

2018 Annual Report - Joint IFCN-ILAE Task Force on EEG Databases

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Executive summary

The taskforce recommends:

- 1. Bridging Solution:** Until the more elaborate educational and clinical research database (see below) is developed, the task force recommends a bridging solution that can be made operational in the second half of 2018. This intermediate solution will address the educational goals of IFCN and ILAE.
- 2. Educational and clinical research database:** A more elaborate solution will be developed, addressing the specific needs. The taskforce suggests that Stefan Rampp, Persyst and Holberg EEG collaborate on this project. Stefan Rampp will coordinate, as project manager, the web-based platform that integrates SCORE and the universal web-based EEG reader, from Persyst.
- 3. BIDS (Brain Imaging Data Structure) database:** To be used as a platform for research projects in the domain of cognitive and translational neuroscience. BIDS is a flexible tool that can accommodate the huge diversity of these projects.

Taskforce Objectives

IFCN and ILAE have joined forces to develop an online interactive EEG database. The goal of the database will be to promote education and research (i.e. research using the data stored in the database). The database will comprise: (1) Raw-data: de-identified EEG and video-EEG recordings; (2) Annotations - features extracted and stored using the SCORE system (which was developed as part of an ILAE-IFCN collaboration); (3) Distinct graphical user interfaces (GUI) will be developed for the two main functions, which are education (open access) and research (limited to approved users). It is an additional goal and an advantage to link the EEG database to neuroimaging and clinical databases.

The educational part supports both self-study and integration with existing online and face-to-face courses.

The starting point was the web-based, interactive educational database using the SCORE system, which has been developed for the latest edition of the Niedermeyer EEG textbook. This includes 170 representative EEG/video-EEG samples, and will constitute a starting point for the future IFCN-ILAE database.

The database will have three components that need to be integrated: (1) the web-based platform for education and research; (2) the web-based universal EEG reader; and (3) the system for standardized annotation of EEG and for storing these features (SCORE).

The objective of the task force was to analyze the possible solutions and make recommendations on how to develop the EEG database.

The selection process

Following the first meeting of the task force on December 3, 2017 (Washington, DC), an open call was sent to representatives of companies and to researchers who had previously developed web-based universal EEG readers and interactive educational databases. Prior to the meeting, the task force reviewed the documents sent by the potential providers of the technology. The detailed documentation of this process can be downloaded from the following link: https://drive.google.com/open?id=1IpTvTY3Xvyf5asbH46bre_v3Dr0-cDZe

At the second meeting of the taskforce, May 6, 2018 (Washington, DC), the following potential providers presented their proposals:

1. Harald Aurlien (Holberg EEG) demonstrated the interactive educational database, using the SCORE system that had been developed for the Niedermeyer textbook.
2. Nicolas Nierenberg (Persyst) presented the web-based universal EEG reader.
3. Stefan Rampp (Erlangen University Hospital) presented the web-based educational platform.
4. Cyril Pernet presented BIDS (BRAIN IMAGING DATA STRUCTURE: A simple and intuitive way to organize and describe neuroimaging and behavioral data)
5. Jonathan Halford was not able to attend the task force meeting. Therefore, Jean Gotman and Sándor Beniczky had met with him separately. Jonathan Halford told them that he did not have the necessary resources to develop the web-based educational and research database. The possibility of financing a graduate student, who would work on this during the next 3-4 years, was discussed, but there were a great many uncertainties to the plan. It was therefore concluded that this option would not be pursued.

The SWOT analysis of these proposals is in [Appendix-1](#).

Based on this data, the task force makes the following recommendations:

Bridging solution:

Until the more elaborate database (see below) is developed, the taskforce recommends a “bridging solution” that addresses the educational needs. This is an intermediate solution between the currently existing interactive, web-based educational tool that was developed for the Niedermeyer EEG textbook, and the more elaborate database described below. The students annotate and score EEGs, using the standardized system (SCORE) and then they compare their scorings with the expert scorings.

The bridging solution is provided by Holberg-EEG in collaboration with Persyst. The details, including timeline and costs, are summarized in Appendix-2. The estimated cost of developing this solution is 27,800 Euro. The estimated yearly costs for maintenance and support are 7,432 Euro and 109 Euro/active-user (depending on the total number of active users – for details [see Appendix-2](#)).

Besides these technical features, there is a need for consensus-based scorings of the samples (at present, the samples are scored by one expert). The members of the task force volunteered to score 20-30 samples each. The task force recommends that this solution is made available within the next 6-12 months.

Educational and clinical research database:

This is a more elaborate version of the bridging solution that will decrease the yearly costs and will make possible clinical research functionality such as uploading new data and using the stored data for clinical research. The task force recommends that Stefan Rampp, Persyst and Holberg EEG collaborate on developing the IFCN-ILAE educational and research database. Stefan Rampp will coordinate, as project manager, the development of the web-based platform that integrates SCORE and the universal web-based EEG reader from Persyst. Stefan Rampp has already started a dialogue with Holberg-EEG and Persyst, and will elaborate a detailed proposal on: (1) the architecture of the database; (2) the specific tasks/deliverables of the three collaborators; and (3) the timeline and the costs related to each task/deliverable. Usage scenarios are detailed in [Appendix-3](#). The terms of collaboration between the societies and the companies (Holberg-EEG and Persyst) need to be clarified, especially the aspect of the publicity that is intrinsic in developing the database using technical solutions provided by these companies. The task force will follow-up on these deliverables via email correspondence.

BIDS (Brain Imaging Data Structure)

BIDS is an ideal platform for collaborative research and for sharing EEG and neuroimaging data. [Appendix-4](#) summarizes the essential features of BIDS. The task force recommends that IFCN and ILAE endorse it as the platform for cognitive/computational neuroscience projects and for translational research. Aristeia Galanopoulou, Chair of the ILAE Commission on Neurobiology, has already been in contact with Cyril Pernet and discussed the possibility of using BIDS for EEG atlas for translational research. The task force recommends that the two societies promote use of BIDS – for example, by links to BIDS from their homepages, and possibly by inviting a paper on BIDS to be published in one of the societies' scientific journals. BIDS is an open and low-budget solution, requiring no/minimal funding.

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