

Rationale

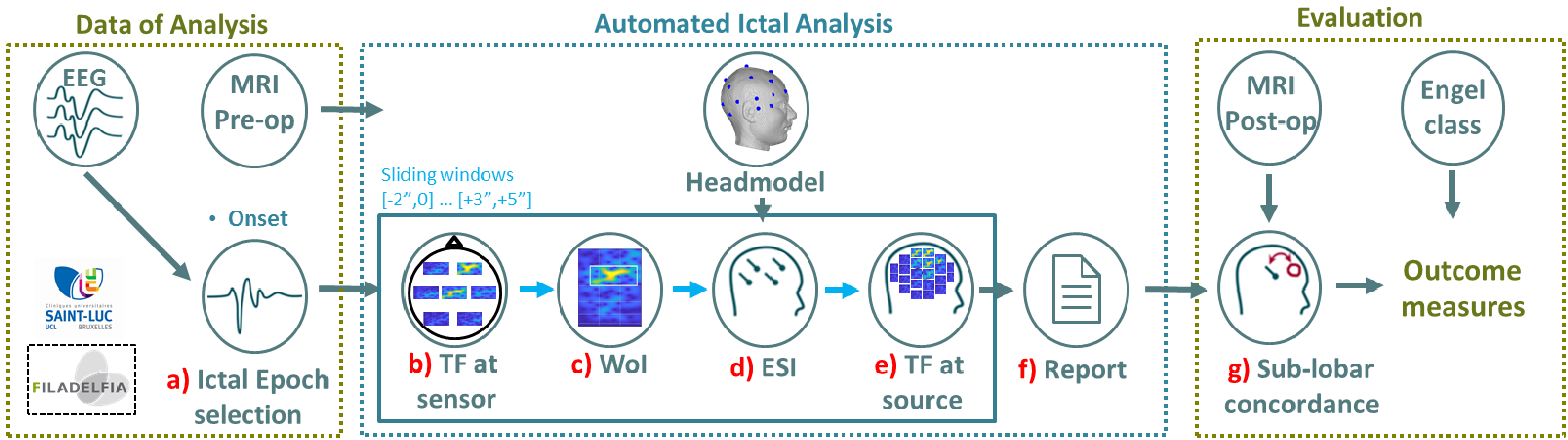
EEG source imaging (ESI) of **interictal** epileptiform discharges is the omnipresent technique to localize the epileptogenic focus. However, the **irritative zone** does not necessarily correspond with the **seizure onset zone (SOZ)** and the **localization of the SOZ** is of utmost importance for treating refractory epilepsy.

Ictal ESI has potentially comprehensive information for **SOZ localization**, but the analysis is challenging.

Aim

- In this study, the clinical validation of the automated ictal analysis using a sliding window approach was Performed.
- Data of 67 patients that were in the presurgical evaluation and underwent surgery was analyzed.
- The analysis was performed retrospectively and blinded to all data other than the EEG and pre-operative MRI.

Methods



Ictal analysis pipeline using sliding window (SW):

a) marking of the ictal EEG onset (by expert electrophysiologist),

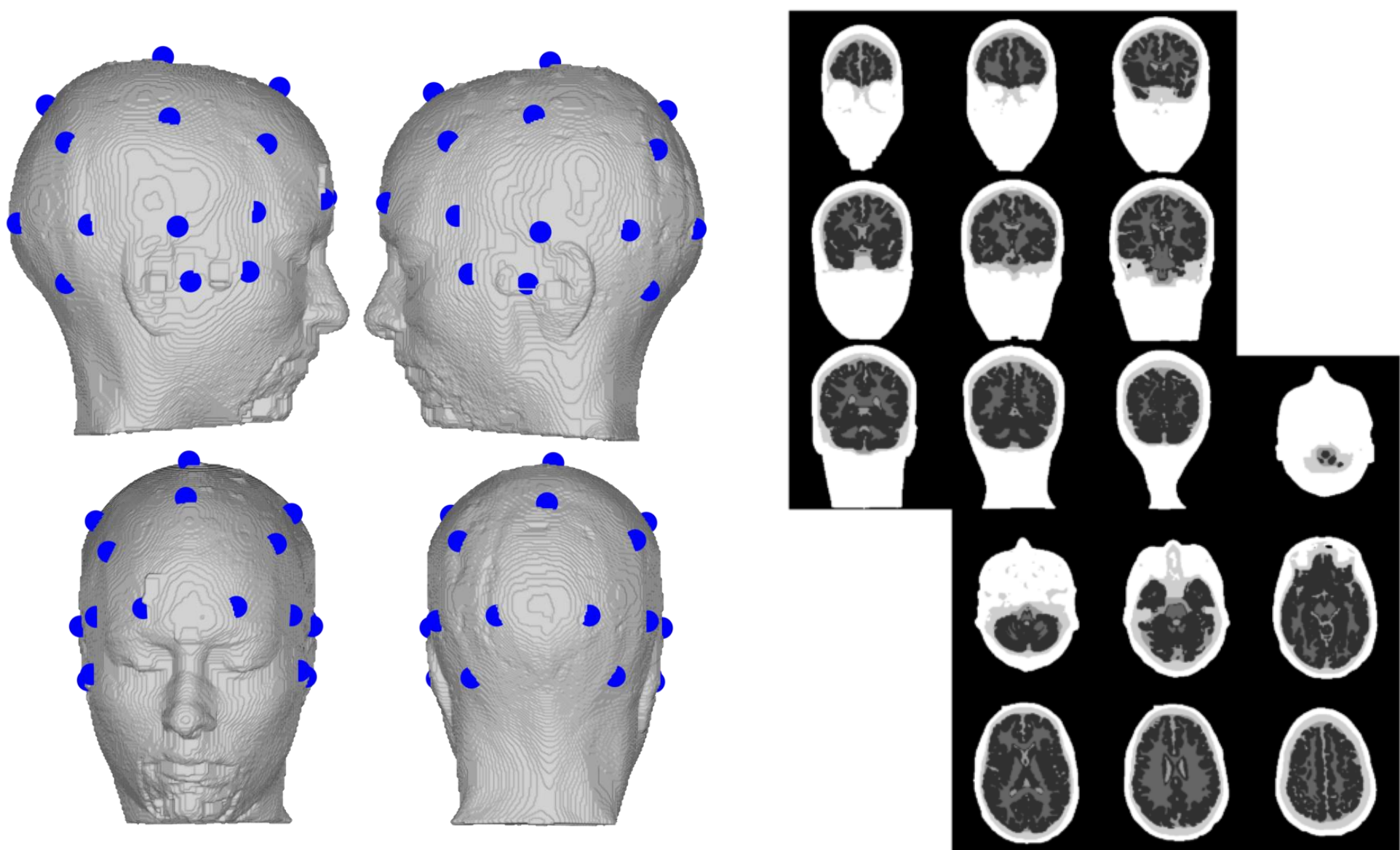
For each 2s sliding window between -2" and +5" with 1" overlap:

- b) performing time-frequency (TF) analysis at sensor level,
- c) acquiring up to 2 window of interest (Wol) by a region growing procedure selecting those with highest energy,
- d) applying ESI and mapping ictal waves to source space,
- e) performing time-frequency (TF) analysis at source level and identifying the source with the highest energy as SOZ,

f) generating the ictal report,

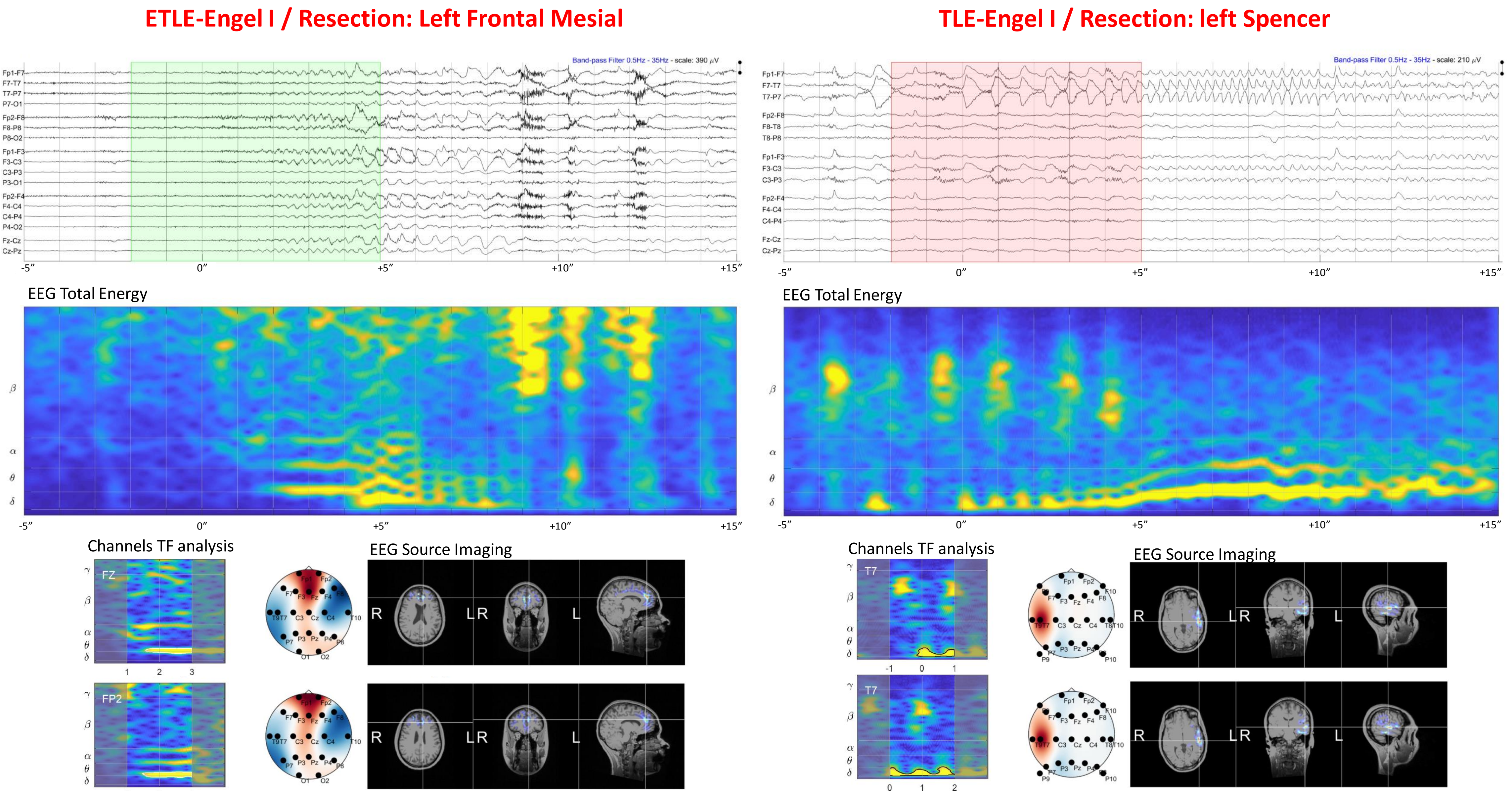
g) evaluating the analysis by measuring sensitivity, specificity and accuracy at seizure- and patient- level and based on the post-surgical outcome.

headmodel



Results

Example cases



- Number of patients: 67
- Engel I resection:
 - TLE patients: 25/33 (76%)
 - ETLE patients: 17/34 (50%)

	Seizure Level			Patient Level		
	TLE	ETLE	ALL	TLE	ETLE	ALL
Sensitivity	84%	68%	75%	80%	53%	69%
Specificity	44%	61%	56%	38%	53%	48%
Accuracy	71%	65%	67%	70%	53%	61%

- We achieved an accuracy of 67% and 61% to localize the epileptogenic focus over all seizures and patients, respectively.
- The accuracy in TLE subjects is higher than the one in ETLE cases at patient level. More ETLE patients are required to evaluate this algorithm.

Conclusion

- The results show the potential of ictal EEG source localization to localize the EZ.
- The results indicate that the method also work in the more complex ETLE cases.