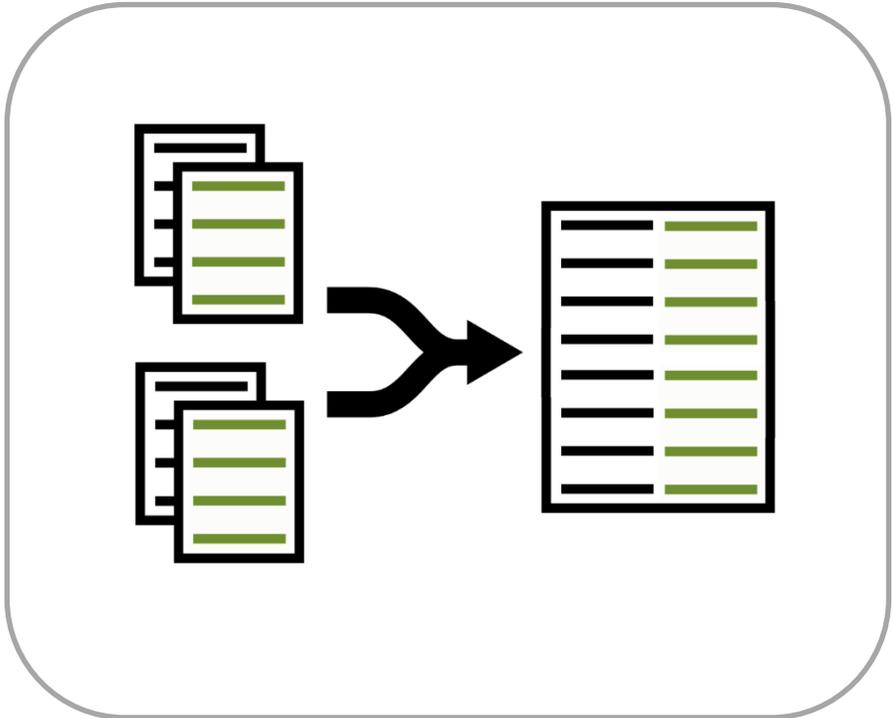


DataMerger

Objective and subjective data fusion

User Manual



Imprint

DataMerger User Manual

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1 Welcome!

Dear customer,

Thank you for choosing **DataMerger** from movisens. With this software you get a great tool that solves the complex task of merging together and synchronizing data from different sources (like physiologic measurement data and experience sampling data) for further statistical analysis.

Please read this manual completely and thoroughly! In this manual you will find all Information relevant to the use of the software as well as for solving problems.

If you have any further questions, don't hesitate to call us. It is our pleasure to help you:

Phone: +49 721 381344-0

E-Mail: support@movisens.com

2 Scope of application

DataMerger is a software tool merging together and synchronizing data from different sources. The software is optimized but not limited for use with the following movisens software tools and services:

- movisens **DataAnalyzer** (scientific analysis of sensor data)
- **movisensXS** (experience sampling platform)

The following data sources are supported:

- Analysed data from all movisens sensors (Move II, ekgMove, edaMove, Move 3, LightMove 3, EcgMove 3, EdaMove 3)
- Subjective data (i.e. answers from questionnaires from **movisensXS**)
- Mobile sensing data from **movisensXS** (e.g. location data)

! **DataMerger** is not a medical device.

3 Software Installation

This chapter describes how to install and uninstall the software and how to update it. Additionally the system requirements are defined.

3.1 System Requirements

Before installing the software, please check if the following system requirements are fulfilled.

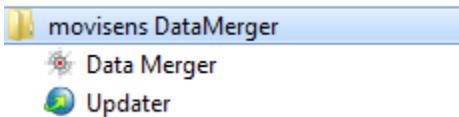
- PC with Windows 7 or higher
- Administrator rights during installation
- A minimum of 160 MB free space on hard disc

3.2 Installing the software

Please ensure that your PC fulfils the requirements described above.

Step 1: Double click the file “movisens_DataMerger_Setup.exe”

- ✓ The Installation runs automatically in the background. After successful installation, a shortcut “movisens DataMerger” is created in the Windows Start Menu.



3.3 Updating the software

You need an internet connection to make an update. Select Windows Start Menu → movisens DataMerger → Updater.

If a new version is available, it will be downloaded and installed automatically after starting the updater software.

4 Workflow

In this chapter, you learn how movisens **DataMerger** can help you simplifying data organization tasks common to most ambulatory assessment / experience sampling studies.

A typical workflow in a study from a data processing perspective consists of the following tasks:

Step 1: Data acquisition with one or more sensors (e.g. movisens **EcgMove 3**) and/or with experience sampling and/or with mobile sensing (e.g. subjective data and GPS data with **movisensXS**)

Step 2: Download of data from sensors (with movisens **SensorManager**) and/or from the **movisensXS** platform

Step 3: Optionally checking data for quality and completeness (i.e. sufficient compliance)

Step 4: Data analysis of sensor data with movisens **DataAnalyzer**

Step 5: Data organization and management

Step 6: Merge and synchronization of data coming from different subjects and different data sources

Step 7: Statistical analysis (SPSS, R, etc.)

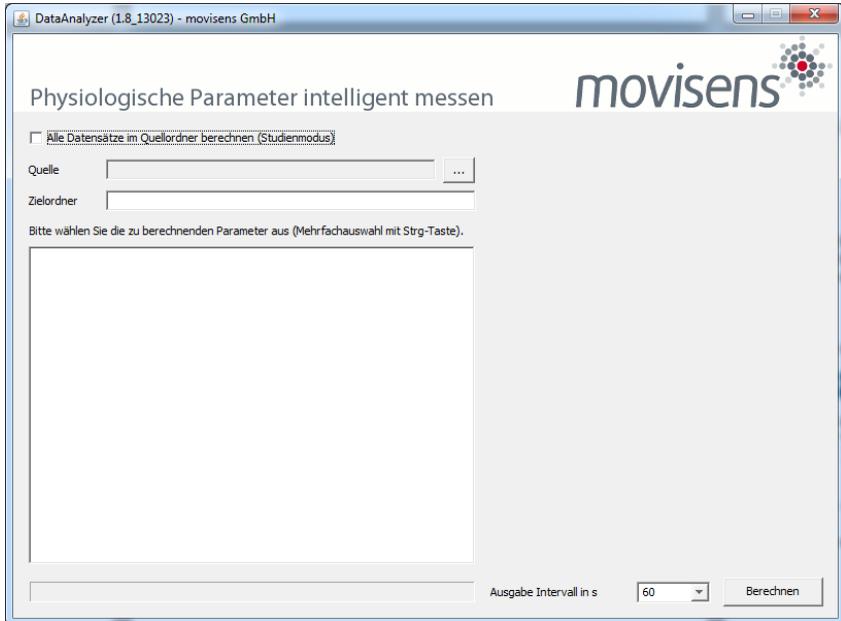
DataMerger will help with Step 6 (Merge and synchronization of data). As a result you will have one data file including all the resulting data from all subjects and all data sources perfectly synchronized. You can then use this data file for further statistical analysis (Step7).

This document also describes Step 5 (Data organization and management), because it is a prerequisite for all further steps.

4.1 Data analysis of sensor data

The physiological data assessed with the different types of sensors has to be analyzed before they can be merged and synchronized together and with subjective data from **movisensXS**.

All the details can be found in the [DataAnalyzer User Manual](#).



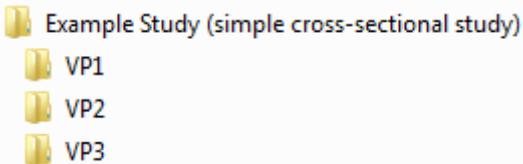
When using **DataAnalyzer** make sure you set the same *Output Interval* for all of your measurements. We suggest using the standard value of 60s. The same value has to be used later in **DataMerger** for the interval setting.

4.2 Data organization

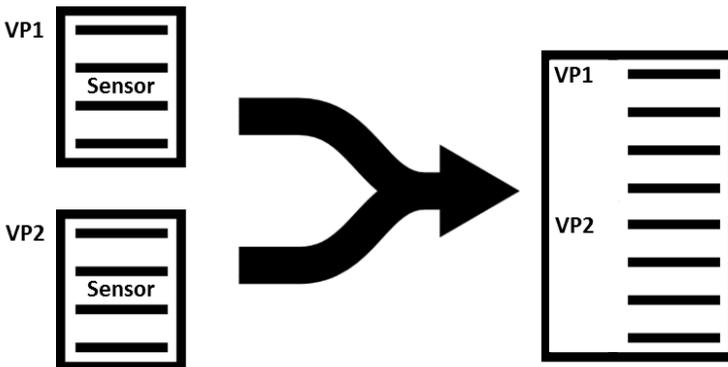
To prepare the data from your study for merging, you have to organize the data in a folder structure that matches your study. Here are some examples:

Example 1: Cross sectional study

For a simple cross sectional study with only one data source (one sensor or only data from **movisensXS**) create folders for each participant:



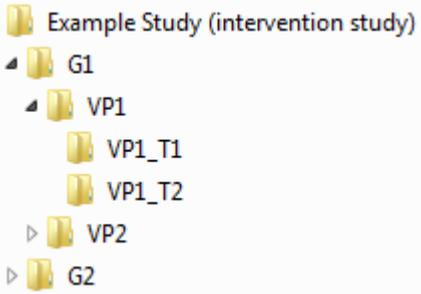
The folder for each participant has to be filled with the results folder generated with **DataAnalyzer** (including the file "results.xlsx") or the results file downloaded from the **movisensXS** platform.



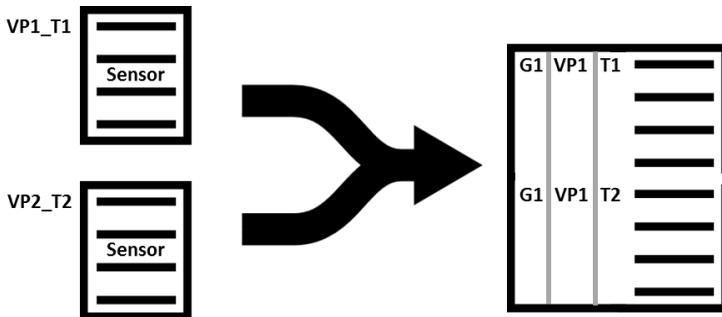
DataMerger will generate one file (output.xlsx) where data from following subjects is listed in new lines in the same order as in your folder structure and add a new column for the number of the participant.

Example 2: Intervention study

For an intervention study the structure could contain two or more groups and two or more measurement points per participant:



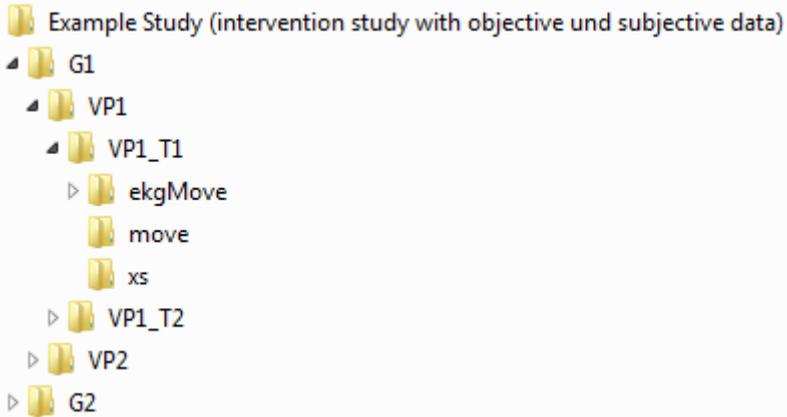
The results folder generated with **DataAnalyzer** (including the file "results.xlsx") or the results file downloaded from the **movisensXS** platform will be filled in the lowest layer of your data structure, e.g. VP1_T1.



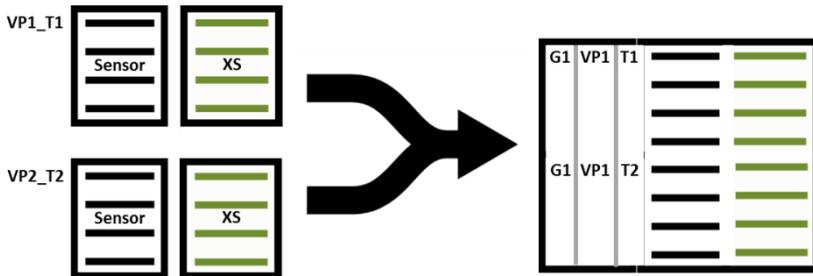
DataMerger will generate one file (output.xlsx) where data from different groups, subjects and measurement points is listed in new lines in the same order as in your folder structure and add a new column for each layer of your data structure.

Example 3: Intervention study with different data sources

If data from different sources should be merged the structure should have an additional layer with sub folders for each data source:



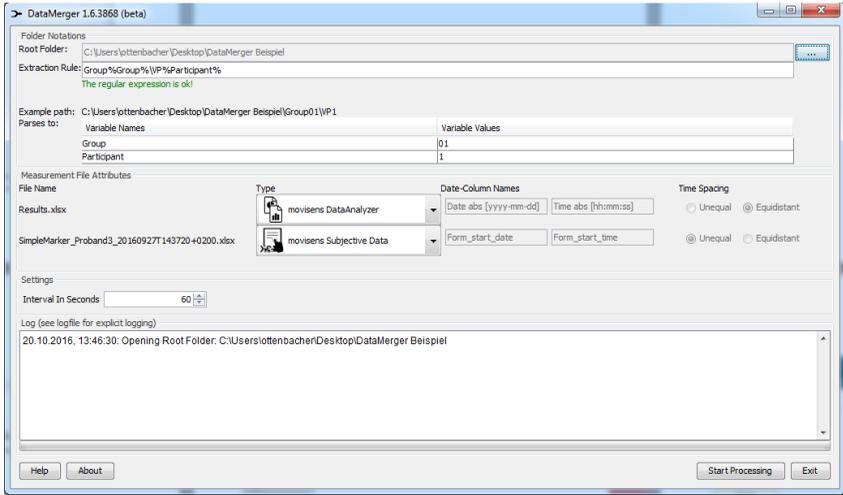
The results folder generated with **DataAnalyzer** (including the file “results.xlsx”) or the results file downloaded from the **movisensXS** platform will be filled in the appropriate folder.



DataMerger will generate one file (output.xlsx) where data from different groups, subjects and measurement points is listed in new lines and data from different data sources is listed in new columns add the end of the table. In addition, a new column for each layer of your data structure is inserted at the beginning.

5 Use of DataMerger

You can start Data Merger with Windows Start → movisens Data Merger → Data Merger.



Step 1: Set root folder by click on the “...”-Button. The root folder should point to the root of your study folder structure that contains all your data sets (e.g. folder “Example Study” in the previous examples)

Step 2: Enter the extraction rule. This rule will extract necessary data from your folder structure and show it in additional columns in the output file. Examples of the extracted data will be shown in the table. Read chapter 5.1 for more details about how the extraction rule has to be composed.

Step 3: If the extraction rule matches your folder structure, available data sources will be shown (sensor data and/or subjective data). Check if all data sources were found.

Step 4: Set the output interval for the output. One line of data will be produced for each interval. If you use data processed by

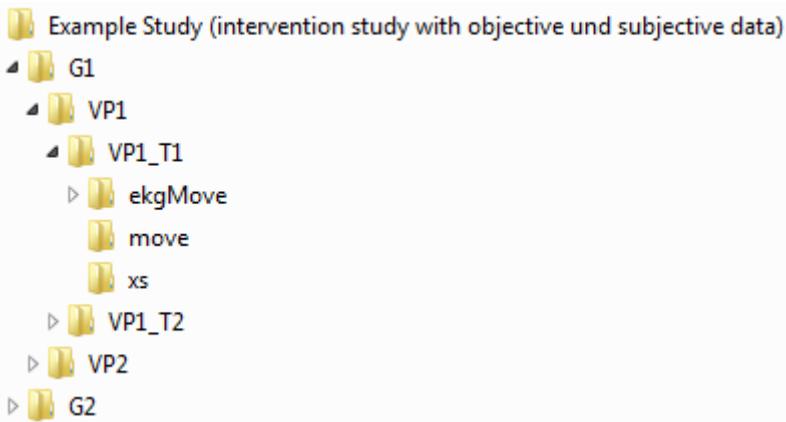


DataAnalyzer, the interval setting in **DataMerger** have to match the Output Interval setting in **DataAnalyzer**.

Step 5: Click *Start Processing* to start the merging process. The final output table will be found in the root folder. The filename is output.xlsx.

5.1 Extraction rule

The extraction rule must match the folder structure of your study. It must consist of all folder layers from the root folder up to the folder that holds the data of one measurement point of one proband. Consider the following example:



Here the path from the root folder to the first measurement point of the first proband in the first group is:

\G1\VP1\VP1_T1\

The correct extraction rule to obtain group, proband number and measurement point would be:

```
\G%Group%\VP%Participant%\VP%Participant%_T%MeasurementPoint%
```

DataMerger will add the columns Group, Participant, MeasurementPoint to the output table and fill in the correct values.

6 Examples

6.1 Use movisens XS to set markers in sensor data

This method can be used to set markers in single proband or group studies. Markers can be set by the proband himself or by the study personnel.

6.1.1 Preparation

Create a new study in movisens XS



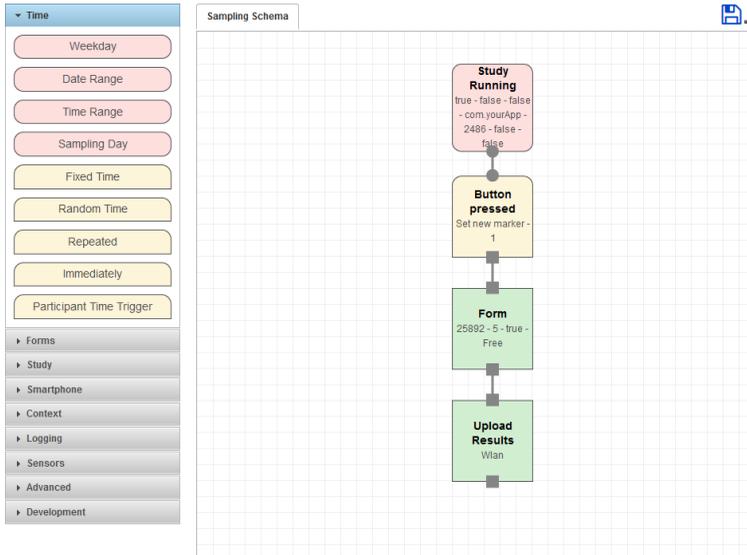
The screenshot shows the 'movisensXS' web interface. At the top, there is a navigation bar with the user name 'Jörg Ottenbacher' and several menu items: 'Studies', 'Administration', 'My Account', 'Help', and 'Sign Out'. Below the navigation bar, the main heading is 'Create a study'. Underneath, there is a prompt 'Please name your study.' followed by 'Study name:'. A text input field contains the text 'SimpleMarket'. Below the input field is a blue button labeled 'Next >'. At the bottom of the page, there is a footer with links for 'Imprint / Terms / Privacy' on the left and '© movisens GmbH. All rights reserved.' on the right.

Configure a simple form that will be shown if you set a marker.

Depending on the information you want to store for each marker you can add items, like a *Select One* item to describe the marker in more detail.

The name of *Label* (marker) will be shown in a separate column in the final output, containing the text you enter under *Stored value*.

Next configure a very simple sampling scheme. It will show the form we just defined when a button is pressed.



Edit the *Button pressed* block and label the button with “Set new marker”:

Edit node "Button pressed" ✕

This event fires if the participant presses a presented button and triggers the successor nodes. A.k.a. Event-contingent.

Button label

Button order

Edit the Form block and select the Name of the form you just created:

Edit node "Form"

This action runs the specified form. Place an alarm before to notify the participant about the form!

Form ID:

Timeout Interval:

Display back button

Screen orientation:

Depending on your study prepare one more smartphones with the **movisensXS** App.

6.1.2 Data Acquisition

For each measurement (single proband or group of probands) add a new participant in **movisensXS** and couple a smartphone:

Participants in this study

[+ Add Participant](#) [Message All](#)

ID	Start Date	End Date	Version	Couple Date	Participant Code	Filled Forms	Missed Alarms	New Messages	Download Results	Delete
1	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>	2016-09-27 13:19:33	2016-09-27 13:20:15	Already coupled	3		<input type="text" value="0"/>	<input type="button" value="Download"/>	<input type="button" value="Delete"/>
2	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>	2016-09-27 13:19:33	2016-09-27 13:27:30	Already coupled					<input type="button" value="Delete"/>
3	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>			<input type="button" value="QR Code"/>					<input type="button" value="Delete"/>

Start the movisensXS App, press couple and scan this participant code



Couple Smartphone to participant Read the...

- Start App and scan code**

Start the movisensXS App on a Smartphone, press *Couple Device* and scan the participant code that appears when clicking on the icon in the table above. After coupling a screen with your study name and participant number should appear.
- Run the Study**

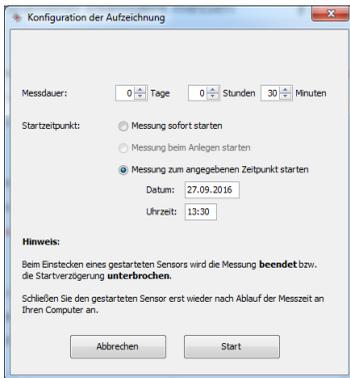
Press the button *Start Study* in the movisensXS app to begin the experience Sampling and hand over the Smartphone to the corresponding participant.

or send the participant this [Link](#)

Completed the study in the top right of the table select *Study* pin code defined in the first block of the **Sampling** (default "2486") to enter the control screen. Then select *Pause Study and Upload Results*, if Results are not already uploaded. After that you can [Refresh](#) this page to see the number of results and missings of this participant.



Use movisens **SensorManager** to start your sensors for data acquisition. For groups we recommend to start all sensors at the same time:



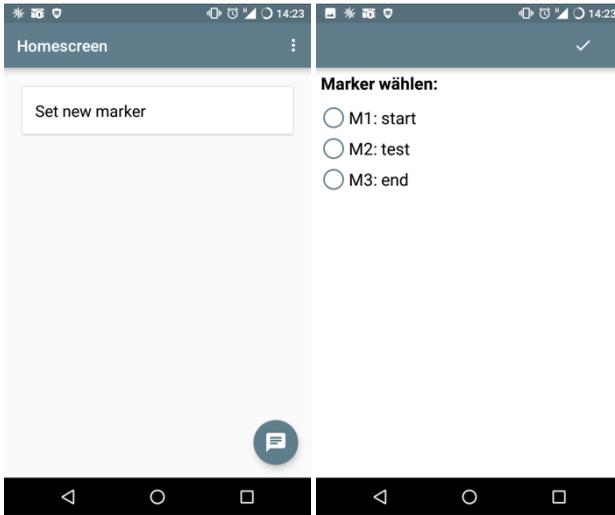
Make a list that links probands to proband IDs you entered in **SensorManager** and **movisensXS**. For example for a group study:

Group1:

SensorManager: VP1, VP2

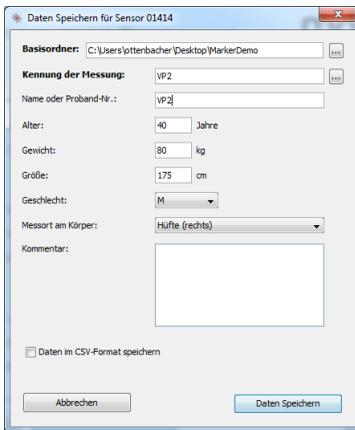
movisensXS: ID 2

Conduct your study and set markers or let the probands set the markers:



6.1.3 Download sensor data

Download Sensor Data and enter the correct Proband-ID.



6.1.4 Analyze sensor data

Use **DataAnalyzer** to analyze your sensor data. Consider using Batch mode to analyze all measurements at once.

6.1.5 Sort and organize data

Make a directory structure that meets your study needs. For example like this:

\MarkerStudy\
-

- \Group01\
 - o \VP01\
 - Move3
 - XS
 - o \VP02\
 - Move3
 - XS

Move the result data from **DataAnalyzer** and the results from **movisensXS** into the according Folders.

Participants in this study

+ Add Participant
Message All

ID	Start Date	End Date	Version	Participant	Filed	Missed	New	Download Results	Delete
1	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>	2016-09-27 13:19:33				33	⏸	🗑
2	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>	2016-09-27 13:19:33					⏸	🗑
3	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>	2016-09-27 13:19:33					⏸	🗑
4	<input type="text" value="Instantly"/>	<input type="text" value="No end"/>						⏸	🗑

Öffnen von SimpleMarker_Proband3_20160927T143720-0200.xlsx

Sie möchten folgende Datei öffnen:

SimpleMarker_Proband3_20160927T143720-0200.xlsx

Vom Typ: Microsoft Excel-Arbeitsblatt (4,1 KB)
Von: <https://xs.movisens.com>

Wie soll Firefox mit dieser Datei verfahren?

Öffnen mit Microsoft Excel (Standard)

Datei speichern

Für Dateien dieses Typs immer diese Aktion ausführen

OK
Abbrechen

Couple Smartphone to p

1 Start App and scan code

Start the movisensXS App on a Smartphone, press *Couple Device* and scan the participant code that appears when clicking on the code icon in the table above. After coupling a screen with your study name and participant number should appear.

2 Run the Study

Press the button *Start Study* in the movisensXS app to begin the experience Sampling and hand over the Smartphone to the corresponding participant.

3 Download Results

When the participant completed the study press the *Menu* button on the top right of the movisensXS app and select *Study Management*. Enter the pin code defined in the first block of the *Sampling* (default "2486") to enter the control screen. Then select *Pause Study* and *Upload Results*, if Results are not already uploaded. After that you can *Refresh* this page to see the number of results and missings of this participant.

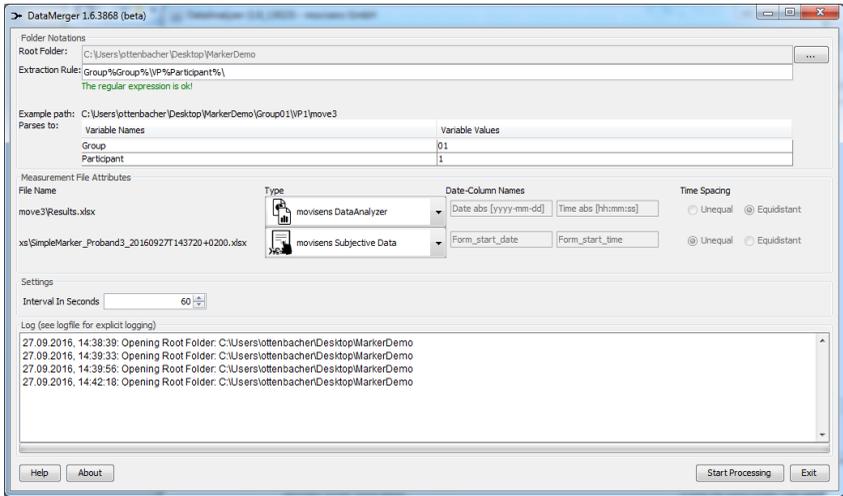


6.1.6 Merge data

Use **DataMerger** to merge all data together into one result file. Select the base folder of your study. Enter an extraction rule that matches your directory structure. For the above example study you can use:

```
Group%Group%\VP%Participant%
```

This will create the columns *Group* and *Participant* in the output containing the group and participant numbers extracted from the folder structure.



7 Legal Notes

7.1 Copyright

The **DataMerger** software is protected by copyright. Renting, exchanging, broadcasting, duplication or copies are not permitted.

7.2 Disclaimer

The material in this manual is for informational purposes only. The products it describes are subject to change without prior notice. movisens makes no representations or warranties with respect to this manual or with respect to the products described herein.

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The **DataMerger** Software is not a medical device and is not intended to be used for medical purposes.

7.3 Trademarks

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