 is a virtual reality headset developed by Facebook Reality Labs. It is the successor to the company's previous headset, the Oculus Quest. The Quest 2 was unveiled on September 16, 2020, during Facebook Connect 7.



- PC minimum system requirements (the app only runs on a PC)
 - CPU: Intel i5-4590 / AMD Ryzen 5 1500X or greater.
 - RAM: 8 GB.
 - OS: Windows 10.
 - VIDEO CARD: NVIDIA GeForce GTX 970 / AMD Radeon 400 Series or better.
 - PIXEL SHADER: 5.1.
 - VERTEX SHADER: 5.1.
 - DEDICATED VIDEO RAM: 3 GB.



Oculus Quest 2 elite strap - this not obligatory accessory turned out to 0 be very useful as its quick release system allowed us to change the headset from user to user maintaining a perfect snug fit in no time.



Spacer – in case any user is wearing dioptric glasses a plastic spacer 0 has to be used to protect both user's glasses and the VR headset

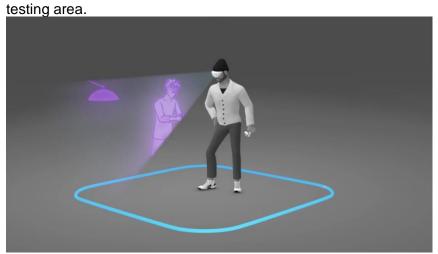
lenses.



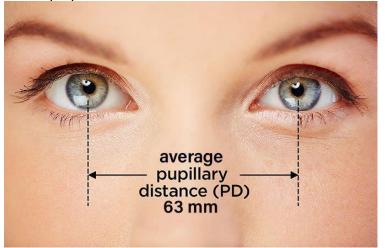
- Software requirements
 - Oculus software, version 40.0
 - o Unity 2019.4.13f1 (64 bit)
 - IPD measuring software Eye Measure (for example), this app needs to get downloaded on an iPhone. This software enables us to set inter pupillary distance of each tester correctly on the VR headset.
- Other requirements
 - WIFI connection: This part has been very tricky for the internal Odlo IT team, as they usually do not allow any outside devices to connect to company computers for security reasons. After having done a lot of testing with the wifi, the Odlo IT team has recommended 2 solutions:
 - Rift connection through a cable
 - Hotspot enable hotspot on a PC in question and thus overcome the strong security measures within any Odlo network
 - Connect from a private network with a lower security (any private connection works perfectly well with the air link).
 - Space for testing in order to test properly all aspects of the application a guardian (perimeter cca 3m) has to be created, where the tester can move around, observe and interact.
 - Coach a trained person, knowing about all features of the application has to lead a tester through the app and assist in case of difficulties.

2.3 Testing and evaluation protocols

- Testing preparation for taking the test
 - Area preparation a guardian of about 3m perimeter has to be created before the start of the test. Obstacles have to be removed from the



• Tester preparation



To achieve the best image clarity, lens spacing should line up with each tester's IPD as much as possible. Meta Quest 2 headsets offer 3 positions of the lenses 57mm, 63mm and 68mm. Therefore it is necessary to measure each participant's IPD and adjust lenses, before taking the test.



The quick release wheel has to be adjusted in order to provide a snug fit to the wearer. Long hair has to be either left loose or the ponytail has to be tied in the neck area and not in the back of the head.

VR Headset set up



Lenses have to be adjusted according to the tester's IPD.

- The VR headset must be connected to the device by a usb cable or even better via air link. Doing this means the tester can't accidentally stumble over the cable. Before the tester puts on the headset, the instructor prepares the VR space by defining the floor level and the boundary. After that the test person puts on the headset, adjusts it as mentioned above and the instructor starts the app on the laptop. Once all set, the test can take place.
- Evaluation protocols

For collecting adequate feedback of the usability of the VR Designer app, the following questionnaire was developed in google forms. The questionnaire contains mostly closed questions as they have several advantages over open questions. First of all, the probability of getting answers is much higher, because the tester is much quicker in answering the questionnaire. The analysis is better and there are less possibilities to make errors or to

misunderstand the user. Most of the questions are Ranking-Questions with a few Multiplechoice questions and drop-down lists.

VR Designer Questionnaire

Please fill in the following information according to your experience using VR Designer app

Consent to Participate: I have been asked to participate in testing VR Designer app, submit my views/perceptions etc. on the tools developed and give my free consent by signing this form:

1. I have been informed about the testing and why it is taking place

2. I have been informed why I have been asked to participate in the testing

3. I understand that my participation in this testing is completely voluntary and that I have the right to decline

4. I understand that I can withdraw from the testing at any time and in such case my data will be destroyed and not included

5. I understand that I together with any potentially revealing information will remain anonymous in the testing

6. I understand that the raw data will be password protected and may be destroyed at a later date following the testing's successful completion.

• Consent to Participate

General Information

1. Age (Drop-down list)

- 1. 1-20
- 2. 21-30
- 3. 31-40
- 4. 41-50
- 5. 51-60
- 6. 60+

2. Please level your experience with VR (Drop-down list)

- 3. Not experienced at all
- 4. Somewhat experienced
- 5. Quite experienced
- 6. Really experienced
- 3. Which aspects of VR are you more interested in? (Multiple-choice)
 - 1. Gaming
 - 2. Fashion
 - 3. Product Design
 - 4. Architecture, Engineering & Construction
 - 5. Medical
 - 6. Education
 - 7. Sport / Training aid
 - 8. Events / Entertainment
 - 9. Other ...
- 4. Please select user type that best describes you (Multiple-choice)

- 1. Fashion Designer
- 2. Fashion retailer / marketer
- 3. Fashion consumer
- 4. Developer focusing on AR/VR 3D design technologies
- 5. University
- 6. Research Center
- 7. SME
- 8. Fashion Industry
- 9. Non-Profit Organization
- 10. General Public
- 11. Other ...

5. Select how much you felt symptoms such as general discomfort, eye strain, difficulty focusing and nausea: (Drop-down list)

- 1. None
- 2. Slight
- 3. Moderate
- 4. Severe

In a scale of 1-5 mark the answer that best describes your reaction to your experience using the app (1: Strongly disagree, 2: Disagree, 3: Neither agree or disagree, 4: Agree, 5: Strongly Agree)

6. By using VR Designer, I was able to have a complete perception of the garment's qualities and texture (Ranking)

7. Virtual garments in VR Designer seemed consistent with real world experience of examining clothes (Ranking)

5

5

1 2 3 4

8. I find VR Designer a useful tool for professionals in fashion industry (Rankingquestion)

1 2 3 4 5

9. The experience of inspecting the garment's qualities in VR Designer is comparable with inspecting them in reality (Ranking)

1 2 3 4

10. VR Designer provides increased options in examining the garment's qualities in comparison with real world procedure (Ranking)

1 2 3 4 5

11. In professionally inspecting a new collection, I'd rather use the VR Designer than real world procedures (Ranking)

1 2 3 4 5

12. I will introduce VR Designer to my colleagues (Ranking)

1 2 3 4 5

13. I will professionally use VR Designer once the app is released for commercial use (Ranking)

1 2 3 4 5

14. I needed assistance to be able to use VR Designer for the first time (Ranking) 1 2 3 4 5 15. I found VR Designer clear structured and easy to use (Ranking) 2 3 1 4 5 16. I was able to easily navigate and control actions in VR Designer (Ranking) 1 2 3 4 5 17. I experienced delays between my actions and expected outcomes (Ranking) 1 2 3 4 5 18. I perceived physical properties of space in VR Designer as in reality (Ranking) 1 2 3 4 5 19. I found inconsistencies in VR Designer's functionalities (Drop-down list)

- 1. Yes
- 2. No

If yes, please describe (Open text possibility)

• • •

20. There were certain actions I wanted to make during the garment's inspection that were not enabled in VR Designer (Drop-down list)

- 1. Yes
- 2. No

If yes, please describe (Open text possibility)

• • •

2.4 Evaluation criteria

For analysing answers following methods will be used:

- Pie charts
- Stacked bar plots
- Several statistical tests such as Cochran Q test

2.5 Tools for collecting user feedback

- The main tool for collecting feedback used during Designer app pilot is Google form.
- Answers from Google form can be exported as an excel sheet. This way all the answers can be compared with each other.

3. Evaluation plan of the DressMeUp App platform in pilot

The DressMeUp app is a mobile application for social media users, allowing them to virtually change their outfit in an image or video by selecting from a pool of digital garments and then uploading the video or image on social media. Influencers and social media users can try on digital garments without the need of physically wearing them. In this way the

user can have the same result for their Instagram or other social media account and he or she can also reduce their environmental footprint.

3.1 Focus Group/ Stakeholders

Target people are any social media users, fashion lovers and brand enthusiasts. The focus group is much wider in this scenario. Anyone interested can participate from anywhere. The marketing campaign will be driven by Odlo's marketing department.

- Online shoppers (no geographical or age limitation) that purchased on Odlo ecom site at least once
- Physical shoppers (no geographical or age limitation) that purchased in any ODLO store at least once

3.2 Pilot operation requirements

- Hardware requirements any device can be used to sign in, because the app is hosted on Firebase.
- Software requirements the whole marketing campaign, newsletter tool and questionnaire has been set up through a new CRM tool at Odlo.
 No special software is needed from the user's side.

3.3 Testing and evaluation protocols

Testing

Planned process for recruiting and testing phase:

- Create a visual content for a newsletter
- Target group selection
- Sending out a newsletter containing the link for downloading the app.
- User downloads the app and test it
- Collect feedback via Microsoft Forms Analytics
- Generate a reward discount voucher for Odlo ecom website after submitting the questionnaire.

Evaluation protocols

For collecting adequate feedback of the usability of the DressMeUp app, the following questionnaire was developed in google forms. Odlo has then taken it into Microsoft form analytics as well. Results of the 2 tools will be combined together later on. The questionnaire contains mostly closed questions as they have several advantages to open questions. First of all, the probability of getting answers is much higher as the tester is much quicker in answering the questionnaire. The analysis is better. The chance of making errors or misunderstanding the user is smaller. Most of the questions are Ranking-Questions with a few Multiple-choice questions and drop-down lists.

DressMeUp Questionnaire

Please fill in the following information according to your experience using DressMeUp app

Consent to Participate: I have been asked to participate in testing DressMeUp app, submit my views/perceptions etc. on the tools developed and give my free consent by signing this form:

1. I have been informed about the testing and why it is taking place

2. I have been informed why I have been asked to participate in the testing

3. I understand that my participation in this testing is completely voluntary and that I have the right to decline

4. I understand that I can withdraw from the testing at any time and in such case my data will be destroyed and not included

5. I understand that I together with any potentially revealing information will remain anonymous in the testing

6. I understand that the raw data will be password protected and may be destroyed at a later date following the testing's successful completion.

• Consent to Participate

General Information

1. Age (Drop-down list)

- 1. 1-20
- 2.21-30
- 3. 31-40
- 4. 41-50
- 5.51-60
- 6. 60+

2. Please select your experience with AR / VR applications (Drop-down list)

- 1. No experience at all
- 2. Some experience
- 3. A lot of experience

3. Please select user type that best describes you (Pick all that apply) (Multiple-choice)

- 1. Influencer
- 2. Fashion lover
- 3. Social media user
- 4. Model
- 5. Athlete
- 6. Ambassador
- 7. Sport Enthusiast
- 8. Consumer
- 9. Other ...

In a scale of 1-5 mark the answer that best describes your reaction to your experience using the app (1: Strongly disagree, 2: Disagree, 3: Neither agree or disagree, 4: Agree, 5: Strongly Agree)

4. By using the DressMeUp app I was able to have a sufficient perception of the garment's qualities and texture (Ranking)

1 2 3 4 5

5. Virtual garments in the DressMeUp app seemed consistent with real world experience of clothes (Ranking)

1 2 3 4 5

6. I dounf the DressMeUp app to be a useful tool (Ranking)

1 2 3 4 5

7. The virtual garments in the DressMeUp app gave me an adequate view of the way real garments would physically fit on me (Ranking)

1 2 3 4 5

2

2

1

1

- 8. I will introduce the DressMeUp app to my friends (Ranking)
- 9. I needed assistance to be able to use the DressMeUp app for the first time (Ranking)

4

4

5

5

1 2 3 4 5

3

10. I found DressMeUp app clear structured and easy to use (Ranking)

1 2 3 4 5

3

11. I was able to easily navigate and control actions in the DressMeUp app (Ranking)

12. I experienced delays between my actions and the reaction while using the app (Ranking)

1 2 3 4 5

13. What would be your maximum time you want to wait for your desired outcome (video / image)? (Drop-down list)

- 1. instantly
- 2. Few minutes
- 3. Few hours

14. I found inconsistencies in DressMeUp app`s functionalities (Drop-down list)

- 1. Yes
- 2. No

If yes, please describe (Open text possibility)

...

15. There were certain actions I wanted to make while using the app which were not enabled (drop-down list)

1. Yes 2. No

If yes, please describe (Open text possibility)

...

3.4 Evaluation criteria

For analysing answers following methods will be used:

- Pie charts
- Stacked bar plots
- Several statistical tests such as Cochran Q test

3.5 Tools for collecting user feedback

- The main tool for collecting feedback is Microsoft Forms Analytics The reason for the tool change for this app only is better compatibility with an automated generation of Odlo discount voucher after submitting the form.
- The side tool for collecting feedback is Google form

4. Evaluation Plan of the MagicMirror App platform in pilot

4.1 Focus Group / Stakeholders

The focus group of this application are any regular shoppers and end consumers of buying clothes. It is a wide audience and not limited to any professions or interests except of the will to buy garments.

• Scenario 1

In this originally planned scenario the plan was to do the testing at Odlo Brand Store. There would be a turning screen and an iPhone installed. We would be limited locally to the Store where the application is installed, but the amount of customers coming to the store was expected to be enough to get valuable feedback.

Because of some internal feedback received doubting the quality and maturity of the app we decided to go with another scenario to highlight the idea that the application would be used at home. By not being in an in-store setting, the user is not directly comparing the experience to trying on and touching the physical samples.

• Scenario 2

The pilot will be taken away from the Odlo brand store, where people would connect it automatically with Odlo brand and image. This way we will reduce the exposure to the public. Internal Odlo employees and their friends will be invited to test instead. The installation place will be then in a private Odlo space and not in a public area.

4.2 Pilot operation requirements

- Hardware requirements
 - Samsung 43 "LS05T The Sero 4K Smart TV 2020 this screen enables a portrait mode and connection via air link
 - Apple iPhone 13 pro the app only runs on Apple devices
 - Handy holder the front camera does not work. Due to this limitation the handy must be placed backwards in a dedicated handy holder centred behind on top of the Samsung screen.
 - HP Elite Presenter we don't want to allow the tester to touch the iPhone and remove it from the handy holder while making the settings and selection of garments. That's why we will additionally use a presenter mouse which is connected via Bluetooth to the screen. The tester can navigate through the app using the presenter mouse only without touching or removing the iPhone.
- Software requirements no special requirements
- Other requirements
 - WIFI connection: This part has been very tricky for the internal Odlo IT team, as they usually do not allow any outside devices to connect to company computers and devices for security reasons. For this reason, we bought a "company" iPhone, so that testers do not have to connect with their private devices.
 - Space for testing in order to test properly all aspects of the application enough space has to be available. We secured perimeter of 5m.
 - Coach a trained person, knowing about all features of the application has to lead a tester through the app and assist in case of difficulties.

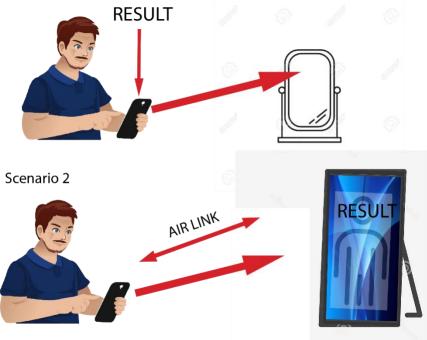
4.3 Testing and evaluation protocols

• Testing

There are actually 2 different scenarios how the testing can be performed.

- Scenario 1 uses a regular mirror and back camera of the lphone. The result can be observed on the lphone.
- Scenario 2 uses a screen, which can be rotated into a portrait mode and can be connected with an Iphone via air link. The result can be then observed on the screen.

Scenario 1



We have decided to use the second scenario for our test. The test will be executed with the focus group 2 – Odlo internal people and their friends only.

• Evaluation protocols

For collecting adequate feedback of the usability of the MagicMirror app, the following questionnaire was developed in google forms. The questionnaire contains mostly closed questions as they have several advantages to open questions. First of all, the probability of getting answers is much higher, because the tester is much quicker in answering the questionnaire. The analysis is better. The chance of making errors or misunderstanding the user is smaller. Most of the questions are Ranking-Questions with a few Multiple-choice questions and drop-down lists.

MagicMirror Questionnaire

Please fill in the following information according to your experience using Magic Mirror app

Consent to Participate: I have been asked to participate in testing the MagicMirror app, submit my views/perceptions etc. on the tools developed and give my free consent by signing this form:

- 1. I have been informed about the testing and why it is taking place
- 2. I have been informed why I have been asked to participate in the testing

3. I understand that my participation in this testing is completely voluntary and that I have the right to decline

4. I understand that I can withdraw from the testing at any time and in such case my data will be destroyed and not included

5. I understand that I together with any potentially revealing information will remain anonymous in the testing

6. I understand that the raw data will be password protected and may be destroyed at a later date following the testing's successful completion.

• Consent to Participate

General Information

1. Age (Drop-down list)

1. 1-20 2. 21-30 3. 31-40 4. 41-50 5. 51-60 6. 60+

2. Please level your experience with virtual try-on apps (Drop-down list)

- 1. No experience at all
- 2. Some experience
- 3. A lot of experience

In a scale of 1-5 mark the answer that best describes your reaction to your experience using the app (1: Strongly disagree, 2: Disagree, 3: Neither agree or disagree, 4: Agree, 5: Strongly Agree)

3. By using the Magic Mirror app, I was able to have a sufficient perception of the garment's qualities and texture (Ranking)

1 2 3 4 5

4. Virtual garments in the Magic Mirror app seemed true to life with real world experience of clothes (Ranking)

1 2 3 4 5

5. I found the Magic Mirror app a useful tool (Ranking)

1 2 3 4 5

6. I found the Trend Detection in the Magic Mirror app a useful functionality (Ranking)

1 2 3 4 5

7. The virtual garments in the Magic Mirror app gave me an adequate view of the way real garments would physically fit on me (Ranking)

1 2 3 4 5

8. I will introduce the Magic Mirror app to my friends (Ranking)

1 2 3 4 5

9. I will use the Magic Mirror app to shop clothes (Ranking)

1 2 3 4 5

10. I needed assistance to be able to use the Magic Mirror app for the first time (Ranking)

1 2 3 4 5 11. I found the Magic Mirror app clear structured and easy to use (Ranking)

1 2 3 4 5

12. I experienced delays between my actions and expected outcomes (Ranking)

1 2 3 4 5

13. I found inconsistencies in the Magic Mirror's functionalities (Drop-down list)

1. Yes 2. No

If yes, please describe (Open text possibility)

...

14. There were certain actions I wanted to make while using the Magic Mirror app that were not enabled (Drop-down list)

1. Yes

2. No

If yes, please describe (Open text possibility)

...

4.4Evaluation criteria

For analysing answers following methods will be used:

- Pie charts
- Stacked bar plots
- Several statistical tests such as Cochran Q test

4.5Tools for collecting user feedback

- The main tool for collecting feedback used during Designer app pilot is Google forms.
- Answers from Google form can be exported as an excel sheet. This way all the answers can be compared with each other.

5.Conclusion

The next deliverable D6.3 Pilot evaluation report will dive deep into testing results and analysis. It will describe in detail the end user tests of trying virtual garments in comparison to physical garments and qualitative evaluations of such by studies of images/photos in juxtaposition.

5.1 Conclusion of the Designer App

Since the date of submitting this deliverable precedes the conclusion of the pilot, we are not yet able to collect and fully analyse all the answers from our pilot test group. According to the original plan the pilot should finish 7.7.2022, but for the reasons mentioned above, it will have to be extended in order to involve design students into the test as well.

During our internal test we were already able to gather some feedback and tackle several issues. Some of them were fixed before the start of the pilot:

- Possibility to see user's hands within the app (implemented before the pilot start)
- Demand for an interaction with the garment hold or pinch
- Option to change the top and bottom make your own outfit
- Menu highlight an item when the laser is pointing at it (implemented before the pilot start)
- Functionalities implemented to ONE controller only the right hand one (implemented before the pilot start)
- Improve trend detection
- Implement one more animation idle
- Improve drop down menu experience, make it bigger (implemented before the pilot start)

5.2 Conclusion of the DressMeUp App

Since the date of submitting this deliverable precedes the conclusion of the pilot, we are unfortunately not able to collect and fully analyse all the answers from our pilot test group. According to our plan the pilot should finish 30.9.2022 and results will be described in the next deliverable.

5.3 Conclusion of the MagicMirror App

Since the date of submitting this deliverable precedes the conclusion of the pilot, we are unfortunately not able to collect and fully analyse all the answers from our pilot test group. According to our plan the pilot should finish 30.7.2022 and results will be described in the next deliverable.

Already during our internal test we were able to gather some feedback and tackle several issues. Some of them were fixed before the start of the pilot.

- Quality of animation issues
- Garment does not follow user's movement
- Demand for being able to try different colours for different garments (implemented before the pilot start)
- Size recommendation
- Tension and pressure map implementation
- The back side of garment is sometimes visible in the front view.