User manual for taps.ai by QuantActions

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Glossary

app: refers to the data collection app (TapCounter) unless otherwise specified in the text
cohort: see *study*
dashboard: taps.ai portal
device: physical smartphone belonging to an identity (person, participant)
ID: non-identifiable alphanumeric string
identity: non-identifiable reference to a physical person
organization: entity with users and studies
participant: physical person participating in a study
participation: entity characterized by a unique ID and potentially connected to an identity
study: group of participants (sometimes referred to as a *cohort*) managed by a user of the dashboard
study manager/editor: person responsible for overseeing a study, generally a user of the dashboard
support: support team of QuantActions, can be contacted at support@quantactions.com
user: who uses or accesses the dashboard

Quick start guide

After an agreement with QuantActions has been reached, a study (or multiple studies) will be created for you, and an organisation will be created as well (unless it already exists). Each collaborator that needs to handle the study should create an account on taps.ai. Once it is done, the study manager sends us an email with the desired roles for each collaborator. After our confirmation you can start exploring the dashboard and leading your study.

Open the study, check the that all details about the study are correct. Pay particular attention to the privacy policy as this will be shown to the user on the app during data collection. If you want to change the privacy policy let us know with an email at support.

Check if the advanced features apply to your study and request to active them if needed.

Initially, you will see a series of ParticipationIDs in the unassigned category, the amount will be the one that you requested (usually a few more that allow you use some spare for testing your onboarding routine).

Take the first ParticipationID and use it to test out the app onboarding on your phone. You can either use copy/paste or use the QR code generator and scan it within the app. Remember to activate the LegacyID if you are testing on iOS (see how to show the LegacyID).

After your app is set up, collect some data and use the option in the "Settings" to force-sync the data collected so far. Refresh the study page on taps.ai. You should now see an identity assigned to the chosen ParticipationID. Give it an External ID to remind yourself that this is a test device (we can always delete it later if you require).

Open the participation and explore the data relative to the device that was assigned to this identity. You will notice that the participation is categorized under "Pending". This is normal for the first 48 hours after app install; the status will be updated every 24 hours after this initial delay.

If you have used an Android device, you will see that the first entry in Summary table is empty (i.e. no taps recorded) and is dated from yesterday, this is normal. New summaries will be synced every day.

If you want to get yourself acquainted with the data, try to download it. Remember that if you are doing this with an iOS device you need to wait 24 hours to see the device and download its data.

If you have managed this, then the rest is going to be easy, send out your ParticipationID or your QR codes. Add external IDs to each of them and watch it get populate as people signup up. When more devices will be present you can start exploring the filtering options.

In case of more questions or issues consult the Common Issues or the FAQs.

Users

Create an account

To create an account, go to the register user page, enter the necessary information and wait for an email with a verification code to be entered in the account creation page. Once that is done, you are ready to login for the first time. Note that the two-step verification that you experience during the account creation will be also present during a routine login, you will always need to provide a verification code sent to your email upon login.

A new account gives access only to the management of the profile. To gain access to the full functionality of the dashboard, the access to an organization and a study needs to be requested at support by the study manager.

Organizations and Roles

A new account is given the role `user`. This role has minimal access and can simply edit their profile information. Each user needs to belong to an organisation, after creating an account, the respective study manager should request to support access to one (or multiple) organisation(s) and/or study(ies). Different roles can be requested depending on the level of access that a user needs. The roles are given at the level of organisation or at the level of a study. Each organisation can have multiple studies (also called cohorts) to organise their data collection.
If a user needs to overlook all studies for an organisation, then they will be given an organisational role, if a user needs to overlook only one study they will be given a study-related role. Each role has a subcategory relative to the type of access they need, namely if they can edit (editor) or if they can simply view (viewer). This granularity allows to give each user the access following the principle of least privilege (PoLP).

- `organisation-viewer`: has access to the organisation information (including the list of users) and the list of studies. Can view the studies, their associated information and list of participants
- `organisation-editor`: has all the access that the above has and in addition they have access to all editorial powers across all studies, assigning users, participants, reset passwords of devices, etc.
- `study-viewer`: has viewing access to information about one study (or multiple ones)
- `study-editor`: has edit access to one study (or multiple ones)

Studies (Cohorts)

Studies are logical aggregation of participants. It can be useful to separate participants into different groups, for this reason studies are also referred to as cohorts. In the dashboard once you reach the organisation tab you will see the list of studies if you belong to only one organisation. If you belong to multiple organisations, you will see the list of organisations, click on the relevant organisation to access the list of studies.

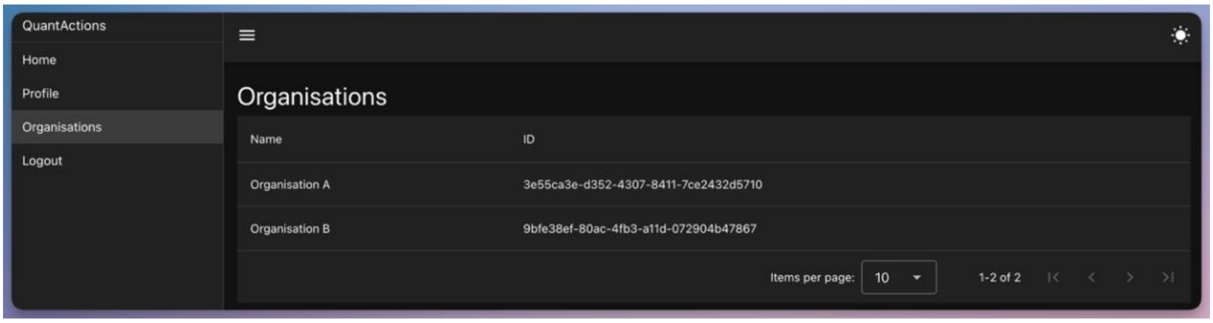


Figure 1: View for users belonging to multiple organisations, select the appropriate organisation to see the list of studies.

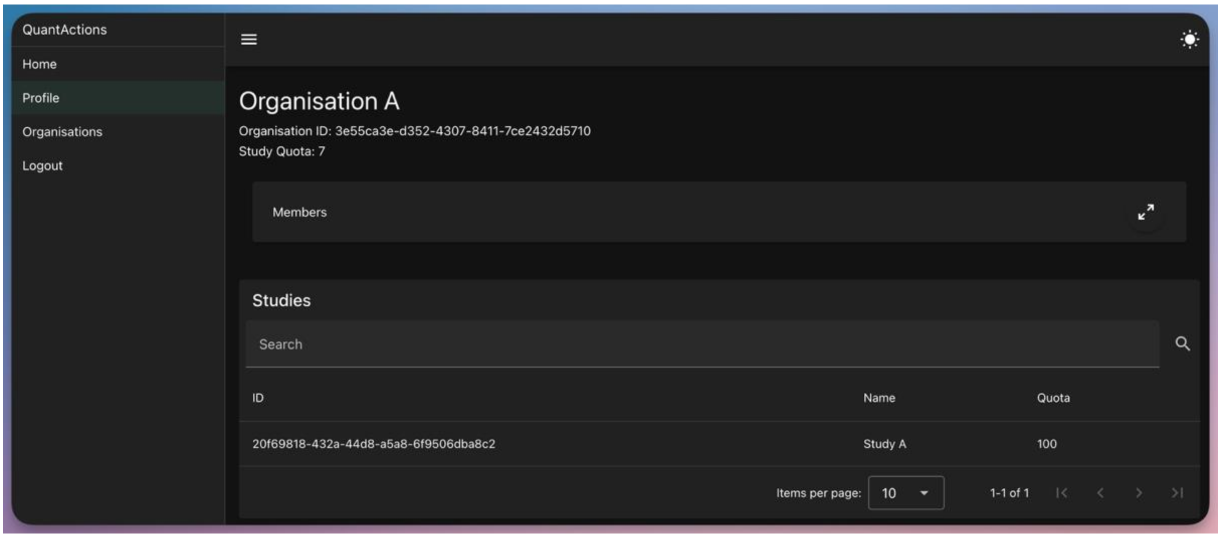


Figure 2: View for a user belonging to only one organisation, the organisation list is bypassed, and the list of studies is directly shown.

The list of studies shows the Study ID, its name and its quota i.e. the maximum number of participants allowed in the study. Click on the relevant row to access the study.

Identities, Devices, Participations

IDs

Given the privacy preserving nature of our platform, users are not indexed by their emails or something identifiable but instead by a series of IDs (UUID v4).

- **IdentityID**: this is the surrogate of an email address and represents a physical person (identity) while maintaining anonymity. Each physical person should be associated with only one identity (see exceptions in link identities)
- **DeviceID**: this identifies the physical device belonging to an identity. An identity can have multiple devices at the same time or sequentially. The identity will thus have, in general, a list of devices each with its own ID and associated data collected.
- **ParticipationID**: this identifies a participation in a study and effectively links an identity to a study making the physical person with that identity a participant. Since a participant can participate in multiple studies, one identity can be associated with multiple ParticipationIDs (one in each study) but not with two ParticipationIDs from the same study. The ParticipationID is the link between the physical person and the IdentityID. Study managers can use the ParticipationID in their own records outside to link participants and their data or metadata outside of the dashboard.

  It is important to note that the link between the physical person and the data only exists in the hands of the study manager. For more info regarding Data and Privacy please refer to our general Privacy Policy and Terms and Conditions.

Identities

These are the surrogate that represent physical persons. Each identity is associated with an ID (IdentityID) and minimal demographics info such as gender and year of birth (which are in general optional for the user to give). Identities are associated with a password that is randomly generated by the app upon install. Each identity can be associate with multiple devices. When a user changes device they can maintain a constant flow of data by installing the app on the new phone and logging in with their identity during the onboarding. For complete information see point 7b. of the user FAQs.

If the old phone is not available (lost, broken, etc.), the study manager has 2 options:

- [recommended] reset the password of the identity: this can be done in the dashboard by following the instruction in the Advanced Identity Management (AIM) section. Upon reset the study manager will be presented with the new password and a new QR code that can be downloaded and shared with the participant. The participant can now login with the new credentials (password or QR code) during app onboarding. Note that the data stream from the old phone will be effectively interrupted by resetting the password.
- link 2 identities: more details in the Advanced Identity Management (AIM) section.

Devices & Device Status

Devices are the physical devices of the participant. The device is characterized by information about the manufacturer and model, the status of the permission, the apps in use on it.
The most important property of the device shown in the dashboard is the "Status" that can have different values:

- OK : everything looks good, all permissions are given, and the device is synching data regularly
- WARNING : Some non-essential permissions are missing, or the data flow does not reflect the usage pattern of a "personal phone" (e.g. a work phone that is used sporadically).
- ALERT : The device is not syncing data regularly; the reasons can be various and can be seen in a list by hovering on the coloured status circle. 

- DEAD : The app has been uninstalled from this device.

The dashboard also shows the "last sync" of the device. A device syncs data regularly (every hour) but can skip syncs if no data has been collected in that hour (e.g. during the night) or if the device stays offline (no internet connection).

The user needs to grant to the app a few permissions for the data collection to be running properly. The app's user manuals for Android and iOS highlight how to grant these permissions. In the dashboard the study manager can see if some permissions are missing, if some are missing the study manager should get in contact with the user to make sure the permissions status is recovered. The app can detect these missing permissions and will try to notify the user of these, but there is always the possibility that the user has not allowed notifications from the app, in this case they will not be notified that an action is needed to resume the data collection properly. The permissions are:

OS	Name	Function	Message on dashboard (if missing)
Android	Display over other apps	Allows to passively collect the taps on the screen	Missing draw over permission
Android	Usage access	Allows to track app usage patterns	Missing app id permission
Android	Physical Activity	Allows the app to run continuously	Missing activity recognition permission
iOS	Full access	Allows synchronization of data with our servers	Missing `Full Access` permission

Participations

Participations are the entities of a study. They are characterized by an ID and potentially linked to an identity (effectively identifying a participant). Study managers can distribute ParticipationIDs to participants in 2 ways:

- as text to be copied and pasted in the app
- as a QR code that can be scanned directly in the app

In both scenarios the ParticipationID to be copied or scanned can be generated via the participations URL where `xxx` should be replaced by the relevant ParticipationID.
Note that each ParticipationID can be associated with only 1 identity. In other words, a physical person can only participate to a study one time.
There is 1 exception i.e. the device of a participant is not available (lost, broken, etc.), for this case follow reset password or link identities.

Participations – Columns

Figure 3: Columns of the Participations table.

Figure 4: overflow menu with access to extra features such as download, show legacy ID, batch edit.

Participations are shown in a table structure, divided in groups and with various columns:

- Group: in this table participations are grouped based on the collective device status (see Devices) or are marked as unused/withdraw: the system collates the status of all the devices associated with a participation (pulling together possibly multiple identities and all devices from each of them) and shows the "best" one.

  For example, an identity might have had multiple devices that are now marked DEAD, but if there is at least one device that is marked OK the status for that participation will be OK. If a participation is unused (i.e. not linked to any identity) it is marked as unused. If the participant has withdrawn from the study, either from the app or from effect of the study manager editing the participation (see edits), the participation is marked as withdraw.

- ID: ParticipationID

- IdentityID: of the identity associated with the participation or none if unused

- External ID: editable field at study manager's discretion (please avoid using emails or other identifiable information)

- State: Collated Status of devices (see first point of this list)

- Last sync: collated last sync ("latest"). Devices sync data regularly (every hour) but can skip syncs if no data has been collected in the past hour (e.g. during the night, a period of inactivity or missing internet connection). Each device shows the time of the last sync (relative to the local time of the study manager). For each participation only one last sync is shown and is the latest sync among all the active devices associated with the participation.
- Withdrawn: date of withdraw, editable by the study manager.

Participations – Search & Filter

Figure 5: Search bar to filter the Participations table.

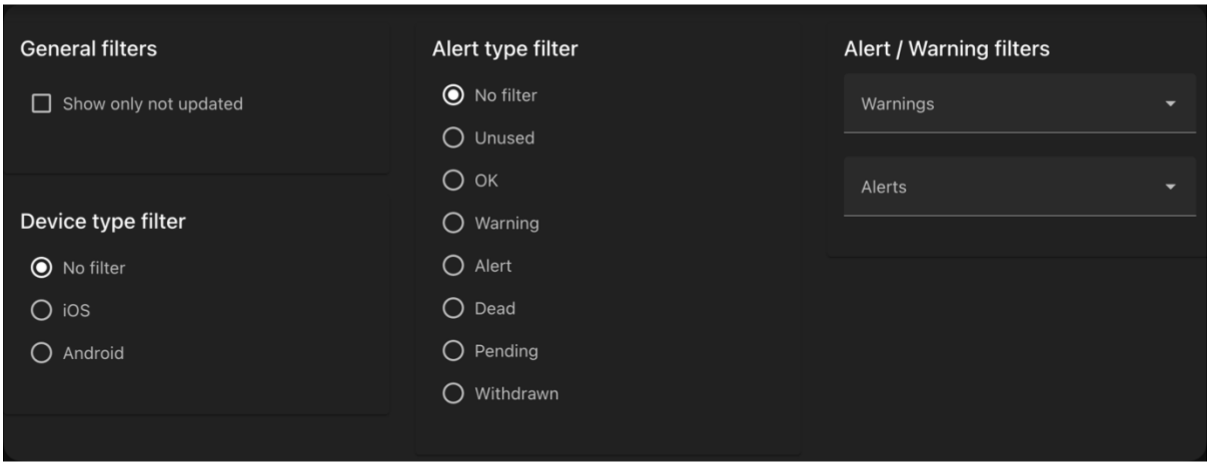


Figure 6: Filter options for the Participations table.

Each study can have tens or hundreds of participants, and it might be useful to filter the view in the dashboard. By clicking on the filter icon, you have access to various filtering options:

- Show only non-updated: shows only the devices that do not have install the latest available update of the app. We suggested to instruct the user to enable automatic updates for the app and/or enable notifications to receive update information.
- Device type filter: you can filter by OS type, either iOS or Android
- Alert type filter: filter by group
- Alert / Warning filters: filter by reasons for alert or warning

Participations - Editing

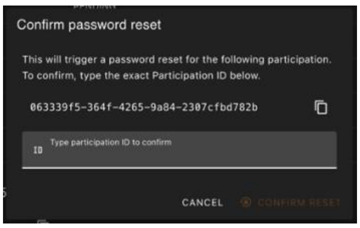
Each participation possesses a few editable attributes. Editable fields are:

- External ID: ID or note from the study editor to identify the participant associated with the participation. This external ID can be edited as free text, please avoid using identifiable user information (such as emails, name, etc.).
- Withdrawn: manually setting a withdraw date or an “end of study” date. The end of data collection is controlled by the user that can decide (or can be instructed) to stop the data collection from the app or directly uninstall the app. If the user does not follow these instructions, the data keeps flowing to the system. In these cases, the study manager can manually set an end date to help grouping participants that have finished the data collection and those that are still ongoing.
- IdentityID: normally a user should sign up to a study in the app by pasting a copied ParticipationID or scanning the QR code containing the ParticipationID. If for any reason the user cannot do so (or the study manager wants to make it easier for the user) the registration can be done manually by the study manager. In this case the study manager needs to have access to the relevant IdentityID which can be retrieved from the participant's app (see for Android: How to copy my personal IDs, for iOS: How to copy my personal IDs in the user manual). Once this is known, the study manager can Click on the edit icon in the IdentityID column of a participation row and enter the IdentityID to link it to the corresponding participation.

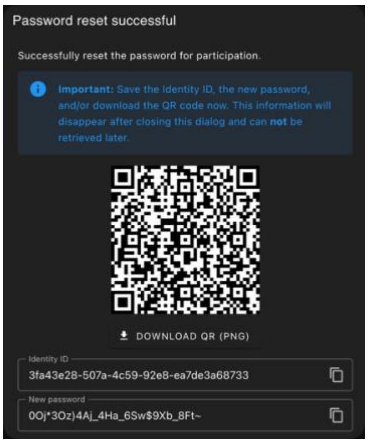
  Warning: the system will only check that the IdentityID exists but is up to the study manager to assign the correct IdentityID to the correct ParticipationID.

Additional edit options can be unlocked by requesting access to the **Advanced Identity Management (AIM).** AIM contains options that are subject to risk of data corruption or data loss, so it is by default disabled. The following are uses cases that are covered by AIM. If you think these could be relevant for you, please send a request for the activation of AIM to the support.

- Linking multiple IdentityIDs: when a participant changes phone or wants to add an additional phone to the data collection, the proper procedure is to retrieve the IdentityID and Password from the old phone’s App (see FAQs 7b). By following this procedure, the new phone will appear as a new device under the same IdentityID. IF this is not possible due to various reasons (phone lost, broken, etc.), the study manager has two options:
  - [Recommended solution] Reset Password: click on the participation row which identity you want to reset the password. Click on RESET PASSWORD and type the ParticipationID for confirmation

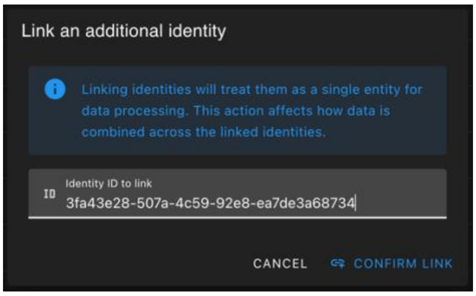
    Click on CONFIRM RESET and the password will be reset.



As the **Important** note says, remember to save this information and communicate it to the user, passwords are encrypted, and we will not be able to retrieve it anymore and the process will have to be repeated.

- Link multiple identities: the participant can proceed with a fresh install of the app in the new phone. After successfully finishing the onboarding, the participant can communicate the (new) IdentityID to the study manager (see for Android: How to copy my personal IDs, for iOS: How to copy my personal IDs)

  The study manager can then click on the relevant identity info (in a participation row) by clicking on the icon, a page will open with the identity info, click on LINK IDENTITY (lower right), report the (new) IdentityID in the field and click on CONFIRM LINK.



  Warning: the system will only check that the IdentityID exists, it is up to the study manager assuring that the correct identities are being linked.

- [Coming soon] Removing the link between participation and identity: in some cases, it could be necessary to sever the link between identity and participation (human error, forced withdrawal, etc.) The study editor can remove this link by clicking on the edit button and proceeding with the remove button.

Participations - Details view

By clicking on a participation row (or on the expand icon) a full view of the participation is shown. This contains all the information associated with the participation, its connected identity and its connected devices.
Together with the basic info on the participation (when it was created or modified) you will see info about each device associated with the participation through one (or more) identity(ies). Details include device type, language settings, last sync and more.

If more devices are associated with the participation you can select from a list which device, you wish to expand. The preview of the devices shows the status to help decide which device you are most likely interested in (usually the active ones).

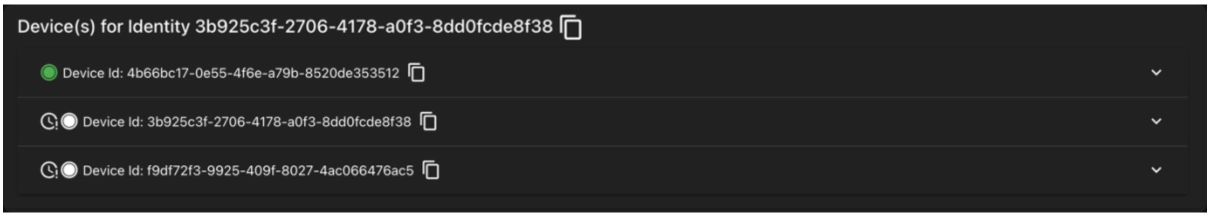


Figure 7: List of devices relative to an identity associated to a participation.

Together with device info each device has 3 additional tables in the expanded view:

- Notes: these are simple text notes that the user can enter in the app. You can use this feature to let users report on, for example, impactful events in their lives. This is open text and not checked by us so please avoid letting the user insert identifiable information there
- Recording summaries: these are a snapshot of the data recorded each day. It includes taps per day, a list of taps per hour and a quick statistic of the speed per day and speed per hour. This is generally used to check briefly that the user is streaming data correctly and the usage is congruent with the one of a personal device
- App catalogues: List of apps in use on the device, when a user uses a new app, this will appear in the list. The list shows for convenience the name of the app and the category associated with it (from the Play/App Store)

Download

Depending on the study and license package, you may be entitled to download only one or multiple types of data. These may include:

- **Raw data**: This type of data is generally only reserved to academic partners; it's the raw representation of tappigraphy. This data is delivered in parquet files, a binary columnar data representation. Unless you are already familiar with this data type, we suggest starting the exploration from our python/MATLAB software package. On taps.ai during the download you can find instruction on how to request access to this software package. The package also includes more detailed documentation on the data types. Here in short:
  - **taps**: one file per device that contains the raw taps organized in usage sessions.
  - **health**: one file per device that contains information about the battery usage of the device.
  - **notes**: see previous section
  - **recording summaries**: see previous section
  - **metadata**: because of logical separation between devices (i.e. each device has its own properties and associated apps and health data), the data is organised by DeviceID instead of by IdentityID or ParticipationID. When downloading the raw data, a metadata file is always present that specifies the connection between devices and identities/participations.

- **TIE (Tap Intelligence Engine) Metrics**:
  - **Daily Metrics**: Metrics relative to sleep, cognitive fitness and usage patterns. They generally have daily resolution and can be downloaded in parquet format or csv. When downloaded the data package will contain documentation on each metric and how to interpret each column of the data. The metrics are Sleep Score, Sleep summary, Sleep duration, Speed Score, Proxy CRT, Engagement Score, Screen Time, Behavioural Age, Typing speed.
  - **Healthy Ranges**: For a few metrics (Cognitive Fitness, Sleep Score and Social Engagement) we provide information about distributions of values across a healthy population, these distributions are also stratified by age range.
- **Report**: In some cases, a PDF report can be generated and highlights the status of the data collection (number or active users, types of OS, etc.) and the most important scores across the population with particular emphasis on the evolution w.r.t the previous month.

To request data download, click on the three dots next to Participation and select Data Download Request.

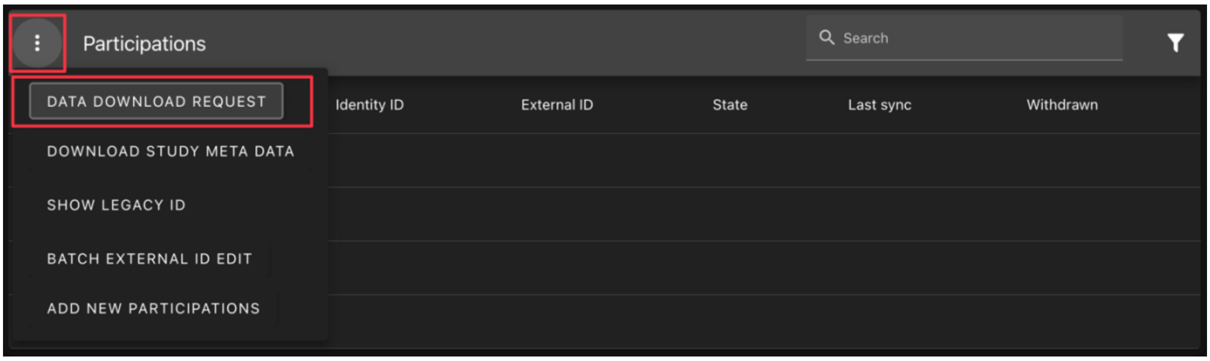


Figure 8: Data download request menu

In the next menu select the data you would like to download and click on Send Request

Figure 9: Selection of types of data to download

After the data request has been sent, the data will be prepared for you, and you will receive an email with all the direct links to download the requested data. Note that depending on the size of the study the data <u>might take up to 24h to be ready</u> for download.

Remarks on iOS

In general, each study can accommodate devices from different OS types (i.e. Android and iOS), while some may prefer to have them separate in two studies, it is up to the study manager to decide. Independently from the decision, some remarks need to be made regarding running a study with iOS devices.

- LegacyIDs: The iOS data collection runs on a legacy infrastructure, for this reason when distributing ParticipationIDs to participant to use for the in-app sign up LegacyID should be use. You can show the LegacyID in the dashboard by clicking on the overflow menu and then clicking the "SHOW LEGACY ID" button.

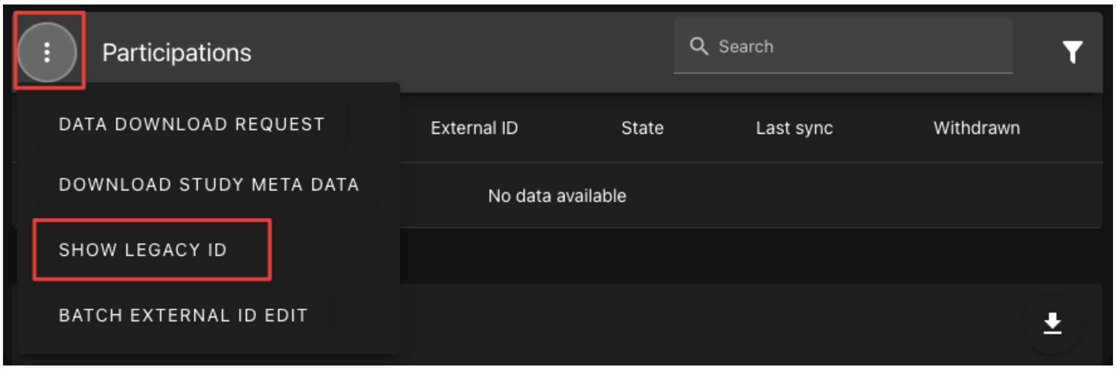


Figure 10: How to show legacy ID for iOS devices onboarding.

  Note: the mapping between LegacyID and ParticipationID is straightforward.
  To obtain the LegacyID:
    - remove the dashes "-"
    - add the prefix 138e
    - add the suffix 28eb
- For example:
- ParticipationID: 02400ae2-6367-40e6-b476-b934f06dfee4
- LegacyID: 138e02400ae2636740e6b476b934f06dfee428eb

- Data Sync (between legacy and new infrastructure): since the iOS data collection runs on our legacy infrastructure, the data is synced with the new infrastructure (and consequently with the dashboard) only once a day at 9 am CET. This implies:
    - new registered devices will only appear after a maximum of 24 hours in the dashboard
    - identities that you want to connect manually can only be connected after they have been migrated (suggestion: always wait at least 24 hours after installation before operating the manual connection)

Batch Edit

In some cases, it is useful to have a way of editing the External IDs in batches, especially when in your records you have specific notes of other IDs for participants. Instead of doing this manually for each participant individually, you can provide to taps.ai either a csv-like structure of a mapping between ParticipationIDs and External IDs or a csv file (with the same mapping).

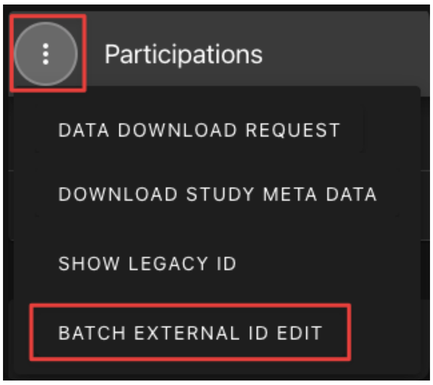


Figure 11: Location of batch external ID button.

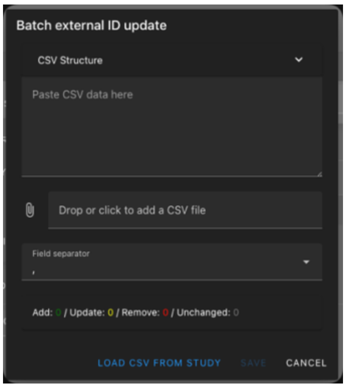


Figure 12: batch external IDs update view, can be used with raw text or a csv file.

If this mapping changes over time you can also upload a new file, and the new mapping will be executed.

Data deletion request

Our data collection App (TapCounter) needs to provide a way for the user to request the deletion of the collected data (as per GDPR compliance). If we receive such a request, this will be shown in the study page. The participant can request QuantActions to delete all data but can agree (in the form that they fill-in during the data deletion request) that the study maintains the data already collected. If the user has agreed that the study should keep the data, we provide a link to the single user data download for your records. After a period of 30 days the link will expire, and the data will be deleted without the possibility of recovery.
Anonymized data that has already been released to the public (e.g. through publication or release to academic repositories), is exempt from deletion as stated in our Privacy Policy.

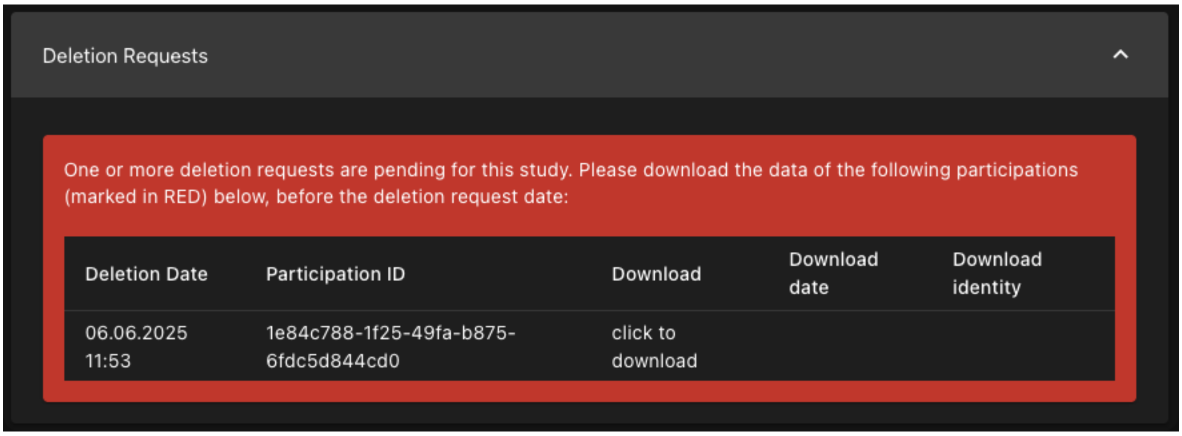


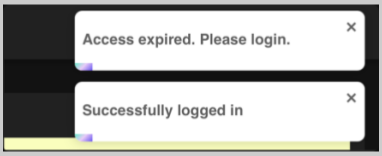
Figure 13: Table on top of the study page that shows deletion requests from participants.

Additional requests

Additional requests can be submitted to support at any time (before, during or after) the study has ended. These additional requests include:

- Request Processed Metrics (TIE) access: you can request the one-time computation of our Processed Metrics (see more details here) for all the participants in your study, the data will then be available for download.
- Request automatic metrics update: metrics can be calculated/updated upon request or can be update every day. You can request for the update to happen automatically every day (note that this option will incur extra costs).
- Request activation of Advance Identity Management (AIM): check the uses cases described in the relative section, if any applies to your study you can request the activation of AIM.
- Request adding a study-specific privacy policy: generally, a study-specific privacy policy will be agreed on before the beginning of the study. If the policy needs to be updated, you can forward to support your request with attached the new text. Note that the users will always see the up-to-date privacy policy in the app.

Common Issues

Issue	Solution
I am unable to login. I insert correctly password and verification code received by email, but the page still shows the login. Instead, I see two notifications that are in contrast 	The issue you are experiencing with the login may be caused by your browser not allowing cookies to be set. We use cookies to keep you logged in. If you are using Safari, make sure cookies are allowed or use another browser (e.g. Chrome)
I have created an account but once I login, I also see my profile page, no studies or organizations	You have not yet been assigned to an organization nor to a role in a study. If you did not yet request the proper authorization, see Organizations and Roles
I want to mark a participation as “ended”	Go under the column “Withdrawn” of the participation that you want to mark. Click on the edit icon . Select the date corresponding to the end of the data collection. The participation will now be present in the group “Withdrawn”
I want to link an identity to a ParticipationID manually	Go under the column “Identity” of the participation you want to assign. Click on the edit icon . Insert the IdentityID of the identity that you want to link
I need to be assigned a different role	Make a request at support, including your study manager in CC
I have downloaded the raw data, what now?	The dashboard provides, in the download menu, instructions to get access to the code (MATLAB/Python) to start exploring the data. See also details about the data in the relative section
Why are some devices marked Pending?	They will be marked as “Pending” for 48 hours after the app has been installed, they will get assigned badges after that time and their status will be updated every 24 hours

I am sure I am using a correct ParticipationID, but the signup keeps failing	You are very likely using a ParticipationID that is already assigned to an identity, either pick an unassigned ParticipationID or link the new identity/device as described in this section