



Stratus EEG Release Notes

Software Version 5.0

What's New in Version 5.0?

Version 5.0 is entirely focused on the web software. Highlights include settings editors within the web platform where functionality has been extended from the installed software with a new permission model for settings items such as montages and perspectives. There are many other changes, over 60 enhancement requests and a number of fixed issues as well.

Authentication

Text MFA

The user can optionally request that the MFA confirmation code is sent as a text message to a cellphone rather than in an email. In order to send text messages, an account must be set up with GatewayAPI (<https://gatewayapi.com/>) and the token entered into the system.



Single Sign On

Stratus EEG web is compatible with external Identity Provider services (IdP) that support the SAML 2.0 standard in a way such that the system can be configured to use the IdP for authentication. If the Stratus Server has multiple Sites set up, different sites can use different IdP's.

Web browsers



Microsoft Edge has been added as a supported web browser. So, 5.0 has been tested both on Chrome and Edge. Firefox has been tested but is not compatible with the application.

Web Centrum

Server / Server transfer

Exams can now be transferred from one Stratus server to another. This is similar to exporting from one server and uploading to another server, except for that the data is not downloaded

to the user's PC but goes directly between the servers. Metadata such as EEG description and Impression is transferred as well.

The Server/Server transfer is accessed from the Export popup.

Export Exam

Export type *
External Server

Include: Video Attachments

Anonymize: No Yes

External Server Address *
https://demo50k.kvikna.com

Login *
support-gardar

Password *

Connect Connected

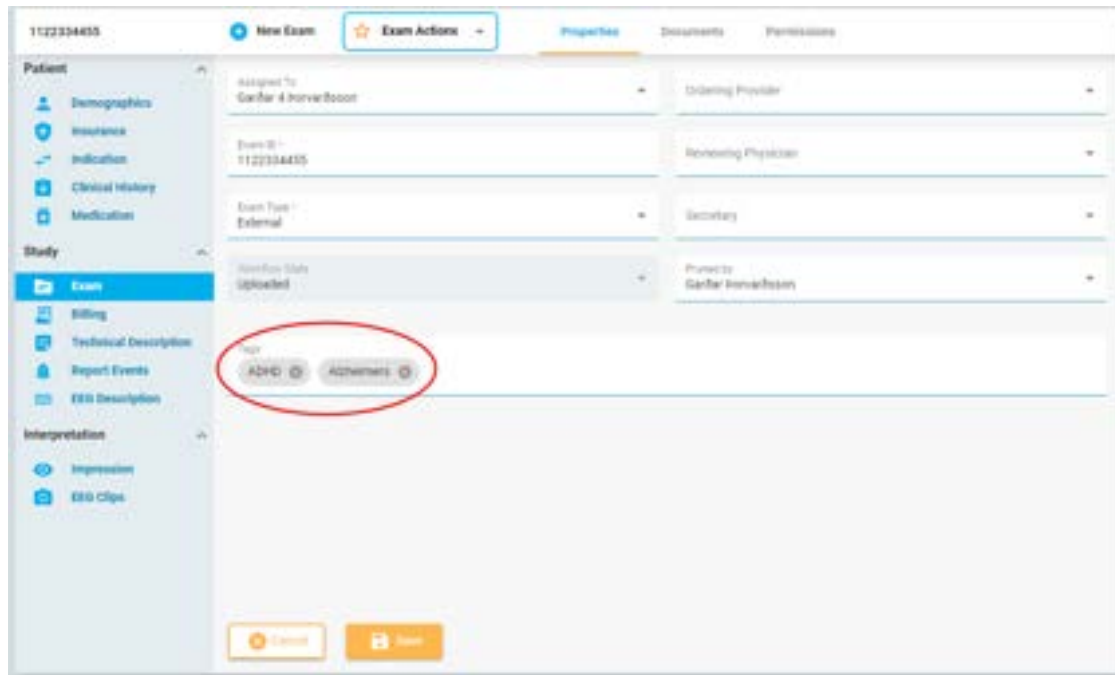
Exam Data will be uploaded to the External Server.

Cancel Export

Tags

Tags can be used to identify exams and later search for these exams. There are two types of tags, global and personal. Personal tags are managed through "My Tags" page while global tags management is only available for administrators.

In the visit list, it is possible to search for exams based on tags.



Speed test



The speed test can be helpful to diagnose problems. This measures the network speed between the client and the server. This differs from publicly provided internet speed tests in the way that it tests both the client and the server speed. This is accessed from the title bar.



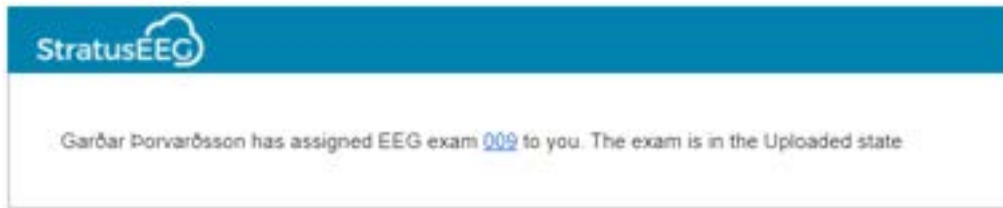
Welcome email

When a user is added, the new user will receive a welcome email from the system stating the URL to the service, user name and a link to set password.

The email is sent by the Windows Server SMTP service. Refer to Technical Manual on how to configure the SMTP service.

Email notification on assign exam

When an exam is assigned to a user, a notification email is sent to the user. The email contains a link to the Patient folder containing the exam.



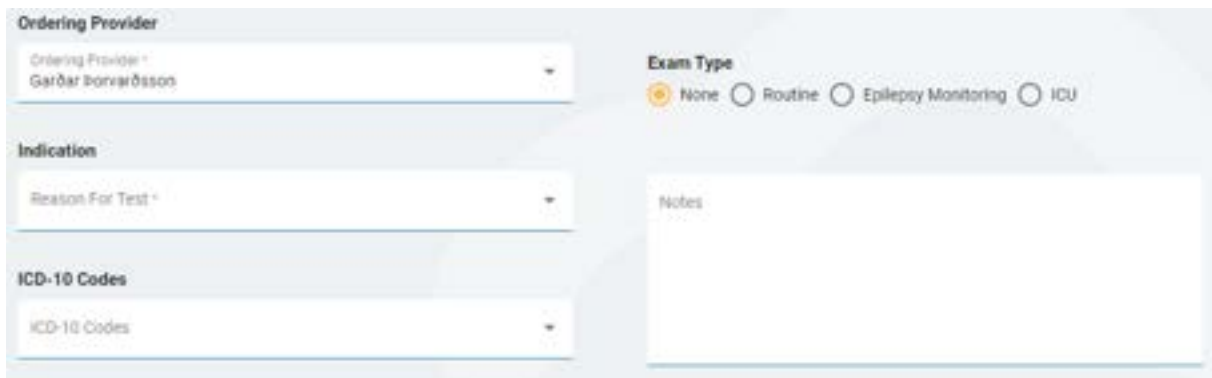
Users can opt out by un-checking "Receive email notifications" in My Settings.

The email is sent by the Windows Server SMTP service. Refer to Technical Manual on how to configure the SMTP service.

Referrals – US/International

The Referrals (Orders) feature has been enhanced since originally released in version 4.2. The server can now be set to either International or US-mode, and this does change information gathered for Referrals.

When making a referral on a server set to international mode, the user can choose between ExamTypes that are set to be available for Orders, and add a free text Note.



If the server is set to US-mode, the following changes are made:

- Patient's (or contact's) phone number and email are mandatory.
- Insurance options are displayed.
- The Ordering Provider must be set up with an NPI number.
- At least one ICD code must be specified
- Study options are significantly changed

The screenshot shows an EEG order form with the following sections:

- Ordering Provider:** A dropdown menu with "Gertur Þorvaldsson" selected.
- Indication:** A dropdown menu with "Reason For Test: Clinical suspicion of epilepsy" selected.
- ICD-10 Codes:** A dropdown menu with "ICD-10 Codes" selected. Below it is a table with columns "Code" and "Description". One entry is visible: "G40.319 Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus".
- Prior Routine EEG:** A checkbox labeled "A Routine EEG has been performed in the last year. If checked, results must be provided on Document Upload page".
- Test(s) Ordered:** A section with a checkbox for "Routine EEG" (with a note: "Required if previous Routine EEG was not completed within the past year") and a checked checkbox for "Long-term EEG".
- Long-term EEG options:**
 - Video:** Radio buttons for "With Video" (checked) and "No Video".
 - Monitoring:** Radio buttons for "Intermittent Monitoring" (checked) and "No Monitoring".
 - Duration:** A dropdown menu with "72 Hours" selected.

Exceptions for Referrals

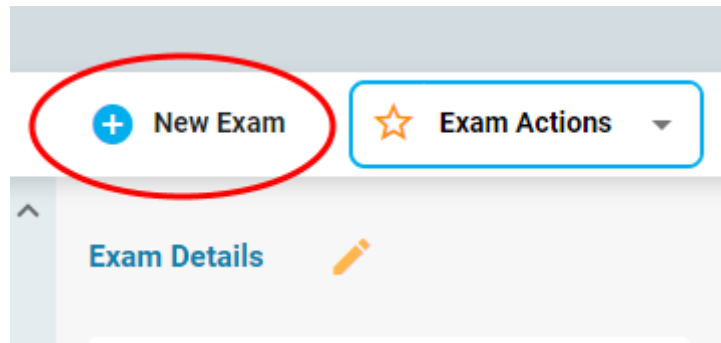
Referrals can be reported as in an exception state. The exceptions can be defined in the database.

The screenshot shows a patient referral form with a sidebar on the left and a main content area on the right. The sidebar includes sections for "Patient" (Demographics, Indication, Clinical History, Medication) and "Study" (Referral, Billing, Technical Description, Report Events, EEG Description). The "Referral" option is selected. The main content area includes:

- Edit Order** (link)
- Ordering Provider *** (dropdown menu with "Lars Johan Ahnliide" selected)
- Exam Type** (radio buttons for None, Routine, Epilepsy Monitoring, and ICU, with ICU selected)
- Exception** (dropdown menu with options: None, Order Incomplete, Unable to Contact, and Unable to Service)

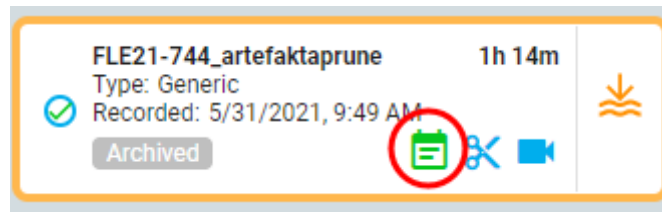
New exam

A button to make a new exam for a patient within the Patient folder has been added.



Task indication

When a task is running on an exam, this is indicated on the exam card with a green icon.

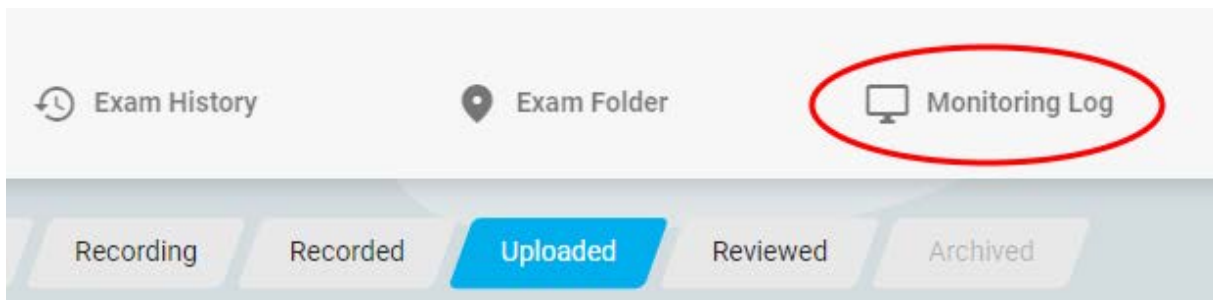


Admin can edit user details

Admins can now edit all the user-specific fields from My Settings for any user. This includes uploading a signature, Address, NPI number etc.

Monitoring Log

A button has been added on Exam page in Patient folder to show the Monitoring Log.



Date	User	Amplifier Status	Camera Status	Concurrent Patients	Type	Comment
5/18/2022, 11:00:00 AM	þórey	In Range, Impedance Ok	C2 OK, C1 OK, Files Checked	1	Intermittent	
5/18/2022, 12:15:00 PM	þórey	In Range, Impedance Ok	C2 OK, C1 OK, Files Checked	1	Intermittent	Comment 1
5/18/2022, 12:15:00 PM	þórey	In Range, Impedance Ok	C2 OK, C1 OK, Files Checked	1	Intermittent	Comment 2
10/10/2022, 2:24:56 PM	þórey	In Range, Impedance Ok	C2 OK, Files Checked	1	Intermittent	s/fowefowekf

Pruner property

A field for "Pruner" has been added to exam properties. The date when the pruner property is set is stored and displayed.


Ordering Provider:
Reviewing Physician:
Secretary:
Pruned by: Garðar Þorvarðsson, 10/14/2022
Size: 480 MB

Billing information

Billing information tab shows information in one place that are relevant to billing to US insurance companies. It allows association of CPT codes and technical exclusions to each day in case of multi-day exams.

Billing Details ✎

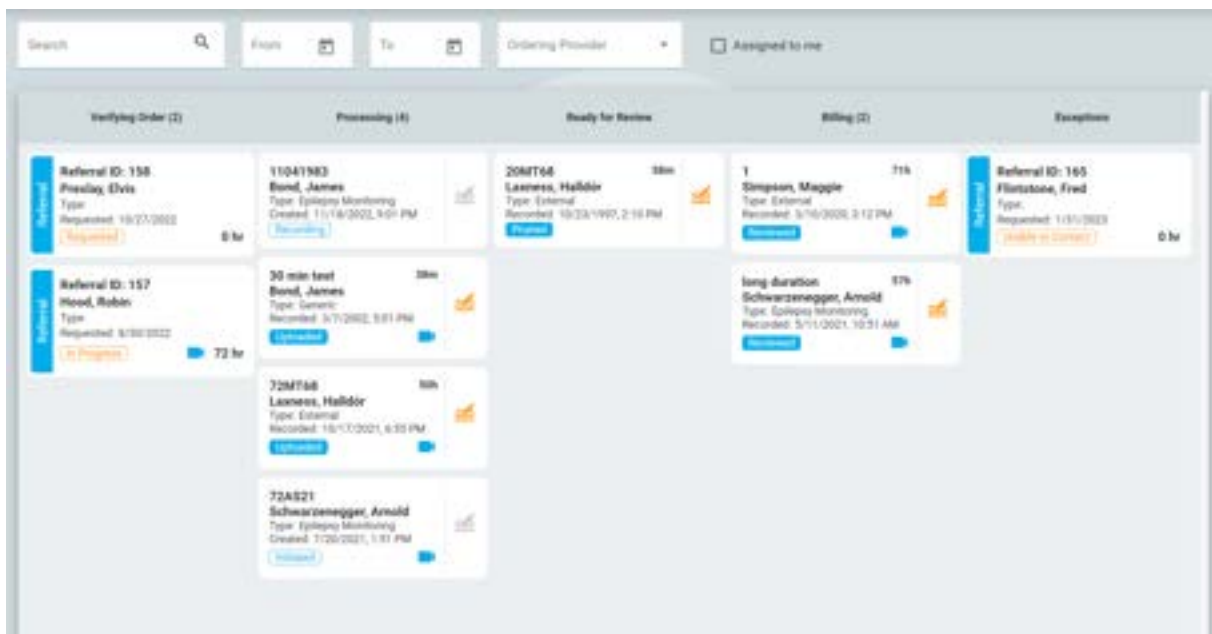
Start Date: 10/10/2020	Order ID: 0	Specialty: Clinical Neurophysiology
Patient Name: Smith, Unnamed	State:	NPI: 123456
Patient ID: 01002	Insurance: Aetna	Recorded By: Garðar Þorvarðsson
Date of birth: 7/11/2019	Ordering Provider: Garðar Þorvarðsson	Pruned by: Benjamin Gettler

 **Regenerate**

Exam Periods:	Period 1	Period 2	Period 3
Start:	10/10/2020, 2:54 PM	10/11/2020, 2:54 PM	10/12/2020, 2:54 PM
End:	10/11/2020, 2:54 PM	10/12/2020, 2:54 PM	10/13/2020, 3:11 PM
Duration:	22h 46m	23h 37m	24h 4m
CPT:	95700,95712	95712	95712
Max Inspection Interval:	24h	24h	24h 16m
Max Concurrent Patients:			
Exclusions:	TD - technical difficulties		

Status tracker

The Status tracker shows Referrals (Orders) and Exams and their progress along the workflow. The Referrals and Exams are organized in Columns that can have custom headings and workflow range. This needs to be set up directly in the SQL database. There are various options to filter the list of Referrals/exams.

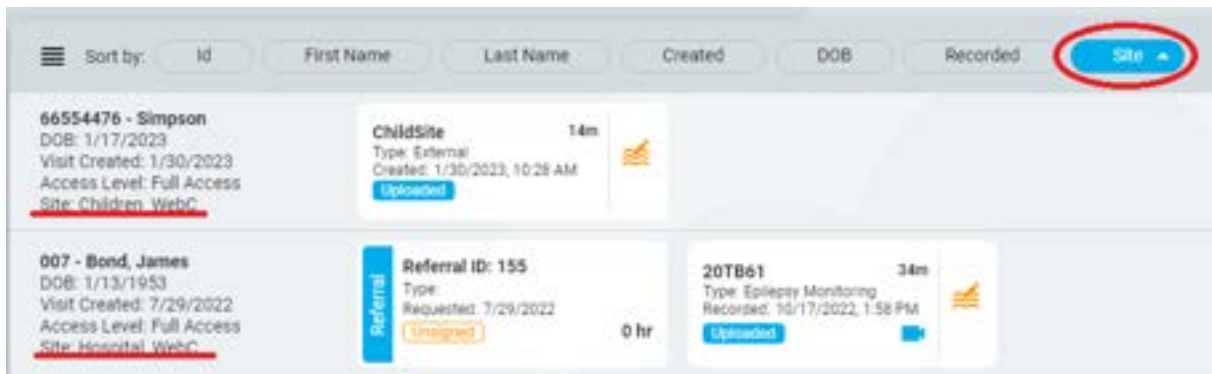


The screenshot displays a workflow management interface with the following columns and items:

- Verifying Order (2):**
 - Referral ID: 158, Pineday, Elvis (Type: Epilepsy Monitoring, Requested: 10/27/2022, Status: Requested)
 - Referral ID: 157, Hood, Robin (Type: Epilepsy Monitoring, Requested: 9/10/2022, Status: In Progress)
- Processing (4):**
 - 11041983 Bond, James (Type: Epilepsy Monitoring, Created: 11/18/2022, 9:01 PM, Status: Recording)
 - 30 min test Bond, James (Type: Generic, Recorded: 3/7/2022, 5:51 PM, Status: Completed)
 - 72MT68 Laxness, Halldór (Type: External, Recorded: 10/10/2021, 6:30 PM, Status: Completed)
 - 72AS21 Schwarzenegger, Arnold (Type: Epilepsy Monitoring, Created: 7/20/2021, 1:31 PM, Status: Incomplete)
- Ready for Review:**
 - 20MT68 Laxness, Halldór (Type: External, Recorded: 10/23/1997, 2:18 PM, Status: External)
- Billing (2):**
 - 1 Simpson, Maggie (Type: External, Recorded: 5/16/2022, 2:12 PM, Status: Incomplete)
 - long duration Schwarzenegger, Arnold (Type: Epilepsy Monitoring, Recorded: 5/11/2021, 10:31 AM, Status: Incomplete)
- Exception:**
 - Referral ID: 165, Flustrone, Fred (Type: Epilepsy Monitoring, Requested: 1/31/2023, Status: Available on Contact)

Sort by Site / mark by Site

It is now possible to sort visits by Site. The site for each visit is shown in "Patient Visits" list.



Translation of IFU

A language selection has been added that dictates the language used for the Information For Use (IFU), i.e. the user manual and the about box. The language selection is in the title bar.



Settings Editors

The settings editors relevant for Review have been implemented in Web Centrum. Note that it is now not necessary to open an exam for Review in order to edit the settings items.

There is a significant change in how permissions to settings items are controlled. There are now three levels of permissions:

- Global – available to every user.
- Restricted – available to users in specific user groups.
- Personal – only available to one user.

In order to create or edit Global and Restricted settings items, the user must have "Global Settings" role ability. All users are able to create Personal settings items for themselves. Additionally, users with Global Settings ability are able to make personal settings items on behalf of other users. The affected settings items are:

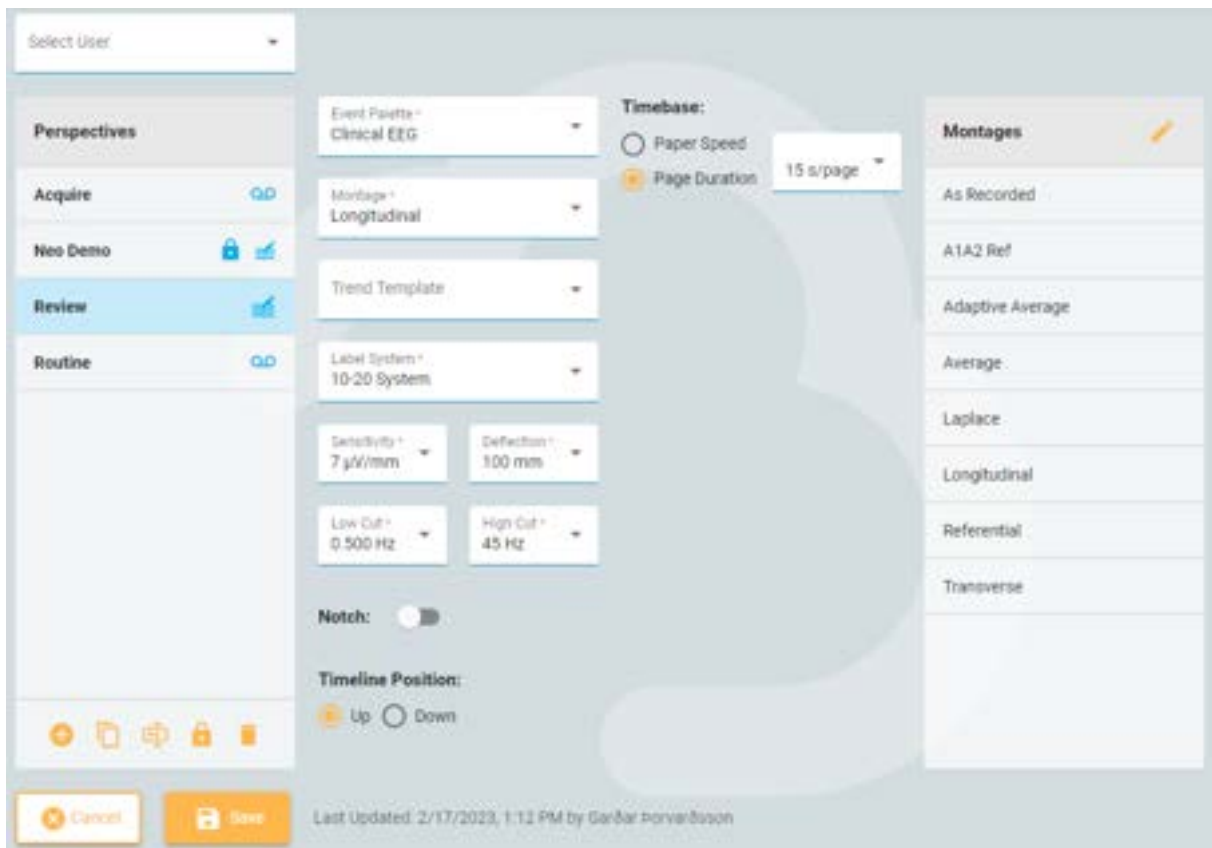
- Perspectives
- Montages
- Trend Templates
- Event Palettes

Primitive settings items such as Events and EEG electrodes are only Global, and can only be created by users with Global Settings ability.

Neon 12		Restricted
Neon 12 AV		
PSG		Global
Referential		
Slater bipolar		Personal

Perspectives

Perspective editor is open to everyone. Both Review and Acquisition Perspectives can be created and managed.



Events

Use the Events Editor to create and manage events. All events are available globally within the system. The Events editor is only available for users with Global Settings role ability.



Event Palette Editor

Event Palette editor is open to everyone. This is used to create and manage event palettes. All events are available for everyone to create Event Palettes.



Montage Editor

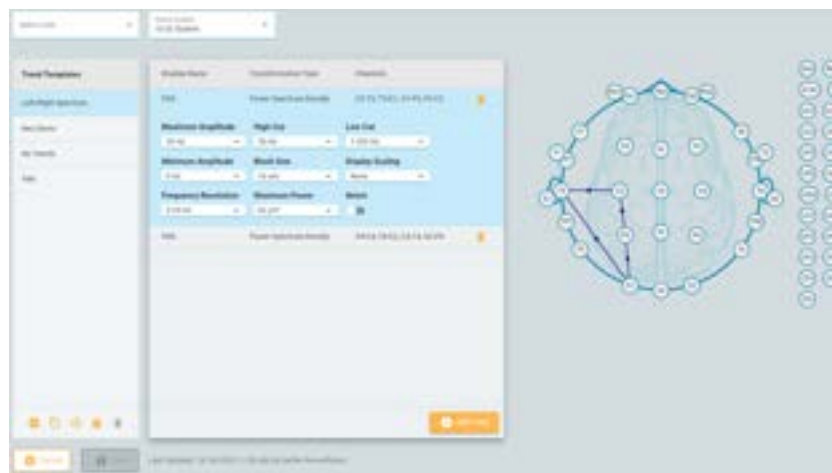
Montage editor allows creation of montages as well as definition of EEG Electrodes, EEG References and Non-EEG Signals. Montage editor is open to everyone while EEG Electrodes, EEG References and Non-EEG signals can only be edited by users with Global EEG Settings Role.



When creating a new montage it is possible to associate the montage to one or more perspectives without going to the Perspective editor.

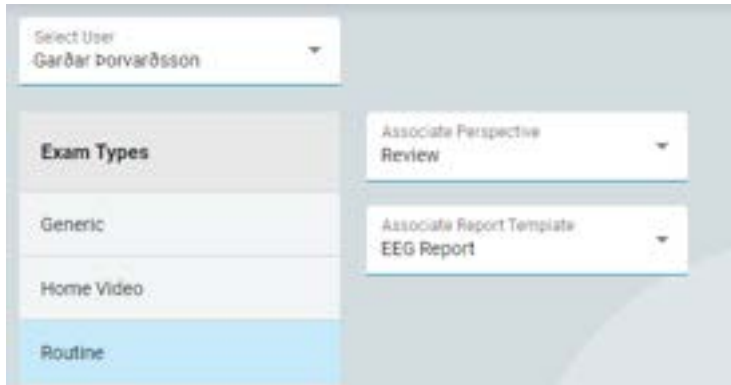
Trend Templates

Trend Templates editor is used to generate Trend Templates. Trends Template editor is open to everyone.



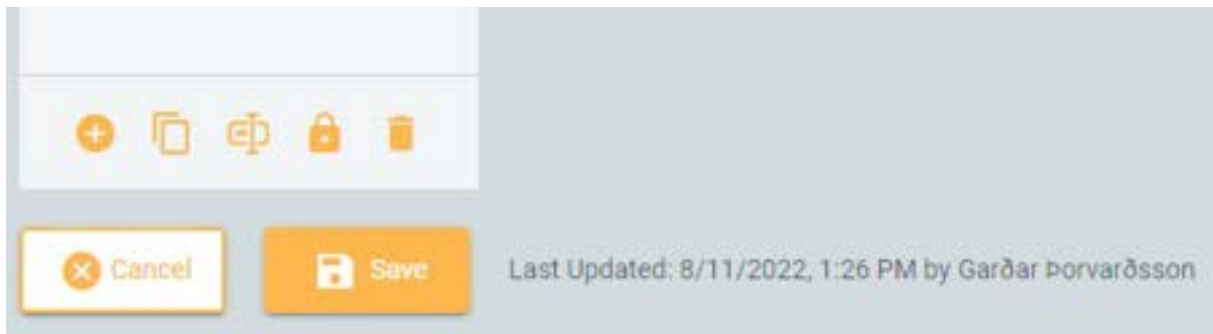
Preferences

Preferences editor is used to set user preferred Perspectives and Report Templates pr. Exam Type. Users with Global Settings role ability can set the preferences on behalf of other users.



Changes to settings items

The user and date of last change for a settings item is stored and displayed in the Settings editors. This applies to Montages, Trend Templates, Event Palettes and Perspectives.



Reporting

EEG Description

Several new fields have been added to the EEG description.

- Organization added to PDR description with options: Undetermined, Good, Moderate and Poor.
- Sleep pattern added with options: Not observed, N1, N2, N3, REM.
- Interictal epileptic activity added with Not observed, Awake, N1, N2, N3, Rem.
- Free text description field for interictal epileptic activity.
- Ictal epileptic activity added with Not observed, Awake, N1, N2, N3, Rem.
- Free text description field for ictal epileptic activity.

The screenshot shows a form titled "Epileptic Activity" with two main sections: "Interictal" and "Ictal". Each section has a header with a status dropdown (currently "Not observed") and several checkboxes for "Awake", "N1", "N2", "N3", and "Rem". Below each header is a text input field with a rich text editor toolbar (Arial font, bold, italic, underline, text color, background color, bulleted list, numbered list, link, unlink). The "Interictal" section has a placeholder "interictal description" and a "Quick text" button. The "Ictal" section has a placeholder "ictal description" and an "Ictal" button. Both sections have a plus icon in the bottom right corner.

Ability to format free text fields for reports

The ability to format free text report fields for the reports has been added. This applies to

- Clinical History
- Technical Description
- Notes
- Interictal, Ictal and Additional Info for EEG Description
- Clinical Interpretation
- Abnormality Description

Patient Name in Report title

Patient name is added in the report title. This is especially helpful when downloading the report, the title is used for the filename.

The screenshot shows a "New Report" dialog box. It has a "Report Template" dropdown menu set to "EEG Report". Below it is a "Document Name" text field containing "Ballou, Rocky - EEG Report". A blue information icon is followed by the text: "Your report will appear in the Documents tab once the report has been signed or saved". At the bottom are two buttons: "Cancel" and "Print/Save".

Report events

Now, any event can be declared as a "Report Event". This is done in the Events settings editor.

Report events can be annotated with the more comprehensive event editing popup.

Edit Event Notes

Typical: Yes No Undetermined

Exclude from Report: Yes No

Diary Note

Clinical Note
Patient is seen on camera. His head deviates to the left, then loses his balance and ultimately falls, and made a growling sound while attempting to stand up.

EEG Description
EEG shows a brief period of rhythmic bilateral centro-temporal delta followed by electro-decrement. Generalized sharp/sharply contoured waves is subsequently observed maximal over the left hemispheric (posterior) region followed by diffuse slowing.

Cancel Save

Report events appear in a table in the patient folder where they can be further edited. These events are also available to be included in reports.

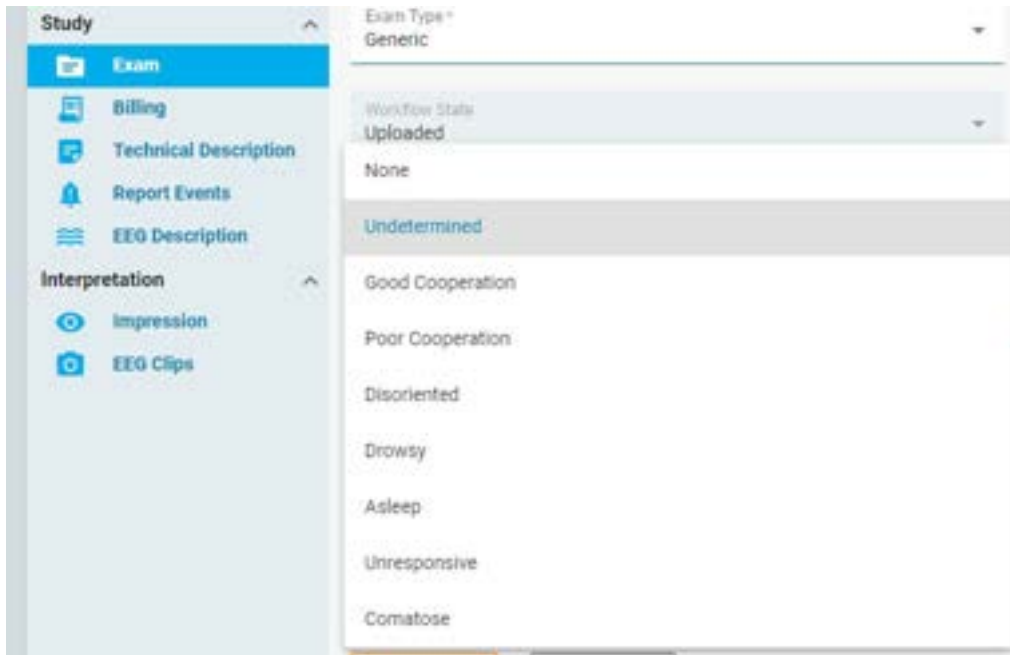
Date/Time	Typical	Diary Note	Clinical Note	EEG Description	Exclude
1 11/18/2021, 10:43 PM	UND				<input type="checkbox"/>
2 11/18/2021, 11:16 PM	UND				<input type="checkbox"/>
3 11/20/2021, 1:44 PM	UND		11/20@1:43pm, run of rhythmic prolonged generalized spike and wave discharges, not in camera view; decrease sensitivity on T5		<input type="checkbox"/>
4 11/20/2021, 2:06 PM	UND		11/20@2:10pm prolonged run of generalized spike and wave discharges, not in camera view		<input type="checkbox"/>
5 11/20/2021, 5:05 PM	UND		11/20@5:06pm prolonged generalized spike and wave discharge, patient on video 1 lying in bed, slight inauth movements and right foot tapping seen		<input type="checkbox"/>
6 11/20/2021, 11:28 PM	UND		11/20@11:30pm, prolonged run of generalized spike and wave, patient on video 1 lying in bed looking at phone no clear movements seen		<input type="checkbox"/>

Each event type is listed separately in the list of Report Events. It is possible to mark individual events to be excluded from the report, and excluding all events of the same type is possible with a multi-select option.

Note that the Stimulsoft report generation engine allows filtering the event list in the template. This can be used to create lists of specific event within the report.

Consciousness

In Exam details tab, the patient's state of Consciousness can now be selected from a list:



This can be included in reports.

Neurological disorder

There is a field for pre-known disorders under Clinical History. Multiple disorders can be attached to each patient. By default, the list of disorders includes:

- ADHD
- Alzheimer's
- Depression
- Epilepsy
- Multiple Sclerosis
- Parkinson
- Schizophrenia

Although there is no UI to extend this list, this can be done by editing the server-side database.



Skull defect

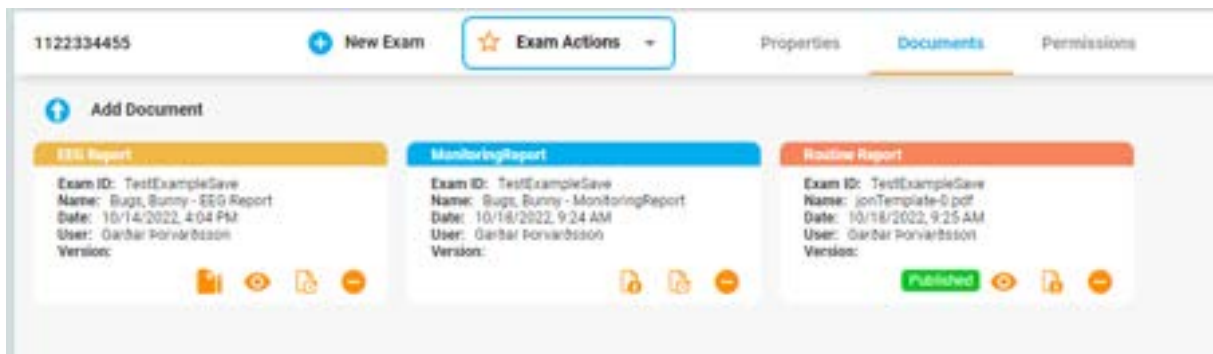
A field for skull defect has been added to Clinical History. This is in the form of a Yes/No field indicating if the patient has a skull defect or not, and an optional description field.

Patient Name on downloaded report

The Patient name is added in front of the report name when downloading a report. This way it is easier to identify the file once downloaded on the user's computer. The format is: [Last Name], [First Name] - [Document Name].

Color-code reports on Documents tab

To make identification of different reports easier, the reports are now identified with a colored banner. The color for each report template is set in the Report Templates editor.

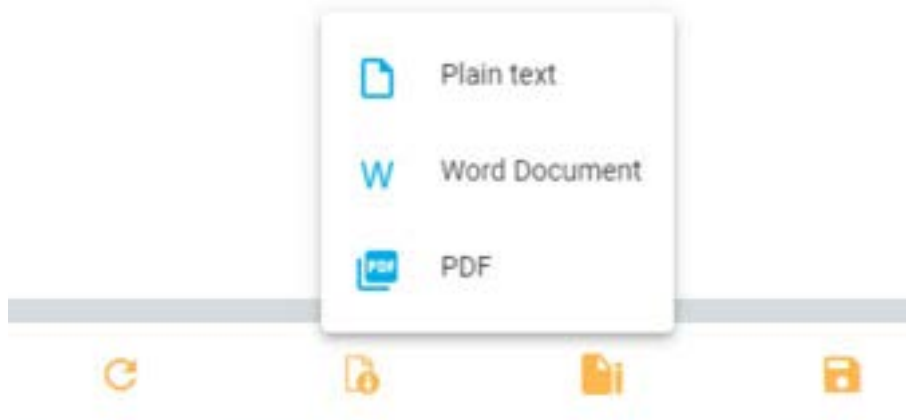


Stop time

Exam stop-time is now a field that can be used in reports. Stop-time survives prune, but not Save As with prune.

Choose report format

It is possible to select the format when downloading a report generated by the Stratus report engine. The user can select between PDF, Word or Text (ASCII).



A signed report can only be downloaded as a PDF.

Deleting published reports

Generally, reports that have been signed and published cannot be deleted. However, users with the "Support" role ability are able to delete published reports.



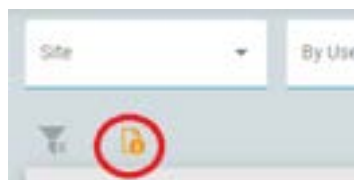
Audit log

Filter by Role

It is now possible to filter by Role. Role has also been added as a column. The "Action" drop-down list does now allow multi-select.

Download to excel

The audit logs can be downloaded as a spreadsheet in MS Excel format.



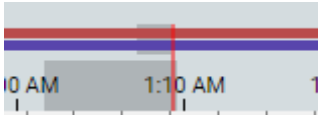
Audit trail for user management

User management operations such as create, modify and delete a user are now logged as audit trails.

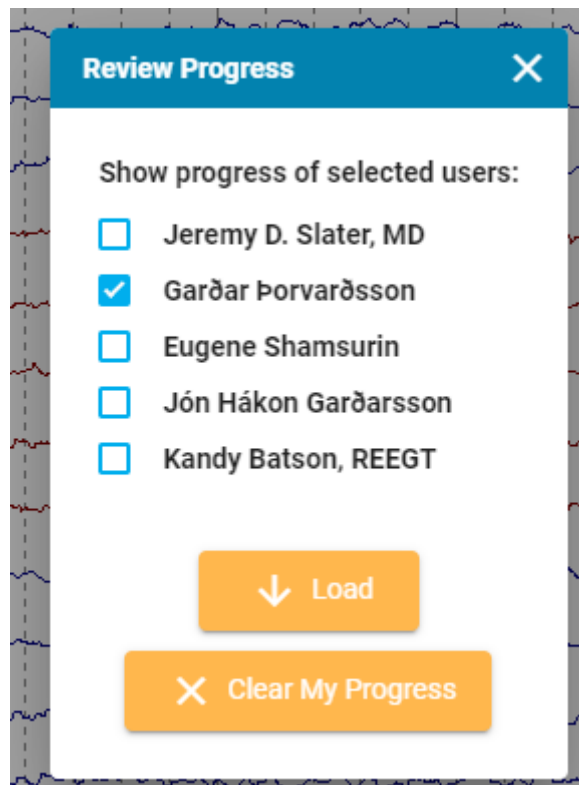
Review

Review progress

The sections of the EEG that have been reviewed are shown as a shadow on the timeline. If video is reviewed, this is shown as a shadow over the video camera bars in the overview.



Review progress is stored pr. user and the user can select to see only what has been reviewed by him/her self or collectively by several users.



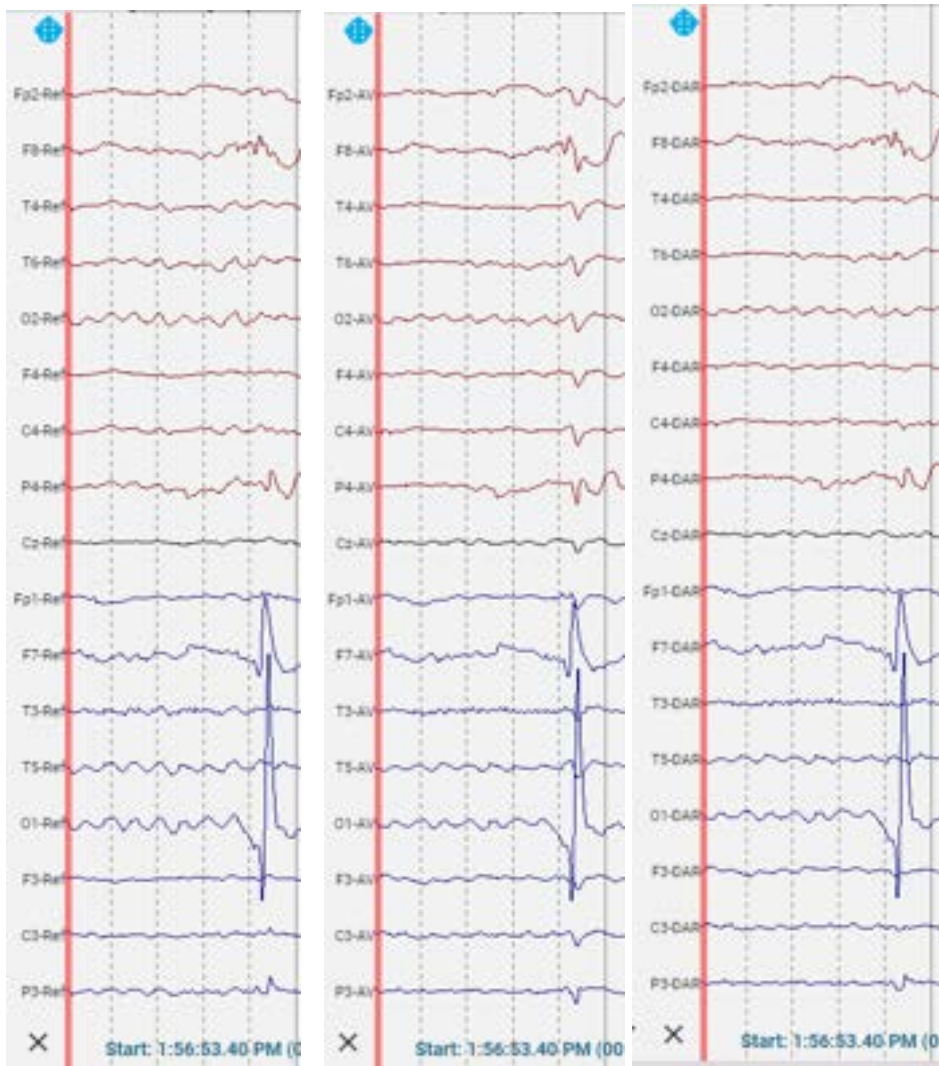
Adaptive Artifact Rejection

The Adaptive Artifact Rejection (AAR) feature is intended to prevent a large artifact on a small number of channels to affect the calculation of average reference.



To enable AAR on a calculated reference, check the *Adaptive Artifact Rejection* box in the EEG References editor (part of Montage editor).

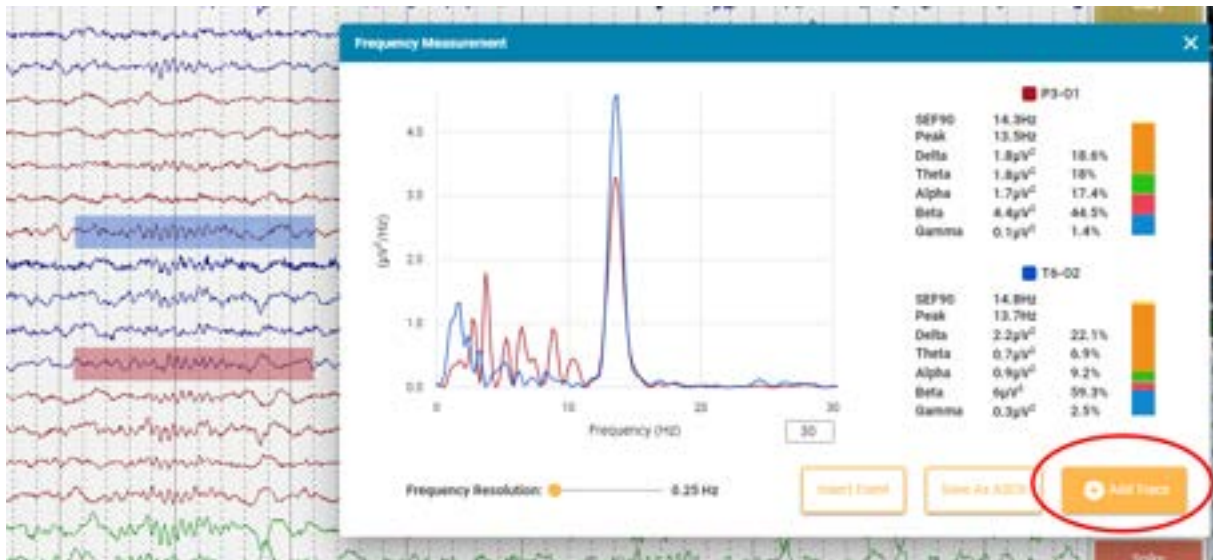
When calculating the value of the reference, the software will for each sample check if there is any channel that is more than two standard deviations away from the average of all samples. If this is the case, the sample from that channel is omitted in the calculation.



The EEG above shows an artifact on O1 and how that affect the average reference while the AAR (called DAR on the picture) is not affected by this artifact.

“Add” button for Frequency measurement

The frequency measurement tool does now have a button to add another measurement. When pressed, the result popup is hidden while the user selects the new epoch for measurement.



Frequency information in Waveform measurement

“Frequency” has been added to the waveform measurement tool. This is calculated as $1/(\text{duration between reference points})$.

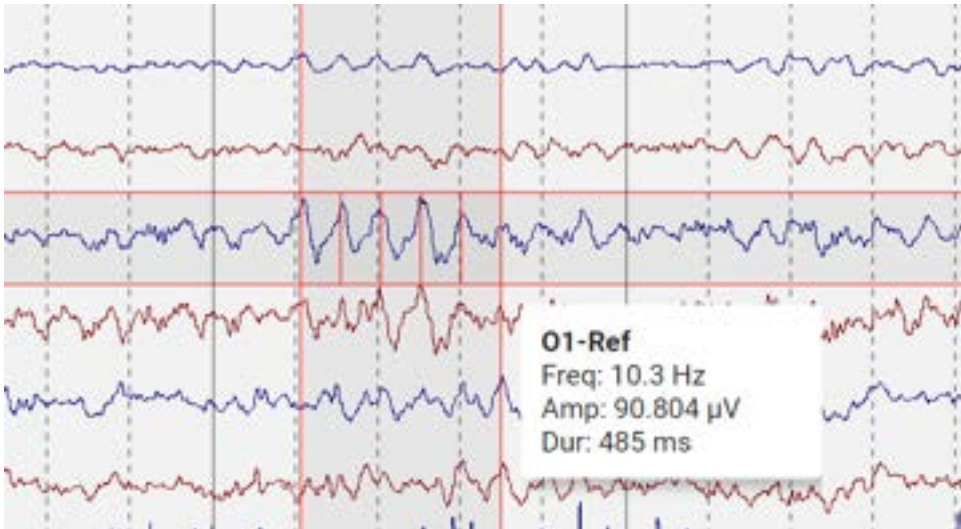


Quick measurement



A new measurement tool has been added. This is activated by Shift+Left Mouse press and hold or by a Toolbar button + Left Mouse press and hold press. The tool draws a box around the area specified by the mouse action and shows:

- Frequency as $1/(\text{duration of interval between gridlines})$
- Amplitude as amplitude calculated using the sensitivity of the detected channel.
- Duration as the total duration of the box.

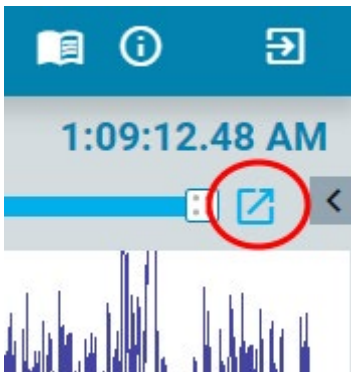


Custom values for Filter and Sensitivity

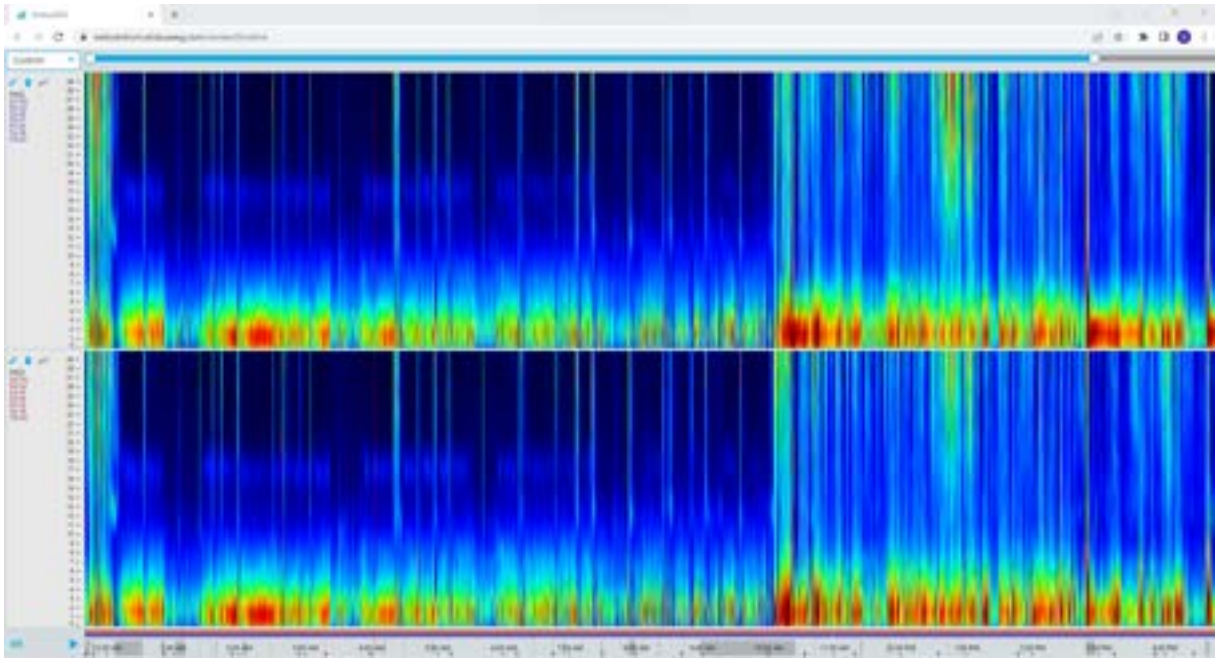
It is now possible to enter the desired value into the dropdown lists for filters and sensitivity in the toolbar.

Float trends to a new Tab

The overview can be floated as a separate browser tab.



This is in particular handy if there are more than one monitors being used for review such that trends can be one monitor and EEG on the other.



Trend Templates

Trend templates is a new feature where several trends can be combined into a template to be saved and re-used. Trend Templates are made and managed in the EEG Settings Trend Template Editor, and applied from the trend dropdown menu in Review.



Minimum value

A minimum value can now be specified for a trend.

Display Name
MA

Maximum
100 μ V

Minimum
0 μ V

High Cut
45 Hz

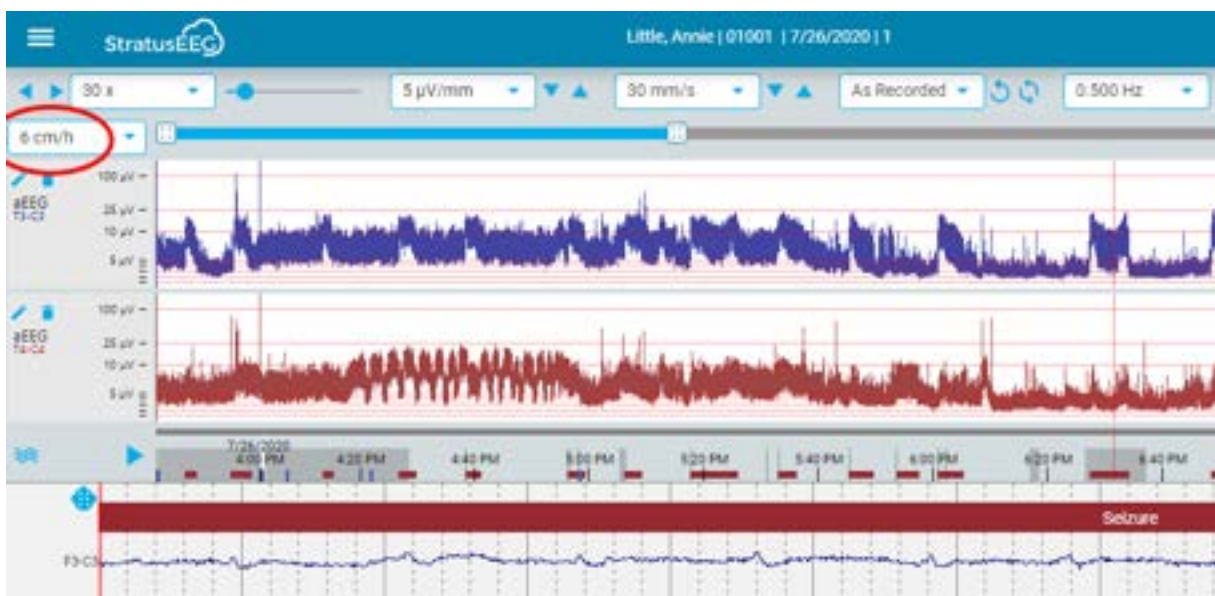
Low Cut
0.5 Hz

Block Size
8 sec

Notch

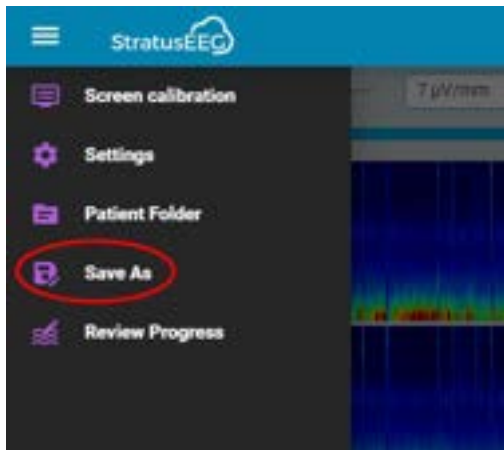
6 cm/h option for overview duration

Duration of the overview can be set to 6 cm/h. This is the traditional chart speed for aEEG. Information from screen calibration is used to draw this correctly.



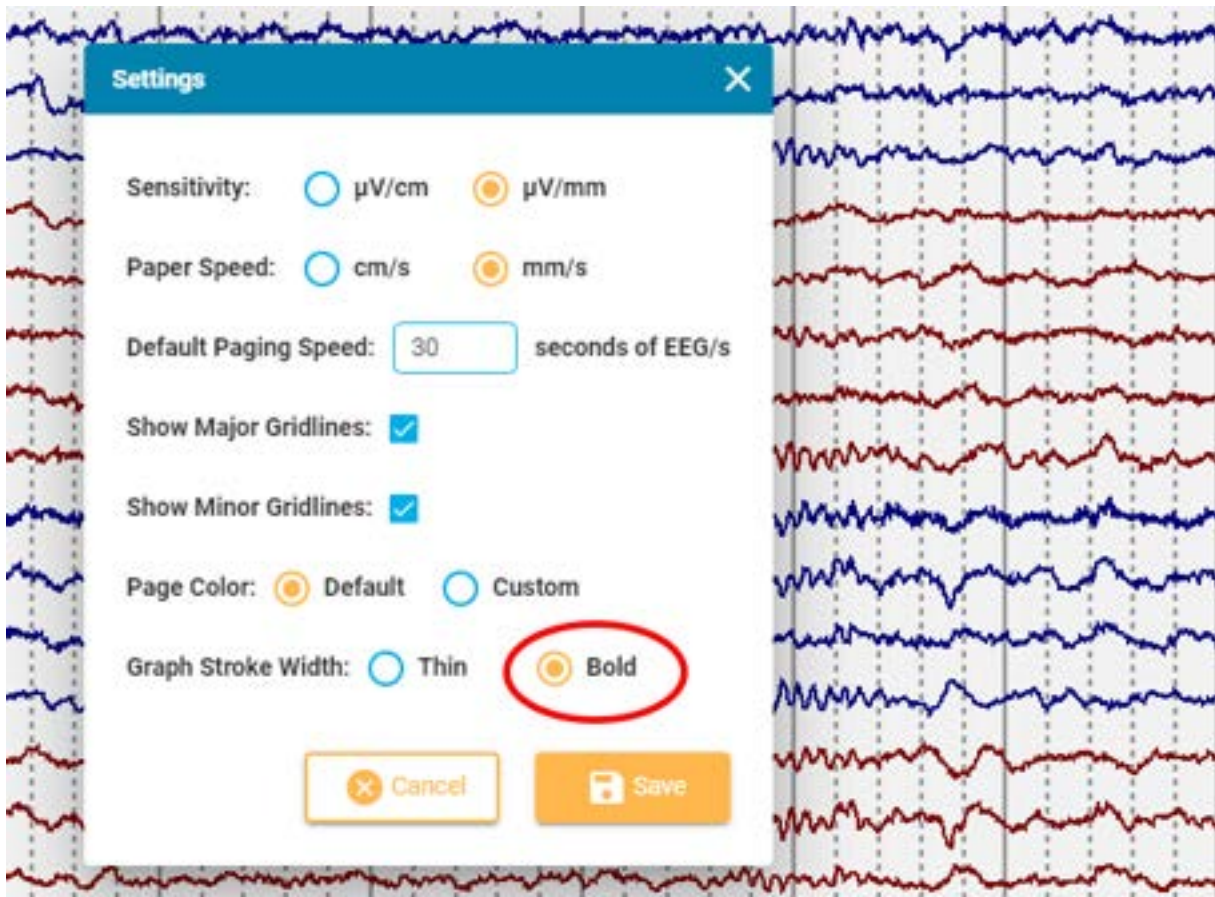
Save As

The Save As function is now available in Web Review. This is accessed through the main Review Menu.



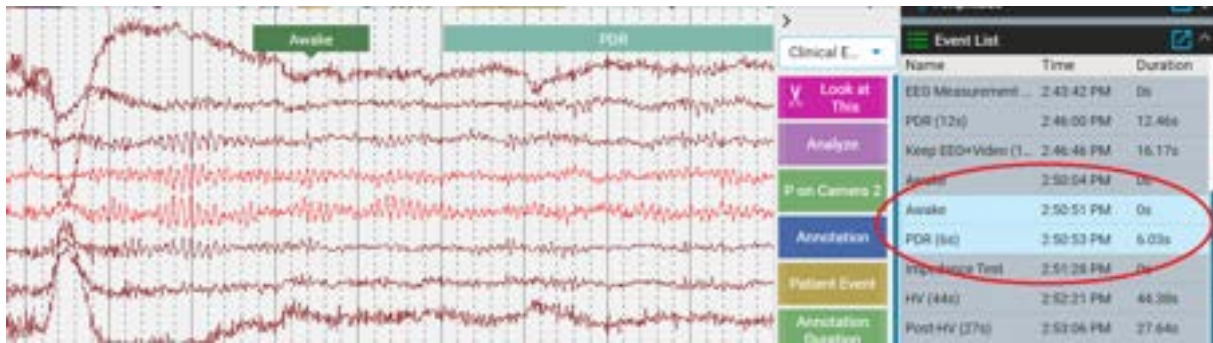
Option for trace thickness

On very high resolution screens, the EEG tracing may look „faint“. Therefore, an option for a bold stroke width has been added.



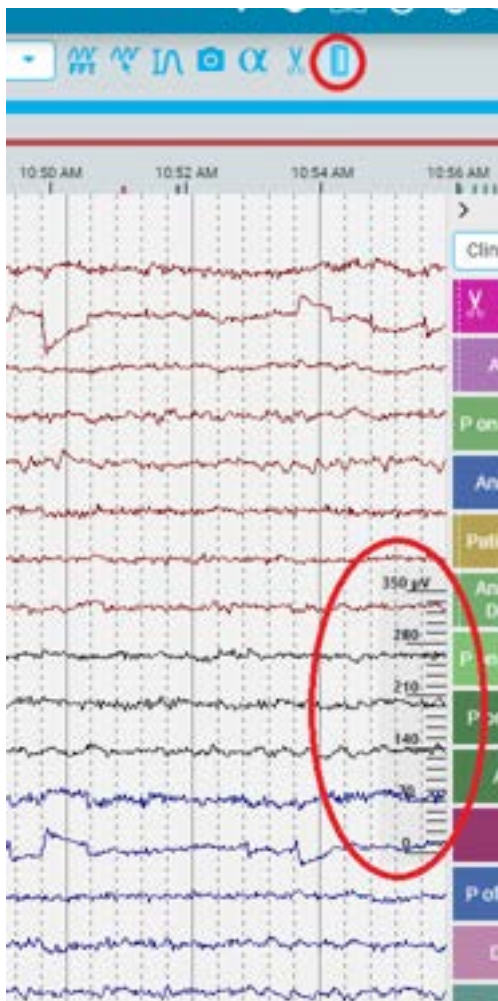
Event list

The event list will now highlight all events on the current page of EEG.



Hide ruler button

A toolbar button has been added to control the visibility of the scale-ruler:



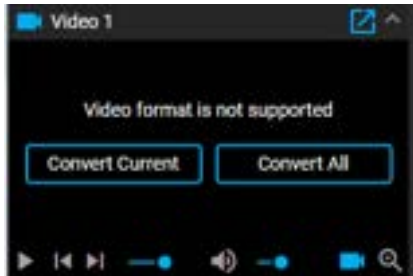
Video playback

Video playback has been enhanced in the ability to move a few frames forward and backward. This is done by:

1. Push and hold the step button on the video control. This will move the video frame by frame on a slowed-down speed as compared with playing.
2. Use ALT+ arrow buttons to do the same.
3. Use ALT+ mouse wheel to move frame by frame.

Video file conversion

In order to be viewable during review using the internet browser, video files must be in the MP4 format. The software does now have the ability to convert AVI files recorded with NicoletOne software to MP4 format that can be played in the Stratus web software. Note that the conversion may take some time to complete.



Monitoring

Monitoring overview auto-update

The monitoring overview on the monitoring page in Centrum web does now auto refresh every minute.

Interoperability

Single sign-on

The stratus web-based analysis software is compatible with external Identity Provider services (IdP) that support the SAML 2.0 standard. In this case, the system can be configured to use the IdP for authentication. To use the single sign-on, a user must be registered both within Stratus and in the IdP system, email address is used to match the users. In case the Stratus Server has multiple Sites set up, different sites can use different IdP's.

Integration API

The Stratus EEG server software contains a REST API that can be used to integrate with Hospital Information Systems. This can be called from internet if necessary. Using this interface, it is possible to:

- Add patients, exams, orders and associated data.
- Retrieve reports.
- Retrieve the discrete information that makes up a report.

The integration API is a RESTful web API that is internet addressable. It is provided by Stratus EEG server. Authentication is two-factor, user/password and certificate. This means that the computer calling the API must contain a certificate known by the Stratus Server. The user used to make API calls dictates the patient information available. Mirth Connect can be used to translate HL7 messages into API calls.

Algorithms API

Up on a request to Kvikna Medical, a description of the algorithms API can be obtained. Using this, EEG data can be streamed, even over internet, from the Stratus server to an algorithm service that implements the API, and results can be streamed back to the Stratus Server.

Fixed Issues

Issue #	Issue Subject
17878	Upload fails when navigating to another tab during upload task
18224	Allow up to 255 characters in email information
16789	Up and Down Arrow keys change sensitivity even if Event List has focus
17207	Site admins can see all sites
17206	Site admin can't create user group
17348	Problems opening some BDF files
16790	Patient admission allows only US phone number
17692	Patient Address and User Address fields are limited to 50 chars, which is too short
17309	No event from EDF shown if one of them has a very long duration
17247	Merge fails if video merge has problems
17967	Labels wrong for As Recorded montage on segment changes
16728	Invalid Character in report text causes text to be cut off
17506	Internal Server Path Disclosure
16054	Inserting many Frequency measurement events eventually fails
17891	External Referral ID not displaying in Web Centrum
17178	Exams get incorrect path when restored if workarea has been changed.
16737	Event filter causes prune button to be hidden
16866	Event date in web review does not correspond to the date in timeline

15794	EOG label incorrectly set to EEG type
17464	Allow "Generate Exam" from order, even if order has not been signed yet
16484	Add the email sender configuration to config Parameters table
16802	Adding events when watching video should insert the event immediately
17878	Upload fails when navigating to another tab during upload task
18224	Allow up to 255 characters in email information
16789	Up and Down Arrow keys change sensitivity even if Event List has focus
17207	Site admins can see all sites
17206	Site admin can't create user group
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