Introducing design ideas for an interactive BCI online forum with a mixed-method qualitative and quantitative approach

P. Ziebell[1*†], A. Modde[1†], E. Roland[1], M. Eidel[1], M. J. Vansteensel[2], N. Mrachacz-Kersting[3], T. M. Vaughan[4], A. Kübler[1]

[1]Institute of Psychology, University of Würzburg, Würzburg, Germany; [2]Department of Neurology and Neurosurgery, University Medical Center Utrecht, Utrecht, The Netherlands; [3]Department of Sport and Sport Science, University of Freiburg, Freiburg, Germany; [4]National Center for Adaptive Neurotechnologies, Albany Stratton VA Medical Center, Albany (NY), USA

*Marcusstr. 9-11, 97070 Würzburg, Germany, philipp.ziebell@uni-wuerzburg.de – †Joint first authorship, both authors contributed equally.

Introduction: Brain-computer interfaces (BCIs) can enable non-muscular communication and control for severely paralyzed people. However, efforts that directly involve potential end-users and address their individual needs are scarce, resulting in a prevailing translational gap [1, 2]. To help bridging this gap, it has been proposed to implement a BCI-specific online forum to sustainably strengthen the interaction between scientists and end-users [3]. The aim of our study was to explore the usefulness of and concrete design ideas for a BCI-specific online forum based on an interview/questionnaire approach involving paralyzed end-users and BCI Society members.

Material, Methods and Results: In this study, 6 severely paralyzed end-users were interviewed and 121 BCI Society members completed a survey about their wishes, suggestions, and opinions regarding a BCI-specific online forum. Data were analyzed with a mixed-method qualitative and quantitative approach [4]. Even though they already felt integrated into the scientific process on a medium to high level, all 6 end-users indicated various unmet needs and provided concrete ideas on how a BCI-specific forum could be a valuable tool. Among the BCI Society members, 101 of 121 expressed support for a BCI-specific forum. Table 1 lists selected design wishes and potential pitfalls to be avoided.

Table 1. Selected forum design wishes and pitfalls to be avoided as reported by 6 paralyzed end-users and 121 BCI Society members.

Design ideas	**… from paralyzed end-users**	**… from BCI Society members**
1st highest rated wish	More systematic exchange with scientists (focusing on what is (not) needed for everyday life, …)	Providing resources for users and scientists (hardware and software tutorial collection for caregivers, juniors, …)
2nd highest rated wish	Access to resources and information (hardware and software tutorial collection for caregivers, …)	More systematic exchange with other scientists (everyday question threads to complement traditional exchange…)
3rd highest rated wish	More systematic exchange with other users (BCI forum to complement disease-specific forums, …)	More systematic exchange with users (more direct integration into research process, "participant pool", …)
1st highest rated potential pitfall	Accessibility should not be too complex (unflustered alternative to social media overload, …)	Organizational efforts should not be underestimated ("easy to create, but difficult to keep up to date", finances, …)
2nd highest rated potential pitfall	Data privacy should not be violated (forum as a private space exclusively for registered users, …)	Scientists should not have concerns to participate (potential for theft of ideas in competition for scientific impact, …)
3rd highest rated potential pitfall	Non-English speakers should not be excluded (integration of language specific forum threads, …)	Unique selling points should not be neglected (distinct differentiation from other forums and social media, …)

Discussion and Significance: As exemplified by the selected ideas in Table 1, concrete BCI-specific online forum design aspects could be identified. At the International BCI Meeting 2023, we want to discuss these and further design wishes and potential pitfalls, such that the forum can serve as a meaningful resource for the BCI community, contributing to the meeting's motto "Balancing Innovation and Translation". In a broader sense, this work complements previous interview/questionnaire studies [5, 6] and further promotes user-centered design for BCI optimization [7, 8].

Acknowledgements: Funding by Lotte Schopper-Stiftung, Stratton VA Medical Center and NIH/NIBIB EB018783-09.

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