Data interpretation

As we gathered all data within our Miro board we could start clustering and interpreting our data towards each criteria. Per criteria some space was created for strengths and weaknesses. For each method we clustered our results within the criteria it belonged to, together with a reference to the method used to gather this insight. These detailed tables can be found in appendix 5, the main conclusions are written down in this section.

Hierarchy

CRITERIA *Hierarchy*		CONCLUSION *Hierarchy*
C1.1 The interface should be simple and clear.	**C1.2 Users clearly know in which status of the process they are.**	**How do people navigate through the app?**
Interviews showed that the navigation within the interface is described as simple and clear. The user understands where to click. Besides, the SMEQ results (Figure 34) showed that the use of the product gets easier over time. Attrakdiff (Figure 36) also showed that simple and clearly structured aspects of the redesign are rated significantly higher than the original version of RaceClocker. Therefore, it can be concluded that this criteria is fulfilled.	This criteria is unfortunately not fulfilled as expected. During the interview, users said that they did not always know what the next page would be.	Navigating through the app is easy and clear, but some participants still want to know what pages they can expect next. For example, instead of having “I’m ready” on the button we can change it to “Ready to time”, so that the user can expect the timer dashboard in the next screen.

Use flow

CRITERIA
Use flow

C 2.1 The layout of the interfaces and the interactions should comply with conventional using habits, which means it should be logical and intuitive for users.

The SUS and Attrakdiff results showed that the application was easy to use in general. In comparison with the SUS results of the original RaceClocker, it is obvious that the scores increased significantly.

However, not everything within the app is intuitive. Some detailed interactions, such as the process of assigning two racers arriving at the same time, is not intuitive enough right away. Two out of the six participants clicked the volume button twice for registering time, because they thought that one time can only belong to one racer. Moreover, for inexperienced timekeepers the sequence of timing is not always understood directly. We designed the timing function in a way similar to using a stopwatch where the user can register multiple times in a row and then assign them to corresponding racers. This will be very useful in the situation when multiple racers are quickly approaching after each other. However, all of the participants thought that timing can only be done in the order of "first time then assign" because of the lack of appropriate instructions. In stressful situations, they do what they are used to. Besides, functions such as undo and reassign show a learning curve, but are very easy to learn (SUS).

C 2.2 The interface system should be flexible and adjusted to the preference of the user.

During the interview, participants said that they want to switch between landscape and portrait mode based on the number of racers. Landscape grid mode is the most suitable one for a race with a large number of racers. In our app, users can switch the timing mode in the setting page, and change the screen mode by rotating the phone.

C 2.3 The amount of functions for the timekeepers needs to be decreased.

The interview showed how the decrease of functions improves the structure of the app. "It is really nicely structured. Not too many options", said Sophia.

C 2.4 The right information needs to be given at the right time.

The welcome page provides users with useful information before the race starts. During the interview it has been said that the welcoming screen gave a personal touch.
"The second page I got was very clear. I saw the places on the map and how long the race would be.", said Danielle Navigating to the result page has been rated as not at all hard to do, this is because the result window only pops out at the moment when all the racers have been timed.

CONCLUSION
Use flow

How well does the flow of the app match the user's expectations?

Actions such as assigning multiple racers at one time are not intuitive for the user, because the way of timing is hard to know without instructions . Therefore, aclear guidance before first time using is necessary.

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Feedback

CRITERIA *Feedback*	CONCLUSION *Feedback*
C 3.1 Users should automatically get instant and correct feedback after each actions. Vibration feedback assures the users. It gives a reassuring feeling when the volume button is pressed. Also the color contrast between timed and untimed racers helps within the process of tracking times. The pop-out window after finishing timing all racers makes users feel satisfied. On the other hand, some participants (3 out of 7) think that the feedback for assigning racers is not enough. They want to have haptic feedback for it as well. Besides, they also want to have stronger visual feedback to show the connections between the time and corresponding racers. Sophia: I need more confirmation to make sure it really has been selected. Elke: I do not know which time is connected to which name.	**Is the feedback provided to the user understandable and useful?** The provided feedback is valuable, however, more feedback for assigning racers is needed. Since the haptic feedback for both the volume button and selecting racers might lead to confusion, we will add some textual feedback after assigning the racer successfully.

Information of buttons

CRITERIA *Information of buttons*		CONCLUSION *Information of buttons*
C 4.1 Users can finish their task with RaceClocker without wrong attempts. The task completion table (Figure 35) showed that there are six uncompleted tasks. They are all about the timing functions. One cause could be that the instruction page is not clear enough. Participants cannot understand the process of timing thoroughly.	**C 4.2 The meaning of the buttons is understandable for users without resorting to external sources.** According to the participant, the buttons in our app are similar to other apps. It was clear for them where to press. The scrolling bar on the timer dashboard makes it clear that the list is scrollable. However, the “eye” button is not clear enough for the participants (3/6). It gets clear after trying this function. Besides, inexperienced timekeepers do not understand the terms such as the start type of the race.	**C 4.3 The interface of the website should be easily readable.** During the user test, none of the participants had problems with reading. The color contrast of the button clearly indicates the state of the racer.	**Is the first time user able to perform the tasks without errors?** The first time user is able to perform at least 30% of the tasks without errors. The most errors are caused by the misunderstood way of timing and operating the system. A learning curve is shown in performing difficult tasks. Therefore, we can conclude that our app is easy to learn.

Operations

CRITERIA *Operations*	CONCLUSION *Operations*

C 5.1 The product enables users to time the participants without having hand-eye coordination problems.

Participants still have a lot of things to do at the same time. They need to look at the coming racers, find the racer in the list in advance, and then press the time button. Most difficulty is encountered during scrolling and finding the right racer. When multiple racers are approaching, remembering the numbers is hard.

Some participants like using the volume button, because timing by pressing the volume button reminds them of the feeling of using a stopwatch. They think that our app is a good alternative for the stopwatch. Instead of writing down names and times, the user can click the racer in the app to assign time. There were still some participants who had problems with the physical buttons. Two participants missed a couple of times because they didn't press the volume button hard enough. One participant pressed the on/off button accidentally during timing.

C 5.2 Users are able to undo the wrong action easily.

There are different opinions on undoing. The participants' opinions on the function to undo vary. The undo function has been integrated into the list of participants. It can be done by deselecting the participant. This interaction feels natural, but at the same time it has a high risk of misoperation.
Sophia: I am a little afraid I will press it again accidentally.

How efficient does the user feel when operating on this app?

Actions that are performed with this app are natural and easy, however, there might be a high risk of misoperation. The racers might be selected or deselected accidentally and sometimes the volume button is hard to press because of little press force.