

USER MANUAL

SennsMetrics

Version 2.2

March 2023

CONTENT

1. Introduction.....	4
1.1 Functionalities	4
1.2 Workflow overview.....	5
2. Installation	6
2.1 Requirements and recommendations	6
2.2 Installation	6
2.3 License manager	10
2.4 Uninstall	11
3. Key concepts.....	12
3.1 Tasks	12
3.2 Events	12
3.3 Markers.....	14
3.4 Biometrics and position sensors	14
3.5 Participants and multi-station recordings.....	15
3.6 Focus studies - multi-subject recordings.....	16
4. Manage studies	17
4.1 Studies and participant recordings.....	17
4.1.1 Overview	17
4.1.2 Data flow	18
4.1.3 Local studies	18
4.2 GUI elements	19
4.2.1 Studies table	19
4.2.2 Configuration.....	20
5. Define and visualize.....	21
5.1 Visualization screen.....	22
5.2 Manage events	25
5.3 Manage segments	27
6. Individual and group Viewer	32
6.1 View and edition modes	32
6.1.1 View mode	32
6.1.2 Edition mode.....	33
6.2 Viewer elements	33
6.2.1 Information console.....	33
6.2.2 Display console	34
6.2.3 Menu area	35
6.2.4 Events area	36
6.2.5 Biometrics area	37
6.3 Event status.....	38

7. Analyze metrics	39
7.1 Biometrics and position metrics	39
7.2 2D maps	41
8. Export	43
8.1 Generate videos	43
8.1.1 Video clips - events	44
8.2 Export data	45
8.2.1 Raw data	46
8.2.2 Metrics	48
9. Annex 1: Biometrics and position sensors	50
9.1 Biometrics definition	50
9.2 Metrics derived from the position sensors	52
9.3 2D maps	53
10. Annex 2: Backup strategy	54
10.1 Data sources	54
10.2 User definitions	54
10.3 Transfer the data to another computer	54

1. Introduction

SennsMetrics allows the analysis of cognitive/emotional biometrics (e.g., activation, impact, valence, memorization, engagement, workload) and position sensors (e.g., gaze position, mouse position and clicks, person's location in a real environment) recorded from SennsLab and processed in the SennsCloud service.

Define and visualize: Define intervals and areas of interest (IOIs and AOIs), segment the participants into different groups; and visualize the temporal dynamics of the metrics at individual and group level.

Analyze metrics: Visualize the aggregated results of the cognitive/emotional biometrics and position sensors, and generate 2D maps (e.g., heat maps) for the position sensors.

Export: Export the data (both the raw data and the aggregated results) and generate videos with the stimuli and temporal dynamics of the metrics at an individual and group level.

1.1 FUNCTIONALITIES

SennsMetrics provides the following main functionalities:

- Define intervals of interest (IOI) and areas of interest (AOI) using events. Researchers can define their own events, consisting of one or more IOIs, and optionally define AOIs congruent with a position sensor.
- Segment the participants into segmentation variables and groups.
- Visualize the temporal dynamics of the cognitive/emotional biometrics individually for each participant or at a group level (group visualization only for fixed-time tasks).
 - Position sensors can be displayed over the target stimulus (image or video) or participants' behavioral recordings (screen capture, webcam), either as a point at individual level or heat maps at group level.
- Visualize the aggregated results for the defined segments and groups.
- Visualize the 2D maps for the position sensors.
- Export the data to Excel format:
 - Metrics: individual and group level.
 - Raw data: time series data points (biometrics) and x-y positions (position sensors)
- Generate and export videos showing:
 - Temporal dynamics of the biometrics at individual and group level (fixed-time tasks).
 - Target stimulus and participants' behavioral recordings (screen capture, webcam)

1.2 WORKFLOW OVERVIEW

SennsMetrics works together with data recorded by SennsLab and processed by the SennsCloud service. The usual workflow is as follows:

- SennsLab defines a study¹ involving a set of hardware devices (e.g., Ring, Diadem, eye-tracker, mouse, location), and optionally registering behavioral recordings such as screen capture or webcam.
- SennsLab records participants for the study.
- The participant recordings are uploaded to SennsCloud to decode the biometrics and extract the position sensors data.
- The results generated in SennsCloud are available to be downloaded.
- SennsMetrics downloads the study definition files and the participant recordings.

SennsMetrics allows starting to analyze the data while the participants are recorded in SennsLab and sent to SennsCloud, adding them as they are available.

Note that some participants may be discarded due to technical problems during the recording (e.g., misplaced, or unregistered sensors).

Note that Bitbrain does not provide a hosting service for the studies and thus we only allow downloading the results once (per license). The researcher is responsible for managing (e.g., saving or creating backups) the results generated in the Cloud once they are downloaded.

¹ SennsMetrics is compatible only with standard templates in-lab and out of lab.

2. Installation

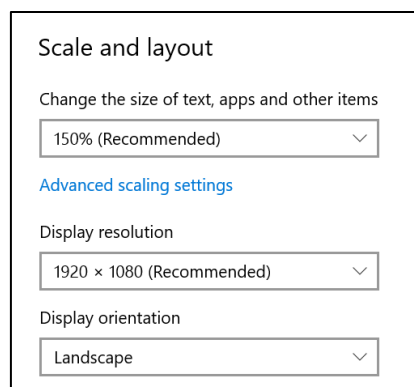
2.1 REQUIREMENTS AND RECOMMENDATIONS

The computer must have the following specifications:

- Operating system (OS): Windows 7 or newer (Windows 10 recommended)
- Processor: Intel Core i3 or higher (Intel Core i5, i7 or i9 recommended)
- Memory RAM: 8GB or higher
- User with administration rights

We recommend a monitor of at least 24".

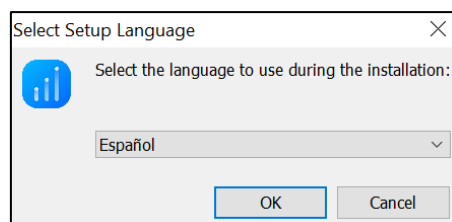
- Display resolution: 1920 x 1080 recommended.
- Important: keep text scaling at 100%



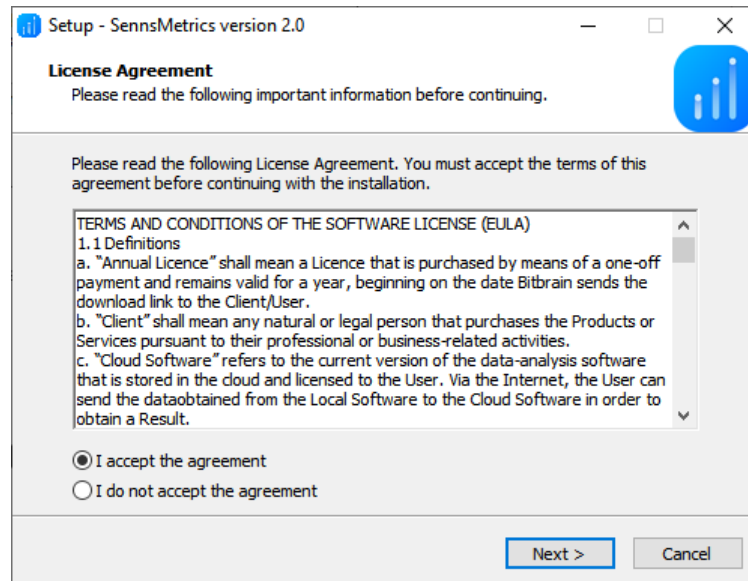
2.2 INSTALLATION

Run the installer and follow the next steps:

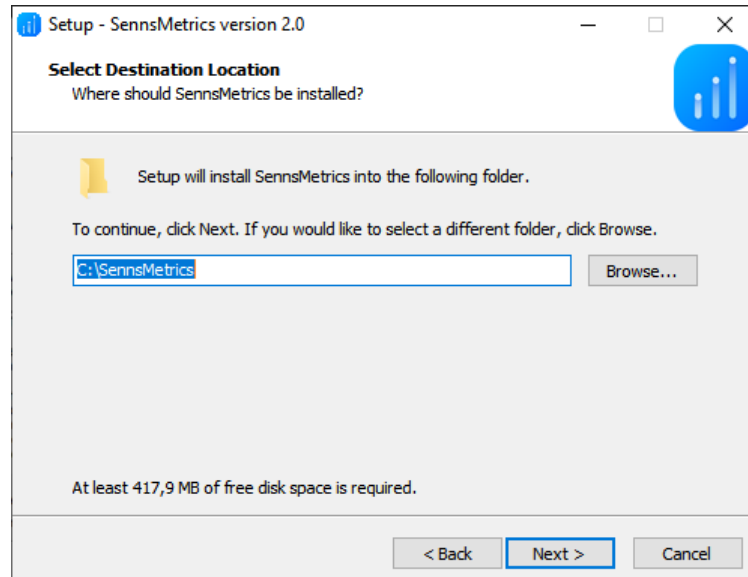
1. Select the language of the installation.



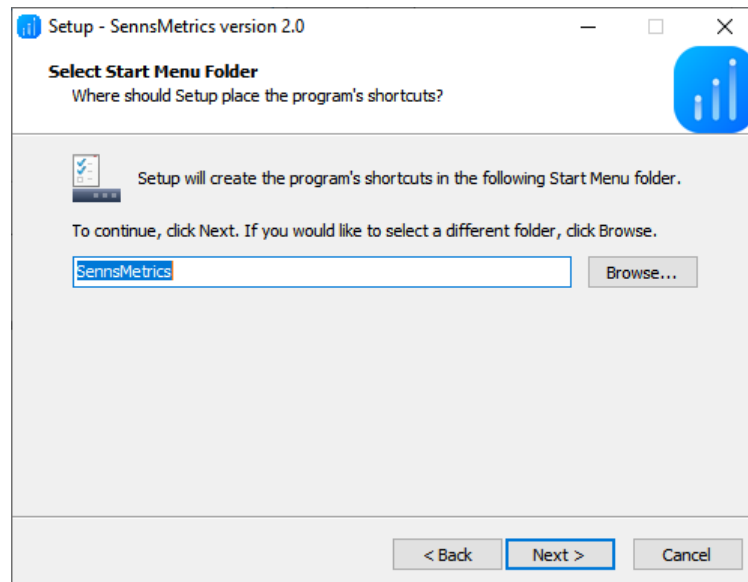
2. If you agree to the license agreement, click "Accept the agreement" and then click Next.



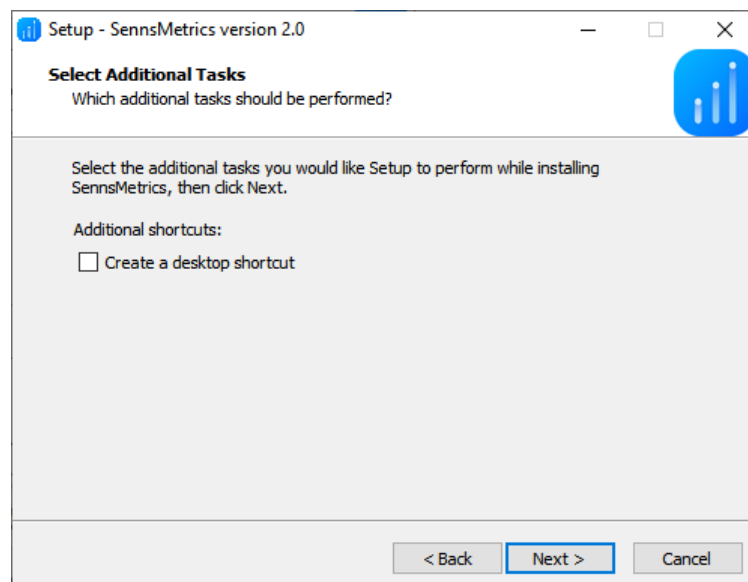
3. Select the destination folder (default folder recommended).



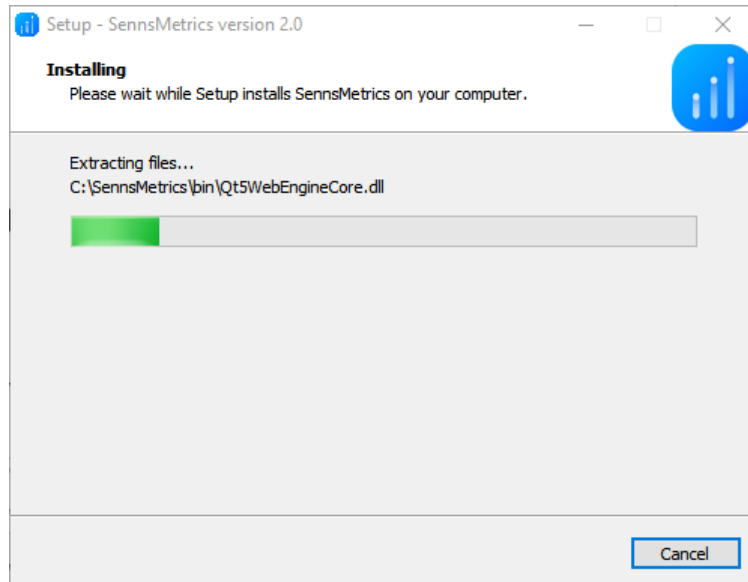
4. Select the shortcut destination.



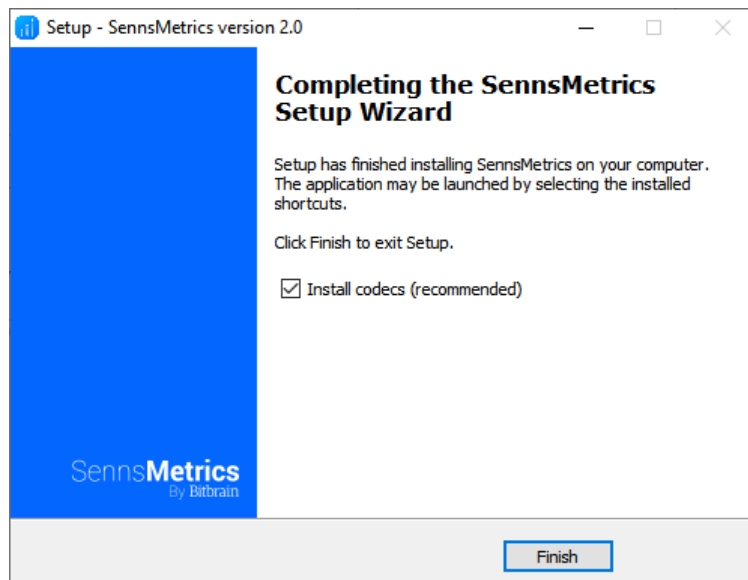
5. Select whether to create an icon on the desktop.



6. Click on Install to proceed with the installation.



7. We recommend installing the corresponding codecs.



2.3 LICENSE MANAGER

The SennsMetrics software requires an activation procedure via Internet. This is mandatory the first time the software is used. When the software is acquired, the researcher receives an email with a license number. Save this number for future use.

The software can be in three states:

- **Active:** the software is active, and all its functionalities enabled.
- **Expired:** the software can still be used with no limitations with local studies, but new studies or participant recordings cannot be downloaded (i.e., no communication with SennsCloud). The license cannot be transferred to another computer.
- **Not active:** the software is not active on this computer and cannot be used.

Settings

There is a settings button  in the bottom right corner of the main screen contents for accessing the license manager and the SennsMetrics configuration.

Activation

Access to the SennsMetrics settings license tab. Enter the license number (received in the email) and an identifier of the computer (e.g., work laptop), and press Activate. This step requires an Internet connection.

Transfer the license to another computer

The license must be first deactivated in the computer currently being used. Run SennsMetrics and press Deactivate. The license can now be activated in the software on a different computer. This step requires an Internet connection.

Configuration

In the settings configuration tab, there are the SennsMetrics configurable elements. In the current version, the only element available is the activation and deactivation of the combined solution with Tobii Pro Lab.

Set on the radio button of "Tobii Pro Lab data importer" to be able to import analyzed data from Tobii Pro Lab to SennsMetrics.

Press "Save" to confirm your selection.

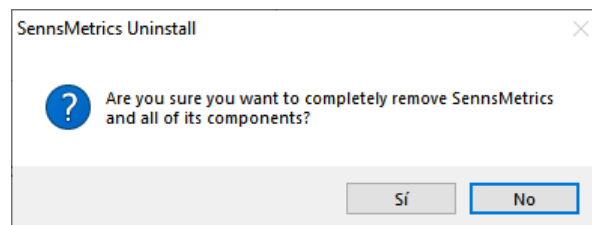
FAQ

- **What to do if I lose the email with the license number?** Contact Bitbrain (support@bitbrain.es) to request a copy of the license number.
- **What to do if my computer crashed?** Contact Bitbrain (support@bitbrain.es) to request to deactivate the license to the currently assigned computer. After that, you will be able to activate the license on a new computer.

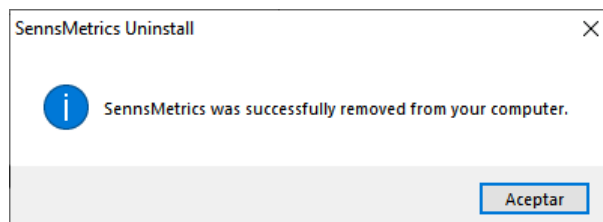
2.4 UNINSTALL

Note that uninstalling the application will remove the software and all the user definitions (events, segments). If desired, the user definitions can be exported to a text file for later use (see [Export section](#)).

To uninstall the software, find the SennsMetrics folder in the taskbar and select "Uninstall SennsMetrics". The following dialog will be displayed:



Click on "Yes" to proceed with the uninstallation. The following message will appear:



3. Key concepts

3.1 TASKS

In SennsLab, stimuli events (images, videos, etc.) are defined in some templates (e.g., Image Passive and Active, Audiovisual Passive and Active). These stimuli are shown in SennsMetrics with the name of the task, regardless of their nature. This means that “target” and “competing” stimuli are both labelled as tasks. “Category” stimuli are not processed through SennsCloud and will not be displayed in SennsMetrics.

3.2 EVENTS

Events are a key concept of SennsMetrics. They are used to define the events of interest for the analysis in terms of the time interval and, optionally, where they occurred (area over an image, video frame, a map, etc.)

An event always has one or more intervals of interest (IOIs) that denote when the event occurred during the timeline of the task. Note that the entire task can also be selected as an IOI.

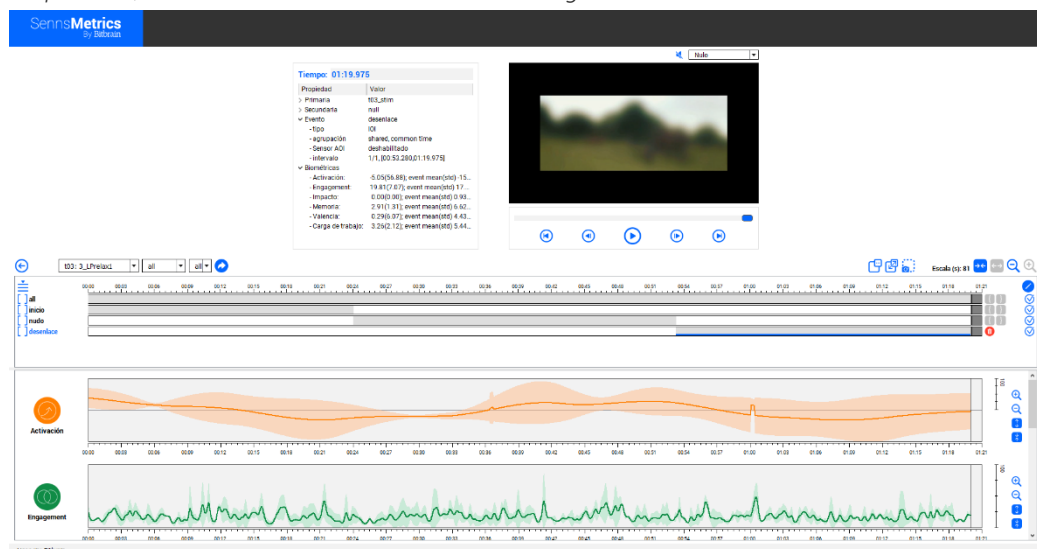
Example: In a spot, the logo of a brand appears on three occasions. An event “brand” with 3 intervals of interest would be defined. In case the brand would appear during the entire spot, the entire task would be selected as an IOI.

There are two types of events:

- **IOI-Event:** Event without position information, formed by one or several intervals of interest (IOIs). **The value of a biometric is computed as the sum of the data points in the IOIs, divided by the total number of points.**

Use case 1: Calculate cognitive/emotional biometrics in a spot by dividing the piece into three moments of interest: beginning, middle and end.

To proceed, create three IOI events each with a single interval.

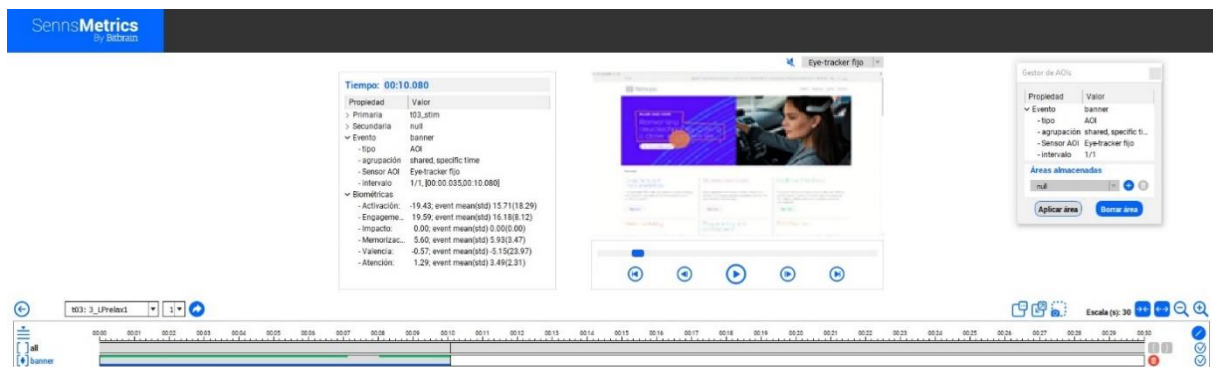


- **AOI-Event:** Event with position information. These events can be defined when position information is available (e.g., eye-tracker over a stimulus or recording, mouse position over the recording of the screen, location over a map). AOI events are formed by one or more intervals of interest and their corresponding areas of interest. **The value of a metric is computed as the sum of the data points in the IOIs where the position sensor is congruent with the corresponding AOI (i.e., is inside), divided by the total number of congruent points.**

Use case 2: Calculate cognitive/emotional biometrics when a banner is displayed on the home page of a web page.

To proceed, create an event (called "banner" for example). The IOI will represent the time where the banner is visible and the AOI where the banner is located on the screen.

SennsMetrics will compute the metrics only when the eye-tracker indicates that the user is looking at the banner.



Another important property of an event is whether its IOIs and AOIs are shared by all participants or not. Three different types of grouping levels are available:

- **Shared, common time:** an event that occurs in all participants and has the same IOIs and AOIs (in case of AOI Event). Individual and aggregated metrics are exported. **This type of event can only be used in tasks that have the same duration for all participants (for example, SennsLab templates such as Image Passive and Audiovisual Passive, where all the sample watches the same image/video).**

This level of grouping applies to "Use case 1", previously seen. All participants have visualized the same spot and want to obtain aggregated results.

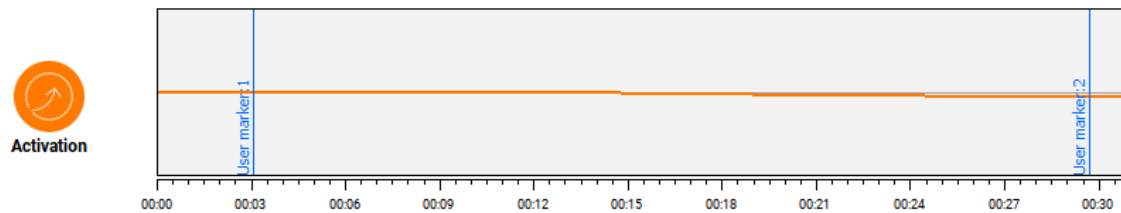
- **Shared, specific time:** event that occurs in several participants, but each participant requires its own definition of IOIs and AOIs (in case of AOI Event). Individual and aggregated metrics are exported. For example, templates such as Free Task, where each participant performs the task at a specific time.

This grouping level applies to "Use case 2". All participants have navigated through the web page, but each of them stayed on the homepage at a specific time.

- **Individual:** an event that only occurs in a single participant. Individual metrics are exported.

3.3 MARKERS

The markers defined by the researchers in SennsLab during the online recording of the participants will be displayed in the Viewer at individual level (i.e., for each participant) and represented as a vertical line in the plot of each biometric.



In addition, markers will also be exported along with the raw data.

3.4 BIOMETRICS AND POSITION SENSORS

SennsMetrics offers a series of biometrics computed by SennsCloud that are dependent on the hardware being used. The definition of biometrics and metrics derived from position sensors are explained in detail in Annex 1: Biometrics and position sensors.

DEVICE	BIOMETRIC	
RING		ACTIVATION
		IMPACT
DIADEM EEG		VALENCE
		MEMORIZATION
		WORKLOAD
		ENGAGEMENT

SennsMetrics supports the following position sensors:

SENSOR

	EYE-TRACKER FIXED (TOBII)
	EYE-TRACKER MOBILE (TOBII)
	MOUSE
	LOCATION (INTRACK)

SennsLab generates 2D maps from the position sensors over the defined intervals of interest.

Note that these 2D maps can only be visualized when the target stimulus is an image.

2D MAPS

	HEAT MAP
	BIOMETRICS MAP
	TIME MAP
	FOCUS MAP
	TRAJECTORY MAP
	CLICK FOCUS MAP
	CLICK TRAJECTORY MAP

3.5 PARTICIPANTS AND MULTI-STATION RECORDINGS

SennsLab allows recording participants from the same study simultaneously in several computers, referred to as stations (requires one license per station).

To allow a non-ambiguous identification of the participants in SennsMetrics, the identifier of the participants in SennsMetrics is composed by:

1. The station name (set when activating the license).
2. Underscore symbol.
3. Identifier of the participant in SennsLab.

For instance, a participant with ID "3" recorded in station "work" in SennsLab, will be displayed in SennsMetrics as "work_3".

3.6 FOCUS STUDIES - MULTI-SUBJECT RECORDINGS

In SennsLab, most of the times the recording sessions involve a single participant, possibly equipped with several EEG, biosensors, or eye-tracking devices. However, there are cases when a recording session involves several participants (as in focus groups studies) because the interaction between the participants has a potential research interest.

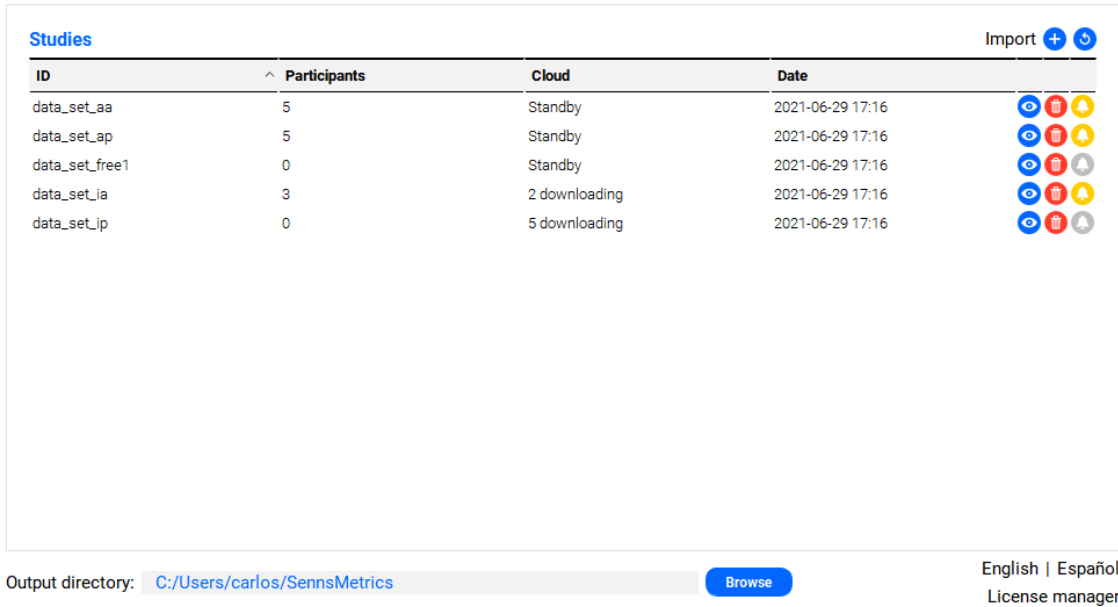
SennsMetrics provides specific support for focus studies:

- Individual and Session viewer. We provide the ability to visualize the temporal dynamics of the biometrics at an individual level (each participant) and at session level (all the participants composing the session). In the latter case, participants can be seen aggregated (i.e., mean and standard deviation) or individually, together with behavioral recordings (e.g., webcam). See Section 6.
- Events were adapted: “shared, common time” events apply to all the participants of a session, not to the full experiment sample. This is better suited for focus studies as researchers could be interested in marking specific time intervals (e.g., cognitive-emotional response to a question) common to all participants of a session, but that might happen in different time instants in other groups.
- The recording session is automatically included as a segmentation variable, so the researcher can perform comparisons among groups.
- Export the raw data to Excel format at Individual and Session level.

Generate and export videos at Individual and Session level. Along this guide we provide an extensive description of single-subject recordings as it is the most common use scenario and will add side comments (marked as “focus studies”) when appropriate to describe the changes.

4. Manage studies

The main menu allows to download and import a study², opening a previously downloaded study and configuring the application.



Studies Import +

ID	Participants	Cloud	Date
data_set_aa	5	Standby	2021-06-29 17:16
data_set_ap	5	Standby	2021-06-29 17:16
data_set_free1	0	Standby	2021-06-29 17:16
data_set_ia	3	2 downloading	2021-06-29 17:16
data_set_ip	0	5 downloading	2021-06-29 17:16

Output directory: <C:/Users/carlos/SennsMetrics> Browse

English | Español
License manager

SennsMetrics allows to download studies recorded using SennsLab (version 7.0), and the results from the participants will be automatically included as they are processed by SennsCloud, thus allowing an incremental analysis. This feature requires the researcher to have Internet access.

For retro compatibility with previous versions (SennsLab < 7.0, SennsMetrics < 2.0), current SennsMetrics version 2.0 allows to import local studies.

Note: Bitbrain does not provide a hosting service for the studies and thus we only allow downloading the results once (per license). The researcher is responsible for managing (e.g., saving or creating backups) the results generated in the Cloud once they are downloaded.

4.1 STUDIES AND PARTICIPANT RECORDINGS

4.1.1 Overview

The "Import" button provides a list of the available studies processed by SennsCloud that can be downloaded. Double click a study or press the button "Import from Cloud", the definition of the study and the recordings of the available participants will be automatically downloaded.

As new participant recordings are available, they will be downloaded automatically. Then, to open a previously imported study, select it on the "studies" table and double click.

²It is not possible to import studies registered with SennsLab < 6.0.

4.1.2 Data flow

We below describe the data flow from a study and participants recordings registered using SennsLab to SennsMetrics.

1. SennsLab defines a study involving a set of hardware devices (e.g., Ring, Diadem, eye-tracker, mouse, location), and optionally registering behavioral recordings such as screen capture or webcam.
2. SennsLab records several participants for the study.
3. SennsLab uploads the recordings to SennsCloud to decode the biometrics and extract the position sensors data.

Note that several recordings can be performed in SennsLab for the same participant (e.g., incorrect participant execution, incorrect setup of the hardware devices). However only one recording can be analyzed per participant in SennsMetrics. This introduces the concept of "invalid recording": if a recording was uploaded to SennsCloud and the researcher wants to remove it, it must be invalidated before a new one can be uploaded. This way the new recording will be downloaded by SennsMetrics and will replace the invalidated one.

4. SennsMetrics downloads the study definition files and the participant recordings.

The participant recordings are automatically downloaded by SennsMetrics if the researcher has Internet access. The status in the view of the participant recordings will, under normal circumstances, change from "pending" to "downloading" and "downloaded".

The downloaded files will be saved to a temporal folder and, when the researcher opens the study, will be deployed to the "studies folder" ("studies" subdirectory in the SennsMetrics installation directory). Do not move the "studies folder", modify, or remove any file included in the directory.

Limit exceeded: the recordings can be downloaded once per license. In case the recording was already downloaded, the status will be "limit exceeded".

Error handling: in case an error happens in the SennsCloud processing, the status will change to "error" temporarily. Bitbrain will be notified and solve it, being this process transparent for the researcher.

Note: If the researcher removes a study, a backup of the study data will be stored in the "backup" folder within the "studies folder". The researcher will still be able to import the data as a local study, however new recordings will not be incorporated.

4.1.3 Local studies

For retro compatibility with previous versions (SennsLab < 7.0, SennsMetrics < 2.0), current SennsMetrics version 2.0 allows to import local studies. In addition, this option is suited for importing a study after it has been downloaded (e.g., for transferring the study data to another computer), see next subsection.

After clicking on the "Import" button, click on the button "Import from Local" and select the file "study_info_SennsMetrics.json" located in the folder where the SennsCloud study files were downloaded.

Then, to open a previously imported study, select it on the "studies" table and double click.

Note: Once a study is imported, do not move the study folder from the source directory, modify or remove any file included in the source directory.

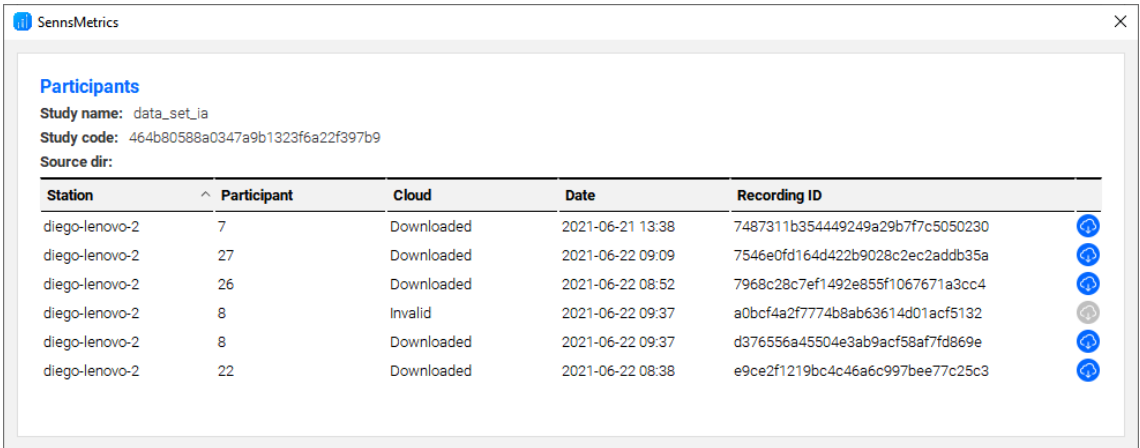
4.2 GUI ELEMENTS

4.2.1 Studies table

In the table "Studies", all the imported studies are shown next to some information about them³:

- ID: Name of the study as defined in SennsLab.
- Participants: Number of participants.
- Cloud: Cloud status
 - Standby: checking for new participant recordings.
 - Downloading: downloading participant recordings.
- Date: Date when the study was processed by SennsCloud (or imported in local studies).
- View button: Visualizes the participant recordings information
- Remove study button: Removes the study (see "studies backup")
- Notification button: Notifies new participant recordings

View of the participant recordings (table "Participants"):



Participants

Study name: data_set_ia
Study code: 464b80588a0347a9b1323f6a22f397b9
Source dir:

Station	Participant	Cloud	Date	Recording ID	
diego-lenovo-2	7	Downloaded	2021-06-21 13:38	7487311b354449249a29b7f7c5050230	
diego-lenovo-2	27	Downloaded	2021-06-22 09:09	7546e0fd164d422b9028c2ec2addb35a	
diego-lenovo-2	26	Downloaded	2021-06-22 08:52	7968c28c7ef1492e855f1067671a3cc4	
diego-lenovo-2	8	Invalid	2021-06-22 09:37	a0bcf4a2f7774b8ab63614d01acf5132	
diego-lenovo-2	8	Downloaded	2021-06-22 09:37	d376556a45504e3ab9acf58af7fd869e	
diego-lenovo-2	22	Downloaded	2021-06-22 08:38	e9ce2f1219bc4c46a6c997bee77c25c3	

³ Participants and Cloud fields are only available for Cloud studies.

- ID: Identifier of the recording as defined in SennsLab.
- Participant: ID of the participant.
- Station: ID of the station that recorded the participant.
- Cloud: Cloud status (see “studies backup”).
 - Pending: new recoding to be downloaded.
 - Downloading: recording being downloaded.
 - Downloaded: recording downloaded.
 - Deployed: recording downloaded and deployed.
 - Invalidated: recording invalidated in SennsLab.
 - Limit exceeded: recording was already downloaded.
 - Error: an error happened.
- Date: Date when the recording was processed by SennsCloud.

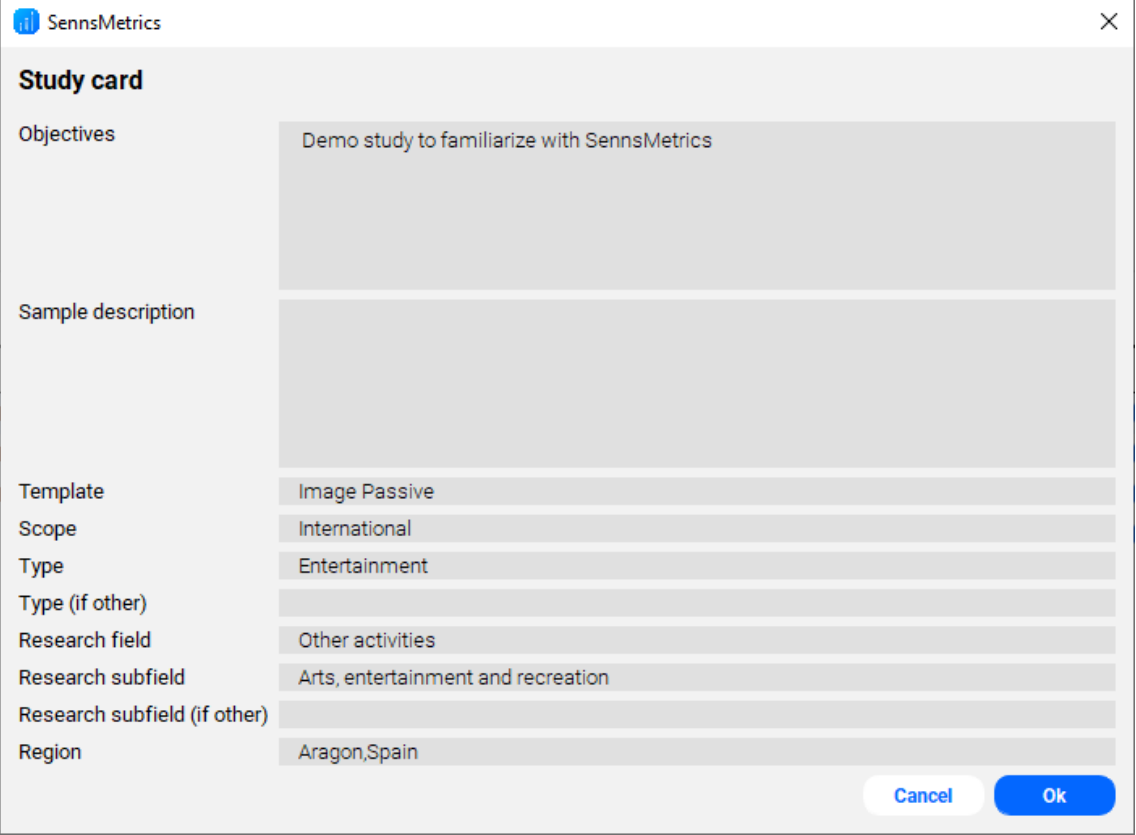
4.2.2 Configuration

- Language: Spanish or English.
- License manager: Active/deactivate the software.
- Output directory: Output directory where the exported data will be saved. A subdirectory will be created for each study.

5. Define and visualize

The study menu allows you to manage events and segments, and to visualize the temporal dynamics of the biometrics at individual and group level.

The information of the study as defined in SennsLab can be accessed by **pressing the "i" (information) button**, placed next to the name of the study in the upper left corner of the screen.



The screenshot shows a dialog box titled "SennsMetrics" with a close button (X) in the top right corner. The dialog is titled "Study card" and contains the following fields:

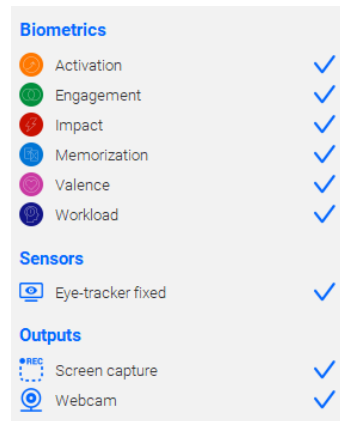
Field	Value
Objectives	Demo study to familiarize with SennsMetrics
Sample description	
Template	Image Passive
Scope	International
Type	Entertainment
Type (if other)	
Research field	Other activities
Research subfield	Arts, entertainment and recreation
Research subfield (if other)	
Region	Aragon, Spain

At the bottom right of the dialog, there are two buttons: "Cancel" and "Ok".

5.1 VISUALIZATION SCREEN

This screen allows to access the individual or group Viewer.

In both cases, the right panel informs about the available biometrics, position sensors, and behavioral recordings for the selected task.



The list of biometrics, sensors and behavioral recordings depends on the SennsLab design. In each of them appears a tick mark. This mark shows whether the element was enabled for a participant (individual level) or a group (group level). An enabled element indicates that the recording was correct.

In case an element appears as disabled, it might be due to different motives (keep the cursor over the tick mark to check it). The motives can be:

- **Excess of noise:** The signal quality was not good due to sensors were not placed correctly , excessive movements of the participant during the recording, etc.
- **Acquisition problems:** The signal was not registered due to communication errors, the state of the device (low battery).
- **Not recorded:** The device was not included in the study execution.
- **Recording not valid for processing:** The recording is not valid for the processing (e.g., calibration in some templates was not completed).

In the group viewer, an element appears as disabled when such element is disabled in all the participants that belong to that group.

Click the button "View" in the right panel or double-click in a Participant or Group to access the View. See section "Individual and group Viewer".

Note: Group level visualization is only available in tasks with a fixed time.

Focus studies: Group level visualization is replaced by Session level visualization.

Individual analysis: shows a table of Tasks and Participants.

Tasks		
	ID	
	 t01: Video1	
	 t02: Video2	
	 t03: Video3	

Participants		
	ID	
	 1	
	 2	
	 3	

Group analysis: shows a table of Tasks and Variables-Groups.

Tasks		
	ID	
	 t01: Video1	
	 t02: Video2	
	 t03: Video3	

Variables		
	ID	
	all	
	age	
	gender	

Groups			
	ID	n.Subj	
	older than 30	2	
	younger than 30	1	

Table "Tasks" shows:

- Group level icon: reflects whether the task allows group level visualization.
- Events status icon: reflects the event's status.
- ID: Name of the task.

Table "Participants" shows:

- Participant status icon: it can reflect that data was recorded correctly or not (e.g., unregistered, or signals recorded with technical problems).
- Events status icon: reflects the events status.
- ID: ID of the participant (composed by the station ID and the participant's name).
- View button: access the sociodemographic data recorded in SennsLab.

Table "Variables" shows:

- Events status icon: reflects the event's status.
- ID: ID of the segmentation variable.

Table "Groups" shows:

-
- Events status icon: reflects the event's status.
 - ID: ID of the group.
 - N. Subj: number of participants that compose the group.
 - View button: access the IDs of the participants and their sociodemographic data

5.2 MANAGE EVENTS

This screen allows to create new events, duplicate, convert, and remove them⁴. The events are specific to each task and, therefore, the task must be initially selected. The three grouping levels are separated into different tables.

Note that the IOIs and AOIs of an event must be defined in the Viewer.

Select task: t01: Video1 

Events are specific to each task, select a task first.

Shared, common time Add +

Shared event, all participants share the same time intervals (IOIs) and areas of interest (AOIs).

ID	n.IOIs	
 all	1	    
 jump-1	1	    
 jump-2	1	    

Shared, specific time Add +

Shared event, each participant defines specific time intervals (IOIs) and areas of interest (AOIs).

ID	n.Subj.
----	---------

Individual Add +

Individual event, not taken into account in group analysis.

ID	Subj.	n.IOIs
----	-------	--------

Each table shows the following fields:

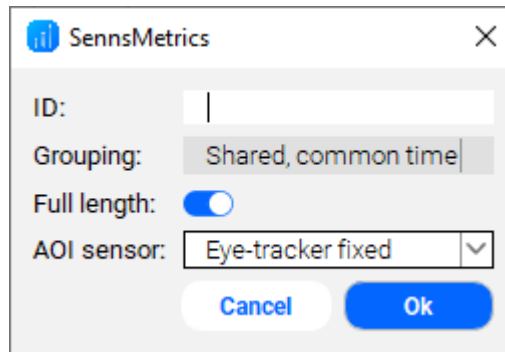
- Checkbox  allows to make the event visible or hidden. Hidden events are not shown in the Viewer and the Analyze screens. They will be exported.
- IOI  /AOI  icons.
- ID: name of the event.
- Properties
 - Shared, common time: shows the number of intervals (n.IOIs).
 - Shared, specific time: shows the number of participants with defined intervals, click on the View button to see the number of intervals per participant.
 - Individual: shows the participant and the number of intervals.
- View button: access the event properties.
- Duplicate button: duplicate an event, it adds a string "(copy)" to the ID.
- Convert button: converts the grouping level of events: shared events of common time can be converted to shared events of specific time; shared events of specific time can be converted to individual events.
- Edit button: edit the event properties.
- Remove button: remove the event.

Create an event: If you want to create a new event, click on Add. 

⁴ In case events have been previously defined in SennsLab, it is not possible to delete them.

The following fields must be defined:

- ID: name of the new event.
- Grouping: nature of the event to be defined.
- Full length: creates a single interval whose duration is the total of the task.
- AOI sensor: select "None" to define an IOI Event; or a sensor for an AOI Event.



The screenshot shows a dialog box titled "SennsMetrics" with a close button (X) in the top right corner. The dialog contains four fields: "ID:" with an empty text input; "Grouping:" with a dropdown menu showing "Shared, common time"; "Full length:" with a toggle switch that is currently turned on; and "AOI sensor:" with a dropdown menu showing "Eye-tracker fixed". At the bottom of the dialog are two buttons: "Cancel" and "Ok".

5.3 MANAGE SEGMENTS

This screen allows defining new segmentation variables and groups.

Variables

Add +

ID	
all	 
age	 
gender	 

Groups

Add +

ID	n.Subj	
older than 30	2	 
younger than 30	1	 

Participants

ID	
1	
2	

Create variable: Click on "Add" in the Variables table and define a name.

Create group: Select a variable and then click on "Add" in the Group table.

ID: man

All participants

ID	Group
1	older than 30
3	younger than 30

Group participants

ID
2

→

←

Participant card

ID (number)	2
Run number	2
Birth year	1985
Sex	Male
Birth country	Spain
Residence country	Spain
Marital status	Married
Educational attainment	Bachelor's or equivalent level 
Employment status	Employed 
Social grade	Social Grade B (Middle class) 

Cancel

Ok

The participants can be assigned to the target group using the left-right buttons. The socio-demographic information of the selected participant is shown in the right panel

The "Run number" field denotes the recording number in SennsLab and can be used to recognize participants that might have been recorded together (might be useful to analyze a Focus group).

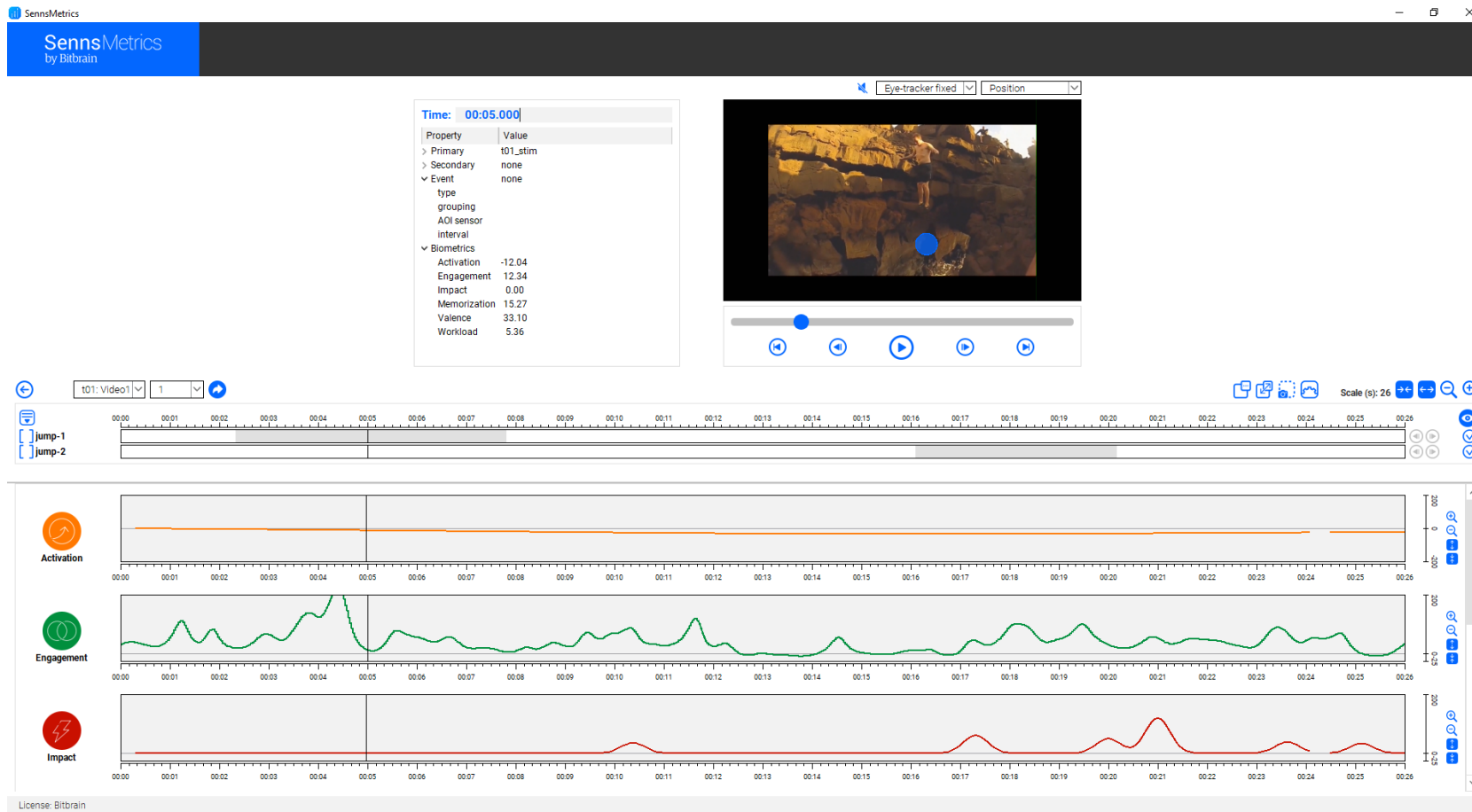


Figure 1: Individual Viewer in view mode

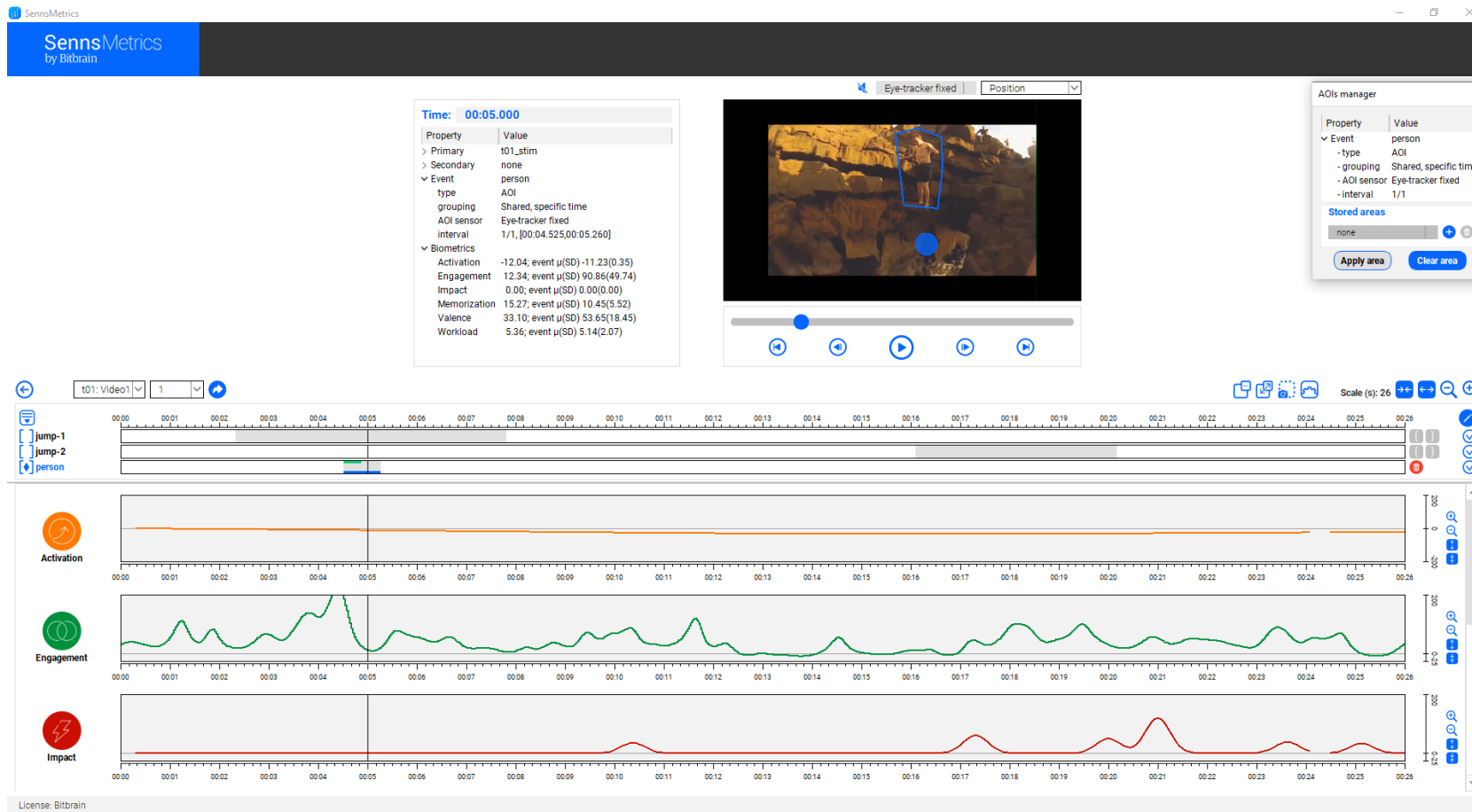


Figure 2: Individual Viewer in edition mode

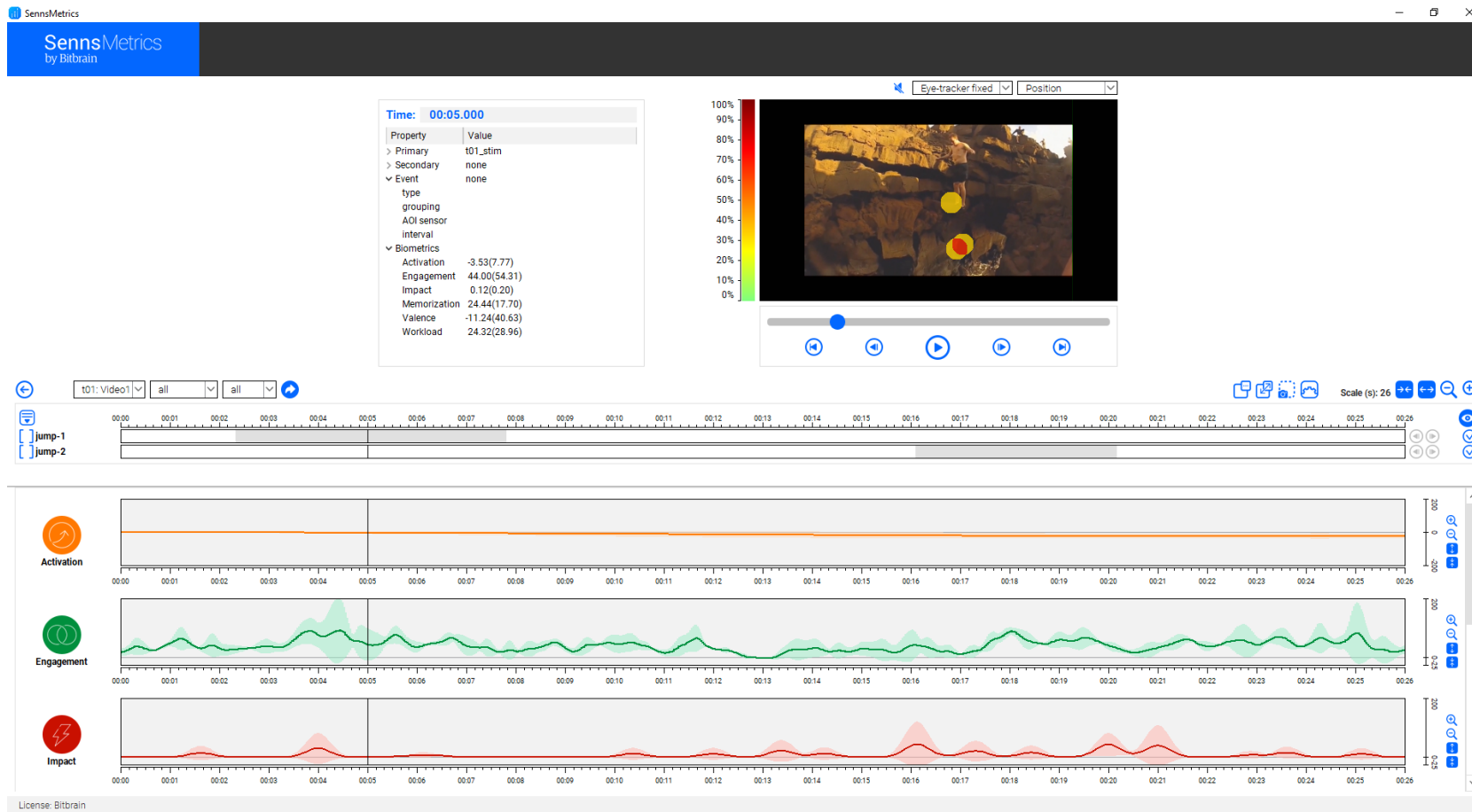


Figure 3: Group Viewer in view mode

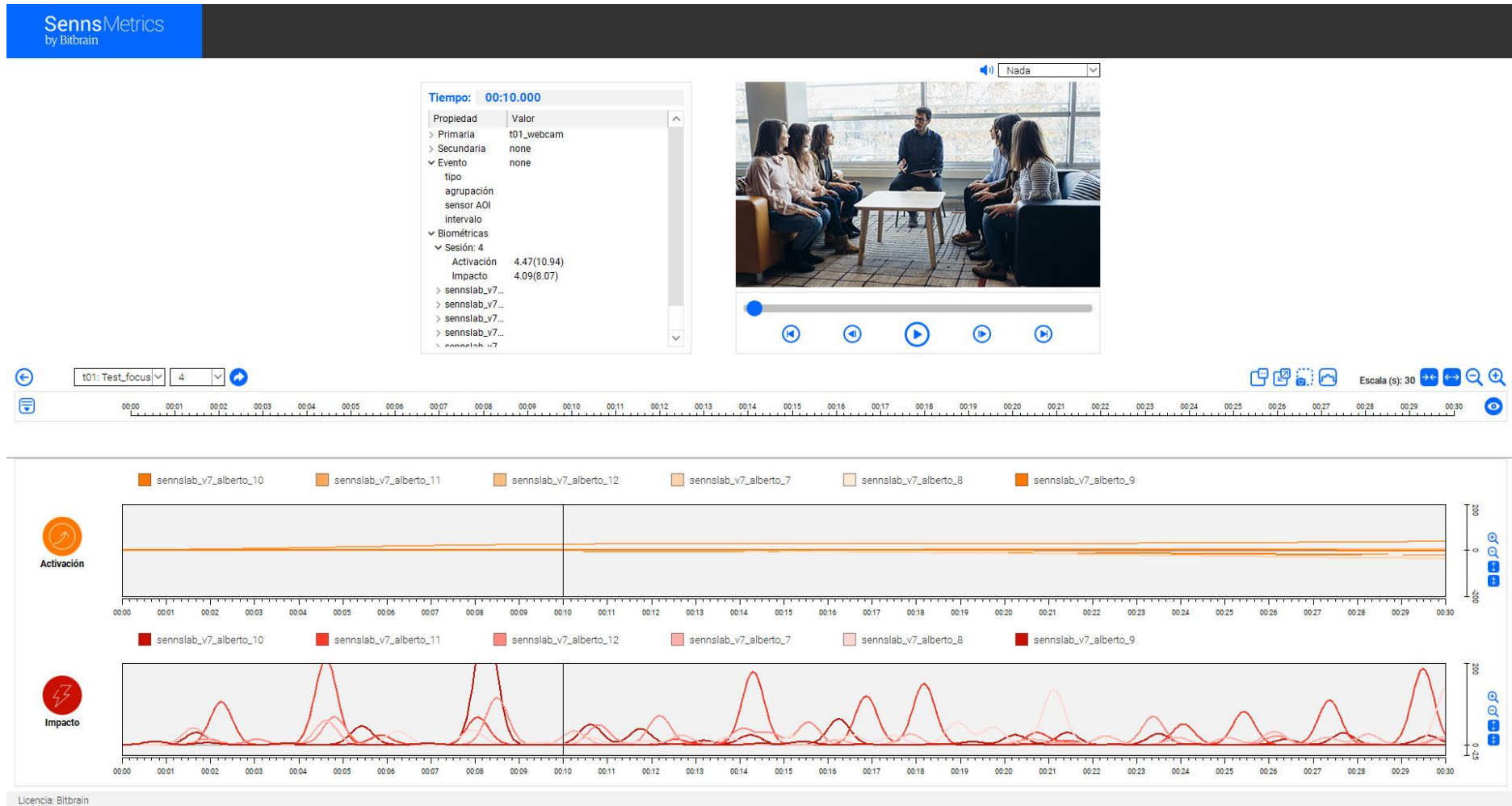


Figure 4: Focus studies, Session Viewer (individual participants)

6. Individual and group Viewer

The individual Viewer is shown in Figures 1 and 2 (view and edition modes), while the group Viewer is shown in Figure 3. In the following description, the different behavior and functionalities of the individual and group Viewer will be marked in *italic*.

Note: *The group Viewer will only show "shared, common time" events.*

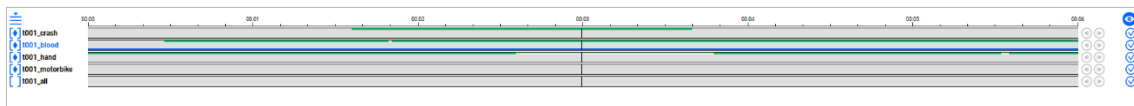
Focus studies: *The session Viewer will only show "shared, common time" events.*

Tip: Use *Control+1* or *Control+2* shortcuts to copy the primary or secondary display (respectively) to the Windows clipboard, so that you can paste it on any other application (Word, Paint, etc.).

6.1 VIEW AND EDITION MODES

The Viewer presents two operation modes: the view mode allows to analyze the averaged values of the events, and the edition mode allows to create new events and define IOIs and AOIs.

Click on  to switch between view and edition modes.



6.1.1 View mode

In the view mode, the researcher can click on an event and IOI to analyze its values in the Information console. In addition, the buttons on the right can be used ( ) to jump between the IOIs of the event (Shortcut: Shift + left / right arrow, respectively).

Every event line or track shows the following information:

- The lower blue line denotes the selected event.
- Time points belonging to an IOI are displayed in grey color (background).
- In AOI Events, the upper green line shows the time points in which the AOI is congruent (e.g., the eye-tracker fixation is inside the defined region of interest). Every interval must have an area of interest, otherwise, the Event is marked as incomplete, and the background is displayed in red color. **The group viewer shows the upper green line when the AOI is congruent in at least one of the participants.*

Congruency rules

- Congruency is computed using raw positions except for the eye-tracker sensors that use fixations.
- In the case of the mouse sensor, there is an additional level of congruency which checks whether the position is inside the AOI and clicked. This congruency is displayed in darker green color.

6.1.2 Edition mode

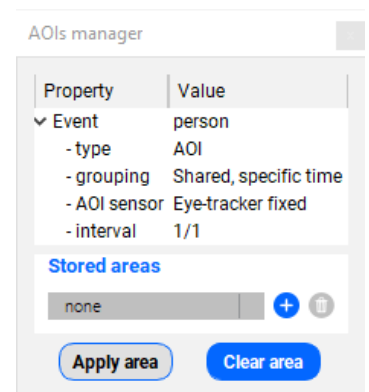
In the edition mode, the researcher can define new IOIs (and an area of interest for each one) to previously defined events.

- Define an IOI: select the start time and then click on the button . Then, place the time marker at the end of the interval and press the button . Alternatively, you can click on the start time and then click again in the end time while pressing the Shift key.
- Remove an IOI: select an IOI and then use the Supr key.

Define an AOI

In case of AOI event, define the AOI using the pop-up window on the top right corner of the viewer:

- Define an area: click on the image to create an area of interest and click on "Apply area" button (or press the Enter key). Note that the first and last points will be automatically connected.
- Delete an area: click on "Clear area" button.
- Store areas: Areas can be stored when they need to be reused in another event and/or participant.



AOIs manager

Property	Value
Event	person
- type	AOI
- grouping	Shared, specific time
- AOI sensor	Eye-tracker fixed
- interval	1/1

Stored areas

none  

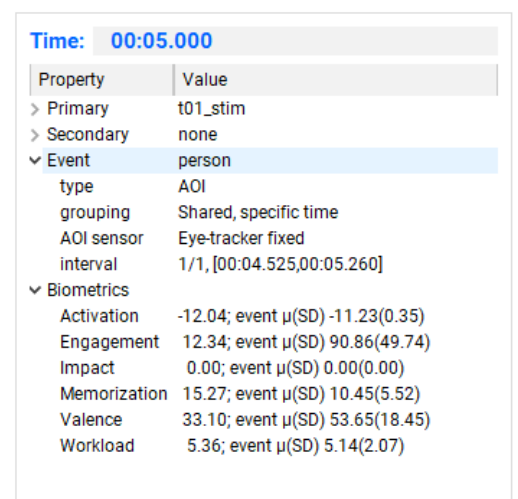
Apply area **Clear area**

6.2 VIEWER ELEMENTS

6.2.1 Information console

It shows information corresponding to the time instant and selected event.

A value can be entered in the time box to seek that time instant (either a number in milliseconds or a text string in the format mm:ss.zzz [minute, second, millisecond]).



Time: 00:05.000

Property	Value
> Primary	t01_stim
> Secondary	none
▼ Event	person
type	AOI
grouping	Shared, specific time
AOI sensor	Eye-tracker fixed
interval	1/1, [00:04.525,00:05.260]
▼ Biometrics	
Activation	-12.04; event μ (SD) -11.23(0.35)
Engagement	12.34; event μ (SD) 90.86(49.74)
Impact	0.00; event μ (SD) 0.00(0.00)
Memorization	15.27; event μ (SD) 10.45(5.52)
Valence	33.10; event μ (SD) 53.65(18.45)
Workload	5.36; event μ (SD) 5.14(2.07)

The information console shows the following fields:

- Primary:** Name of the stimulus in the primary (left) display.

- Type: nature of the stimulus (image or audiovisual)
- **Secondary:** Name of the stimulus in the secondary (right) display.
 - Type: nature of the stimulus (screen capture, glasses, webcam)
- **Event:** Name of the event
 - Type: IOI/AOI
 - Grouping: 'shared, common time'; 'shared, specific time'; 'individual'
 - AOI sensor: Position sensor in an AOI event.
 - Interval: Number of IOIs defined, if one is selected shows the start-end time.
- **Biometrics:** Set of biometrics
 - It shows the value at the selected time point. **The group viewer shows the mean and standard deviation at the selected time point.*
 - In case an interval is selected, shows the mean and standard deviation.

6.2.2 Display console

It shows the displays (primary and secondary ones) and the controls to play the images/videos.

The primary display shows the stimulus associated with the task (if any) while the secondary display shows the behavioral recordings of the participant (if any) such as the screen capture, webcam, or video recorded with the Tobii Pro Glasses. When multiple recordings are available for the secondary display, the researcher can switch among them in the Menu area.

** The group viewer does not show a secondary display (not shared information among participants).*

The position sensors are displayed on top of the display:

- At the individual level raw positions are shown as a blue dot:
 - For the eye-tracker, the researcher can switch between raw positions and fixations.
 - For the mouse, the dot changes to red color when clicked. Note that for visualization purposes, the red dot appears in the [-200, 200] ms relative to the actual click.
- At group level heat maps are shown for each time instant:
 - For the eye-tracker, heat maps use raw positions.
 - For the mouse, the researcher can switch between raw positions and clicks.

Each display provides a set of buttons / features at the top:

- Audio: Activate or deactivate the audio (applies only to videos).
- Position sensors: select the position sensor ("None" to disable).

The reproduction area provides the following buttons / functionalities, from left to right:

- Backward a time window (Shortcut: Ctrl + left)
- Backward one step (Shortcut: left)
- Play: play or pause (Shortcut: space bar)
- Forward one step (Shortcut: right)
- Forward a time window (Shortcut: Ctrl + right)

6.2.3 Menu area

Switch tasks and participants, display functionalities and scale configuration.

Control logic:

- Return to Home. 
- Drop-down list of tasks and participants. * *The group viewer displays a drop-down list of tasks, segmentation variables and groups.* 
- Reload: Loads the selected data in the previous drop-down lists. 

Display functionalities:

- Configure display: media to be shown in each display and its size. 
- Extend: Move the Information and Display Console to a secondary monitor. Note that the secondary monitor must be properly configured as an "extended monitor". 
- Screenshot: Save a screenshot. 
- Advanced configuration: Allows selecting some options such as:
 - Backward/advance step.
 - Playback rate (x1.0, x1.5, x2.0, x3.0)
 - Show or hide the dynamics variability (in group view).
 - Focus studies – session viewer: select plot options (aggregated or individual biometrics, and selection of participants). Note that this option affects only the visualization, not the events computation, which will be still based on all the participants belonging to the session.

Scale configuration (affects all the biometrics):

- Reduce scale to 5s (minimum 5 seconds)
- Reduce scale 1s (minimum 5 seconds)
- Increase scale 1s (maximum defined by task)
- Increase scale to the maximum available

Escala (s): 26    
(Shortcut: Ctrl+4)

(Shortcut: 4)

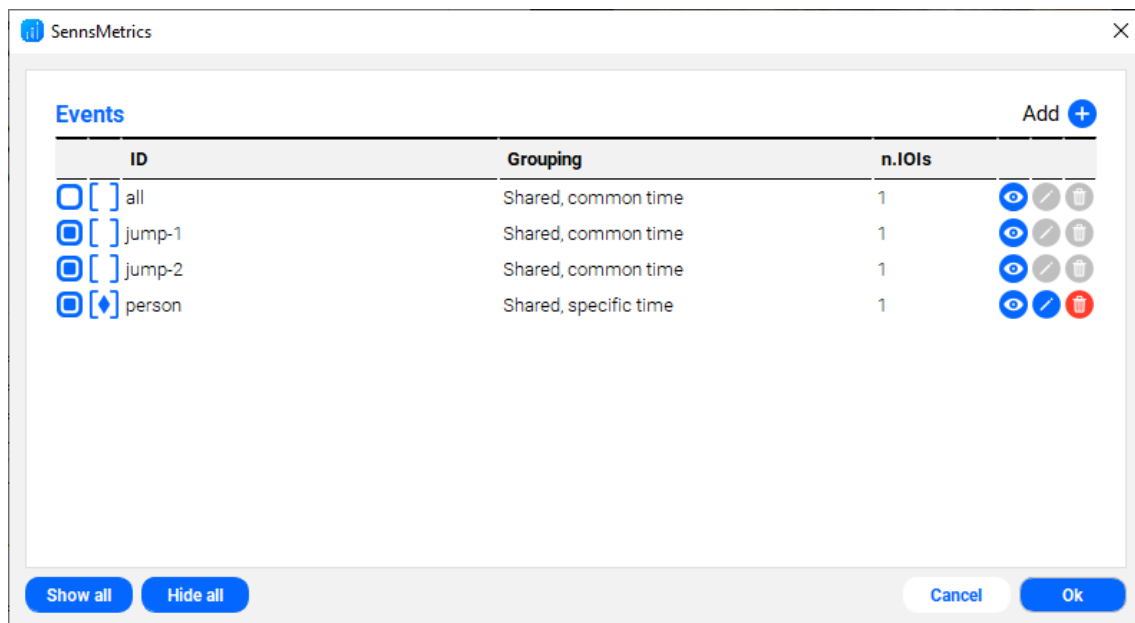
(Shortcut: 6)

(Shortcut: Ctrl+6)

6.2.4 Events area

Create, edit, delete, and manage events.

Event manager: Click on button  to open the event manager.



It shows a table with the defined events and the following fields:

- **Checkboxes:** select the events to be displayed in the Viewer.
 - Buttons "Show all" or "Hide all" modify these buttons.
- IOI / AOI  .  icon.
- ID: name of the event.
- Grouping: nature of the event.
- n.IOIs : number of defined intervals.
- View: show the event properties.

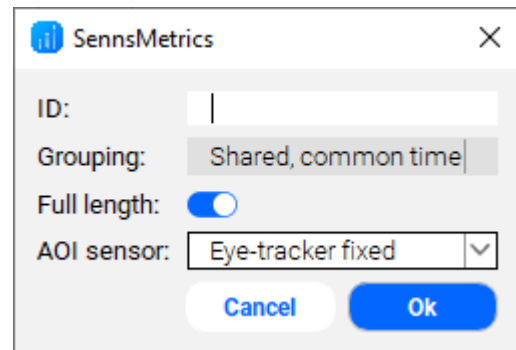
- Edit: edit the event properties (except the grouping level).
- Delete: delete the event.

Add a new event

To add a new event, click on  (or use the shortcut *Shift+a* from the main Viewer screen).

The following fields must be defined:

- ID: name of the new event.
- Grouping: nature of the event.
- Full length: create a single interval whose duration is set to the task duration.
- AOI sensor: position sensor for an AOI Event, **select "None" to define an IOI Event.**



The screenshot shows a dialog box titled "SennsMetrics" with a close button (X) in the top right corner. It contains the following fields and controls:

- ID:** A text input field with a vertical cursor.
- Grouping:** A dropdown menu showing "Shared, common time".
- Full length:** A toggle switch that is currently turned on (blue).
- AOI sensor:** A dropdown menu showing "Eye-tracker fixed".
- At the bottom, there are two buttons: "Cancel" (light blue) and "Ok" (blue).

6.2.5 Biometrics area

Shows the temporal dynamics of a set of biometrics. **The group viewer shows the mean and standard deviation of the temporal dynamics.*

Visualization properties (scale and widget height) for each metric:

- Zoom in
- Reduce zoom
- Increase window size
- Reduce window size



6.3 EVENT STATUS

The event status allows to quickly check whether an event is correctly defined (i.e., it has at least one interval of interest and, in the case of AOI events, all the intervals of interest have one area of interest).

The status appears in the right part of the Viewer indicating:

	Correct: event correctly defined.
	Undefined: "shared, specific time" event that is undefined for the participant. This warning indicates to the researcher that it might need a revision. If it is correct, click on the icon to change it to Acceptable.
	Acceptable: "shared, specific time" event that is considered acceptable by the researcher (i.e., the participant has not IOIs in the event, and it is Ok). Click on it to change to Undefined.
	Incorrect: event not defined correctly. In the case of an AOI event, some of the intervals do not have an area of interest.

It also appears in the Task and Participant-Group tables in the Visualize screen, indicating:

	Correct: all events in the Participant or Group are correctly defined.
	Acceptable: at least one event in the Participant or Group is Acceptable.
	Undefined: at least one event in the Participant or Group is Undefined.
	Incorrect: at least one event in the Participant or Group is Incorrect.

As a general guideline, the research must check the status of the event in the Visualize screen and proceed with the analysis only when the status is Correct or Acceptable.

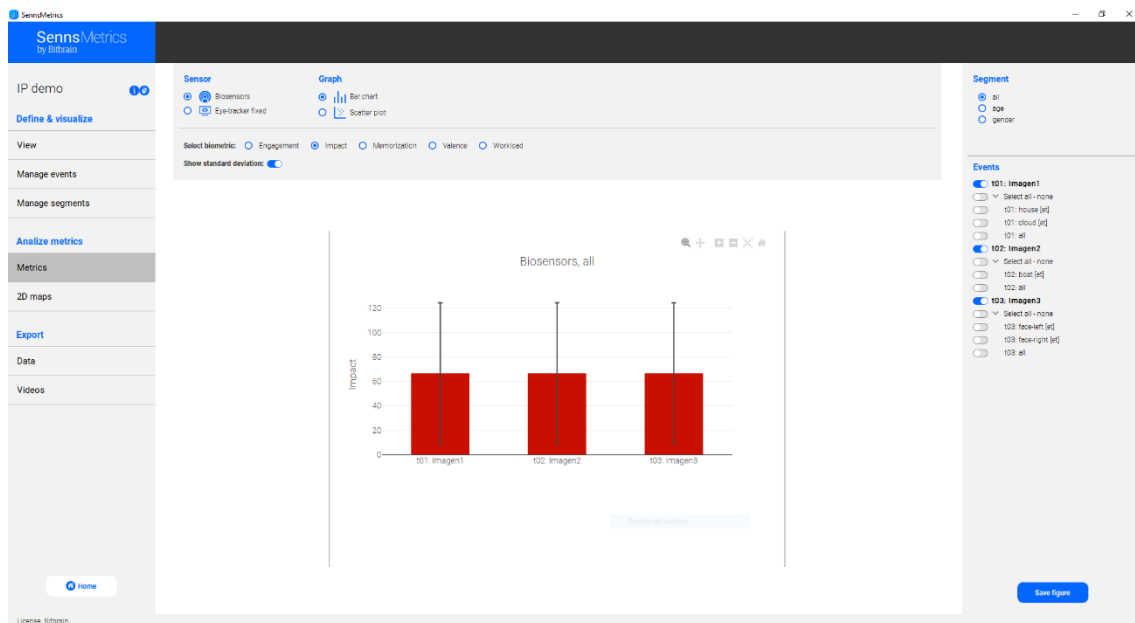
7. Analyze metrics

It allows to visualize the aggregated results of the cognitive/emotional biometrics and position sensors; generate 2D maps (e.g., heat maps) for the position sensors; and export both the raw data and aggregated results to Excel for further analysis.

Tip: Use *Control+c* shortcut to copy the graphs to the Windows clipboard.

7.1 BIOMETRICS AND POSITION METRICS

This screen allows to visualize the aggregated results for the Biometrics and position sensors.



Upper section: The upper section allows selecting:

- Type of metrics (Biometrics or position metrics).
 - Biometrics analysis requires to select the “Biosensors” button.
 - Position metrics analysis requires to select a specific sensor.
- Type of graph (bar chart or scatter plot).

The lower section shows a configuration that depends on both the type of metric and graph. In Biometrics analysis a biometric must be selected, whereas in position metrics one of the derived metrics must be selected (see Annex 1).

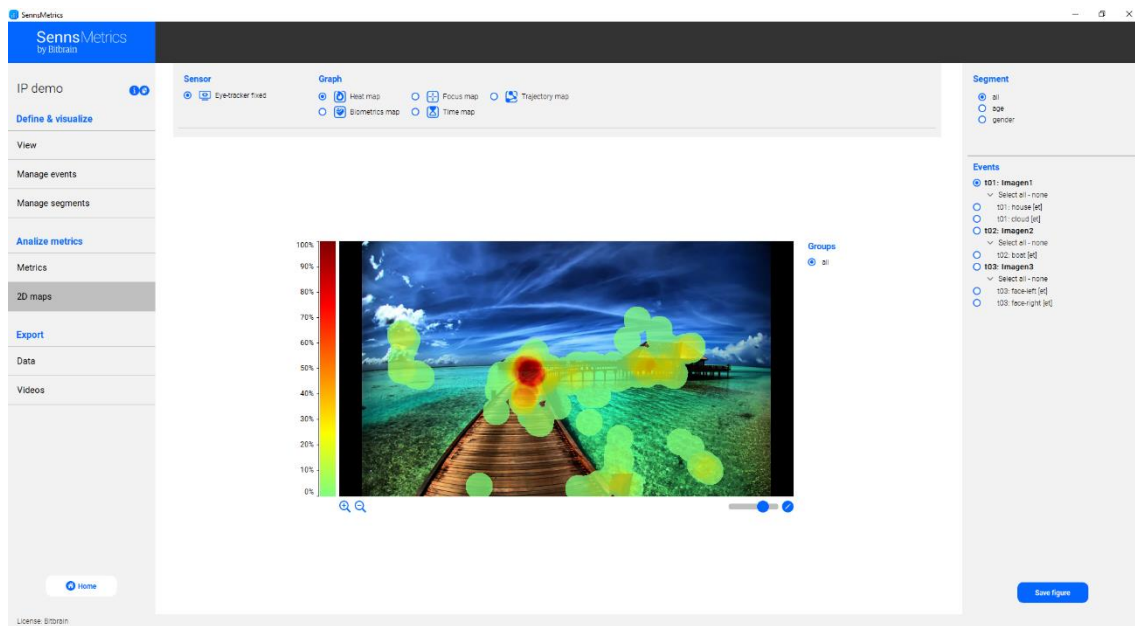
Right panel: The right panel allows selecting:

- A segmentation variable (single selection). In focus studies the session will be added.
- A set of events for each task (multiple selection).
 - The full tasks are denoted in bold font and are selected by default.
 - **Note that when a spatial sensor is selected, the events panel will only show the AOI events that use that specific sensor.*

7.2 2D MAPS

This screen allows to visualize the 2D maps for position sensors such as heat maps, focus maps, time maps, trajectory maps; and maps related to clicks in the case of mouse such as click focus map and click trajectory map. In addition to this, heat maps can be merged with the biometrics to generate emotional heat maps for any of biometrics.

See Annex 1 for an explanation of the different 2D maps.



Upper section: The upper section allows selecting:

- Position sensor (from a list of available ones).
- Graph type. In case of heat maps, the lower section allows to generate emotional maps for any of the biometrics.

Right panel: The right panel allows selecting:

- A segmentation variable (single selection).
- An event (single selection).
 - The full task is denoted in bold font. In case an event defined by the researcher is selected, the values of the derived metrics and area of interest will be displayed.

**Note that the panel will filter the AOI events for the selected position sensor.*

Lower section: The lower section allows (from left to right) to:

- Increase the map scale.

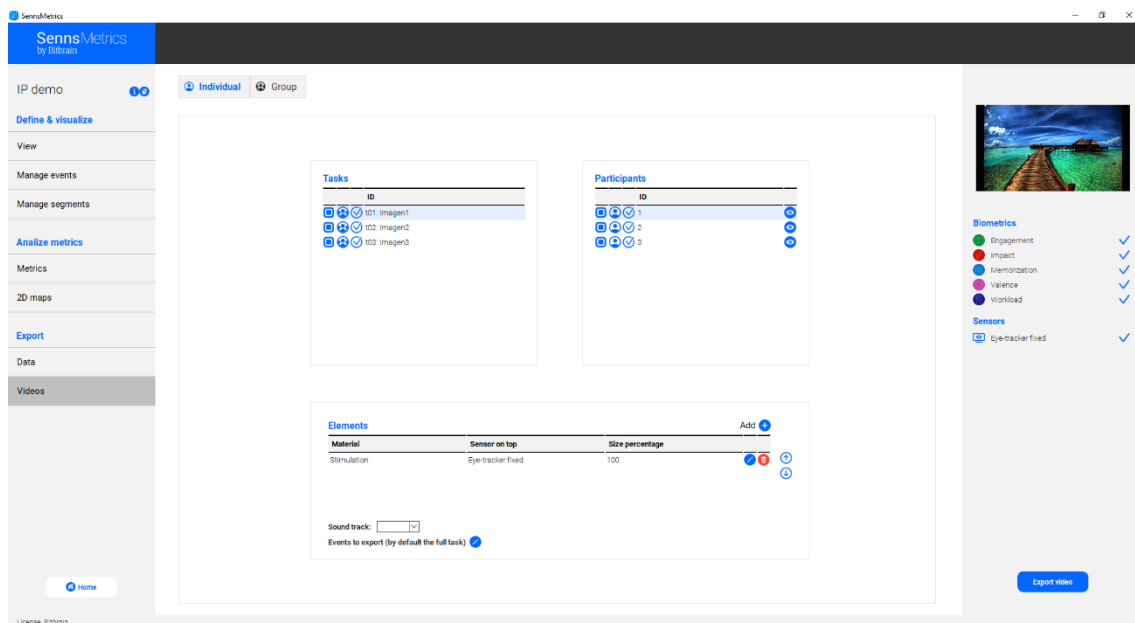
-
- Reduce the map scale.
 - Change the transparency of the maps.
 - Change the color of the area of interest.

8. Export

It allows to export the data (both the raw data and the aggregated results) and generates videos with the stimuli and temporal dynamics of the metrics at individual and group level.

8.1 GENERATE VIDEOS

This screen allows generating videos with the stimuli and temporal dynamics of the metrics at individual and group level. Note this is a computationally expensive operation that will block the software until all the videos are exported.



Central panel: The central panel allows selecting:

- **Upper tables:** tasks and participants (individual level), or the tasks and segment variables (group level). Use the first checkbox to select multiple tasks-participants (or segment variables) to be exported in batch mode.
- **Bottom table:** multimedia materials and soundtrack to be included in the generated videos. The order of the materials determines their position in the generated video (from top to bottom on the left side of the video), use the arrows on the right side of the table. For each material, the following parameters can be selected:
 - Sensor on top: sensor to be displayed on top of the material (e.g., eye tracker over stimulation, mouse over screen capture)
 - Size percentage: relative space that the element takes in the generated video (number from 1 to 100).
 - Focus studies – session viewer: select plot options (aggregated or individual biometrics).

By default, the videos of the complete tasks are generated. Click on the “Events to export” button to export video clips from specific events (see next subsection).

Generated videos: The next figure shows a snapshot of a generated video.

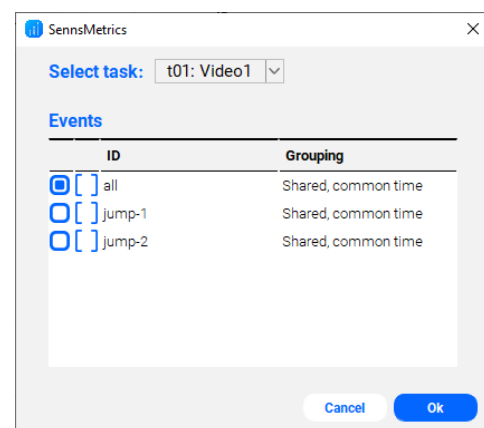


The left part of the video displays the multimedia materials (stimuli, screen capture, webcam, video glasses) and the right part is the biometrics. The order of the materials defined in the bottom table determines the order in which the multimedia materials are placed in the left part (from top to bottom).

8.1.1 Video clips - events

By default, the videos of the complete tasks are generated. Click on the “Events to export” button. This opens a pop-up window where specific events can be selected for each task.

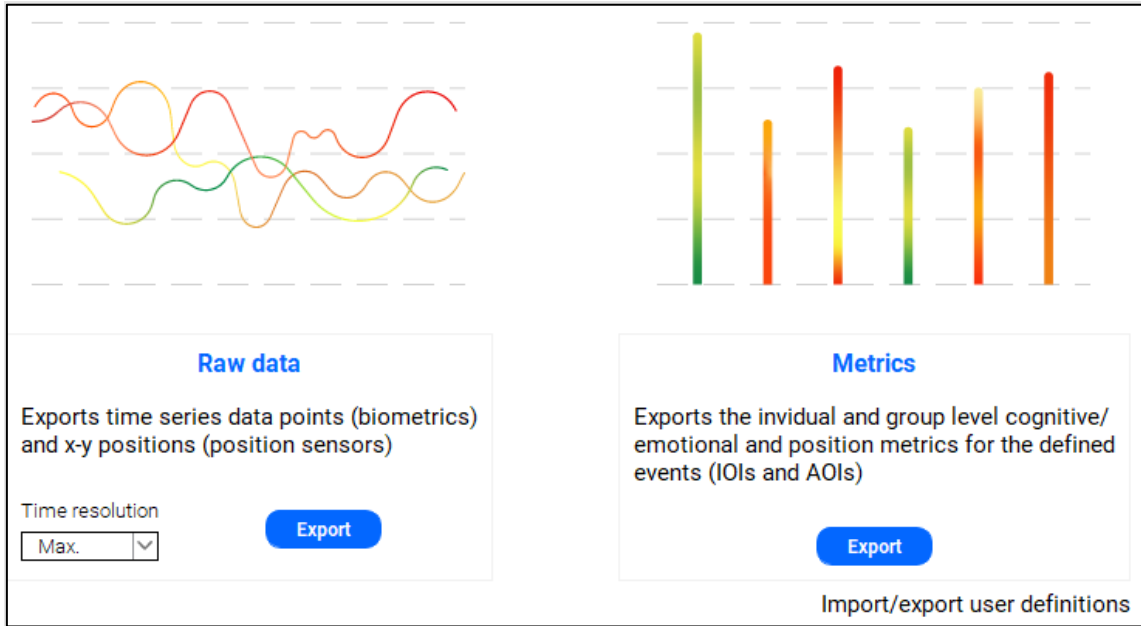
Note that in case an event is composed of multiple intervals of interest, multiple video clips are generated (one for each interval).



8.2 EXPORT DATA

This screen allows to export the data to Excel format:

- **Raw data:** time series data points (biometrics) and x-y positions (AOI sensors)
- **Metrics:** individual and group level (for the defined segments and groups)



Raw data

Exports time series data points (biometrics) and x-y positions (position sensors)

Time resolution
Max. ▼

Export

Metrics

Exports the individual and group level cognitive/emotional and position metrics for the defined events (IOIs and AOIs)

Export

Import/export user definitions

In addition, it allows exporting and importing user definitions (events and segmentation variables and groups), which is useful to transfer the software to another computer.

8.2.1 Raw data

Overview: raw data contains the time series data points (along with the time) for the biometrics and position sensors.

- **Biometrics:** a vector of value and quality
- **Position sensors:** a vector of x-y position, quality, and click in case of recording with the Mouse

Detailed description: Excel files are exported for each participant and for each segment-group (in case of fixed time tasks that can be aggregated among participants).

Focus studies: Excel files are exported for each session group.

Each file has a sheet per task. For each task, the following columns are displayed:

- **Time (s):** time point (seconds). The time resolution can be selected in the graphical interface: maximum resolution, or one value every 125 or 250 milliseconds.
- **Values:** the value of the biometric or (x, y) values of the position sensor.
 - Individual level: biometrics show a value, position sensors (x, y) values.
 - Group level: biometrics show the mean and standard deviation (std), position sensors aggregate the (x, y) values for each participant.

In the case of the mouse sensor, a third value 'click' is added that indicates whether the mouse was clicked or not.

Note that the (x, y) values for the position sensors are normalized in the [0-1] range, so the pixel number can be retrieved multiplying the normalized values by the corresponding number of pixels in the (x, y) screen dimensions, respectively.
- **Quality:** indicates whether a data sample was recorded with good quality (quality = 1) or not (quality = 0).
- **Events:** a column is added for each event (note that group level files only show 'shared, common time' events). Each sample contains one of the following values (in parenthesis, we explain how it is represented in the Viewer):
 - Value = 0: sample does not belong to any IOI (white background).
 - Value = 1: sample belongs to an IOI (gray background)
 - Value = 2: sample belongs to an IOI and is congruent with the AOI (light green upper line). This value is set at group level when at least one participant matches the condition.
 - Value = 3 (specific value for the mouse sensor), sample belongs to an IOI and is congruent with the AOI and was clicked (dark green upper line). This value is set at group level when at least one participant matches the condition.

- **Markers:** a column is added for each marker (only at individual level files) and displays the corresponding value in its time point.

8.2.2 Metrics

The values in the cognitive/emotional metrics are exported automatically (in Excel format) at individual and group level. In addition, an 'info' Excel contains study information.

Info file: contains the following study information

- Study sheet: contains the ID and name of the study.
- Segments sheet: contains the list of segmentation variables. Each variable contains:
 - List of groups, with each group containing the list of assigned participants.
- Events sheet: contains the definition of the events and the status.

Individual level: an "individual" Excel is exported that contains a sheet for each task. Each task sheet contains a table for the Biometrics and one table for each position sensor.

Biometrics table: contains the following information

EVENT	ID: identifier Type: IOI/AOI. Grouping level: "shared, common time", "shared, specific time", "individual"
PARTICIPANT ID	
BIOMETRICS	Value: average result across time Duration: duration (derived from the number of data points) used to compute the value

Position sensor table: contains the following information

EVENT	ID: identifier Type: IOI/AOI. Grouping level: "shared, common time", "shared, specific time", "individual"
PARTICIPANT ID	
AOI METRICS Depend on the position sensor	Value: value for each metric

Group level: an "aggregated" Excel is exported that contains a sheet for each task. Each task sheet contains a table for the Biometrics and one table for each position sensor.

Biometrics table: contains the following information

EVENT	ID: identifier Type: IOI/AOI. Grouping level: "shared, common time", "shared, specific time", "individual"
SEGMENT	Var: segmentation variable ID Group: group ID
BIOMETRICS	Mean: average of values across participants Std: standard deviation of values across participants Duration: average of individual's participant duration Num. participants: number of participants on which the results were computed. *Note that it may be less than the total number of group participants if an event is undefined for any participant.

Position sensor table: contains the following information

EVENT	ID: identifier Type: IOI/AOI. Grouping level: "shared, common time", "shared, specific time", "individual"
SEGMENT	Var: segmentation variable ID Group: group ID
AOI METRICS Depend on the position sensor	Visited? / Clicked?: display the number of participants that visited/clicked the AOI Remaining metrics: average and standard deviation of the individual's metrics.

9. Annex 1: Biometrics and position sensors

9.1 BIOMETRICS DEFINITION

Each of the biometrics calculated in SennsCloud is defined below. Specific biometrics require a particular hardware interface and will function in certain SennsLab test templates.

Activation (Ring)



Hardware Required: Ring

Tests Supported: Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: Basal level of physiological activation produced by a stimulus or situation. Emotional activation may be due to a positive or negative emotional response. Activation is expressed in percentages based on a baseline defined during the calibration stimuli. Values less than 0 are associated with a state of relaxation or calm. Values higher than 0 are associations with a state of excitement. A value of -100% refers to the maximum relaxation response observed during calibration. A value of 100% refers to the maximum response seen in response to the calibration media. A value of more than 100% is possible if the calculated reaction exceeds that measured during the calibration.

Impact (Ring)



Hardware Required: Ring

Tests Supported: Passive Image Template*, Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: Emotional impact measures the number and intensity of point changes in the emotional state produced by a stimulus, external event, or in the performance of a task. In other words, Impact identifies something that is striking or produces excitement or stress. Impact is expressed as a percentage. A value of 0% means no impact. 100% equals the value measured in response to the calibration media. A value of more than 100% is possible if the calculated reaction exceeds that measured during the calibration.

* Impact is calculated as a binary response in the *Passive Image Template*. This information is meant to be useful in the aggregate (averaged over multiple participants).

Valence (EEG Diadem)



Hardware Required: Diadem EEG

Tests Supported: Passive Image Template*, Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: Measures the degree of attraction experienced in response to stimuli or a situation, from a positive / pleasant reaction to a negative / unpleasant reaction. Valence is expressed as a percentage. A value of 100% positive or negative equals the value measured in response to the calibration media. A valence level exceeding 100% (positive or negative) is possible if the calculated reaction exceeds that measured during the calibration.

* Valence is calculated somewhat differently in the *Passive Image Template* and requires some self-reporting for accurate calculation.

Memorization (EEG Diadem)



Hardware Required: Diadem EEG

Tests Supported: Passive Image Template, Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: This indicator measures the intensity of cognitive processes related to the formation of future memories during the presentation of stimuli or during an experience. Captures the degree of storage, encoding, and retention in memory. Memorization is expressed as a percentage. A value of 0% indicates that the chance that the stimulus will be remembered is low. A value close to 100% indicates a high possibility that the stimulus will be retained in the participants' memory.

Workload (EEG Diadem)



Hardware Required: Diadem EEG

Tests Supported: Passive Image Template, Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: Workload measures the neurological focus, or concentration of a participant when presented with stimuli or during experiences. In other words, it represents the use of cognitive resources to carry out a task or visualize a stimulus. Workload is expressed in percentages. Values close to 0% indicate that the participant is very distracted, while a value close to 100% indicates that they are very attentive to the stimulus.

Engagement (EEG Diadem)



Hardware Required: Diadem EEG

Tests Supported: Passive Image Template, Active Image Template, Passive AV Template, Active AV Template, Free Task Template, AV Recording Template, Focus Group Template, UX app pc Template, UX web pc template, UX web mobile template, Human Tracking Template

Definition: This is a measurement of the degree of involvement or connection between the participant and the stimulus or task. This is a more complex indicator than attention, as a participant can be attentive to a task even if the information presented is not of interest. Engagement is expressed as a percentage. A value close to 0% indicates no connection or link to the stimuli. A value close to 100% indicates high engagement with the stimuli or task.

9.2 METRICS DERIVED FROM THE POSITION SENSORS

The specific metrics for each position sensor are explained below.

- Eye-tracker fixed or mobile (Tobii)
 - **Visited?** Indicates whether there was a fixation⁵ within the AOI.
 - **Number of visits.** A visit is considered when a participant makes a fixation inside the AOI and the previous one made it outside of the AOI.
 - **Time to first fixation.** Time it takes for a participant to have a fixation on the AOI for the first time.
 - **Time visited.** Time a participant spends looking at the AOI (regardless of whether they do so on one or more visits).
 - **Number of fixations during.** How many times has a participant made different fixations in the AOI.
 - **Number of fixations before.** How many fixations has a participant made before his first fixation in the AOI.
- Mouse
 - **Visited?** Indicates whether the cursor was inside the AOI.
 - **Number of visits.** A visit is considered when a participant hovers within the AOI and was previously outside the AOI.
 - **Time to first visit.** Time it takes for a participant to go through the AOI for the first time.

⁵ The fixation calculates where the person is fixing the gaze. When using the Eye Tracker, you can have very fast movements from one point to another (raw positions), but that does not mean that the person was actually looking at those points. To calculate it, the Tobii algorithm is used. For more information see *"The Tobii I-VT Fixation Filter"*

- **Time visited.** Time a participant spends on the AOI (regardless of whether they do it on one or more visits).
 - **Clicked?** Indicates whether there was a click (left button) within the AOI.
 - **Number of clicks.** Indicates the number of clicks that have occurred within an AOI.
 - **Time to first click.** The time it takes for a participant to click on the AOI for the first time.
 - **Number of clicks before.** Number of clicks that occurred before the first click on the AOI.
- Localization (InTrack)
 - **Visited?** Indicates if the participant has passed within the AOI.
 - **Number of visits.** A visit is considered each time a participant enters the AOI.
 - **Time to first visit.** Time it takes for a participant to pass within the AOI for the first time.
 - **Time visited.** Time the participant remains within the AOI.

Note that the explanations above refer to the individual level. At a group level, the metric "Visited?" indicates if at least one participant has visited the AOI; and the remaining metrics show the mean and standard deviation of the participants that conform the group.

9.3 2D MAPS

2D maps can be generated from the position sensors considering all the time points over the defined intervals of interest. Note that these 2D maps can only be visualized when the target stimulus is an image.

- **Heat map.** The heat map allows knowing the areas that have been viewed/visited by the most people for the longest time. It is a combination of time and focus maps.
- **Focus map.** The focus map allows knowing the percentage of the sample that has viewed/visited an area.
- **Time map.** The time map allows knowing, from the sample who have looked at a certain area, how much average time they have spent in it.
- **Trajectory map.** The trajectory map presents the most representative trajectory of the trajectories followed by the participants.
- **Click focus map** (only available in case of Mouse sensor). It allows knowing the percentage of the sample that has clicked on an area.
- **Click trajectory map** (only available in case of Mouse sensor). It presents the most representative trajectory of the clicks followed by the participants.

10. Annex 2: Backup strategy

This annex provides a quick guide to make a backup of your data sources and user definitions, which can be useful for long term usage of the data or when transferring SennsMetrics to another computer.

Note that Bitbrain does not provide a hosting service for the studies and thus we only allow downloading the results once (per license). The researcher is responsible for managing (e.g., saving or creating backups) the results generated in the Cloud once they are downloaded.

10.1 DATA SOURCES

We refer with “data sources” to the SennsMetrics data that are downloaded from the Cloud service and contain the stimulus (image or video), biometrics, and behavioral recordings (screen capture, webcam). This information, when downloaded from the Cloud service, is stored in the “studies folder”, i.e., the “studies” subfolder within the SennsMetrics installation directory.

Note that, when a study is removed from the SennsMetrics graphical interface, the data is still accessible from the “studies folder”. Specifically, a “backup” subdirectory will be created in the “studies folder” with two subfolders:

- Sources subfolder: contains the data sources, which can be imported using the “Import a local study” function (see “Manage studies” section).
- User definition subfolder: contain the user definitions.

10.2 USER DEFINITIONS

We refer with “user definitions” to the definitions created by the researcher in terms of events (IOIs, AOIs), segmentation variables and groups, etc. These definitions can be exported and imported from SennsMetrics in the “Export data” graphical interface.

When exporting the user definitions, they are exported to a json file named “user_data.json”. Using the import option, the researcher can select a json file exported with SennsMetrics to load the definitions. Note that this will remove all current definitions.

10.3 TRANSFER THE DATA TO ANOTHER COMPUTER

The complete process is the following:

- Export the user definitions to the old computer and move the “user_data.json” file to the new computer.
 - When the study has been removed from the SennsMetrics graphical interface (studies table), this information is available in the user definition subfolder within the “studies folder” (see previous subsections).

-
- Copy the data sources from the “studies folder” to the new computer.
 - Deactivate the software license.
 - Activate the software license on the new computer.
 - Use the “Import a local study” functionality to import the data sources.
 - Open the study in SennsMetrics and import the user definitions in the “Export data” graphical interface.

www.bitbrain.com
info@bitbrain.com
