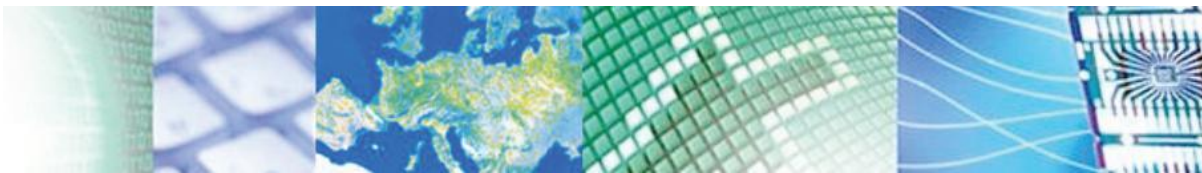




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CHIST-ERA Projects Seminar 2022 Advanced Brain-Computer Interfaces for Novel Interactions (BCI)

Speaker: *V. Javier Traver*

March 30th, 2022



Programme co-funded by the
EUROPEAN UNION

Introduction: Projects of the Topic



<https://project-banana.eu>





Introduction: Projects of the Topic

BANANA: Crowdsourcing of brain signals to annotate visual media

BITSCOPE: Brain Computer Interfaces for Monitoring and Improving User Experience in virtual worlds

GENESIS: Improving Virtual Reality through passive BCI monitoring of quality of experience

ReHaB: BCI for Stroke Rehabilitation through tracking of patient's engagement, cognitive workload, or mental fatigue in real-time in a VR context. 3



BANANA: Crowdsourcing

BITSCOPE: Hybrid Passive BCI for UX

GENESIS: Passive BCI for monitoring of poor experiences in VR

ReHaB: Patients/Clinicians Health Use Case



User experience of various sorts, i.e. mental fatigue, mental workload, emotions, attention, curiosity, memory, motion sickness, poor sense of presence.

Datasets: Lots of datasets to be collected and made available

Signal Processing challenges

Classifiers to be developed - **machine learning**

VR in 3 of the projects

Digital media in all projects



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Major Achievements and Outputs

Project timing: All starting Jan/Feb/March 2022

Major outputs expected: protocols, datasets, algorithms, demonstrators

Impact: Make BCI more useful to more people more quickly through better algorithms, new use cases and improved usability



Upcoming Challenges and Needs

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Common Technical challenges (Research methods challenges)

- Noise reduction
- Combining data from participants
- Multimodal fusion
- Machine Learning challenges / novel neuromarkers ←-features

Common Logistical Problems (Implementation challenges)

- Shared activities and resources
- Ethics & protocols and data privacy ←-common problems to us all
- Data collection - scale and diversity of users



There is a **common road** to travel for all these projects which allow us to consider the following collaborative activities together

- Common **protocols** for data collection - multi-centre data acquisition effort
- **Ethics** application sharing
- **Data** sharing agreements?
- Sharing of **algorithms** for denoising/implementations, e.g. OpenVibe
- Sharing of **software** for stimuli presentation, e.g. VR environments?

This can allow all the projects to get there **faster** in terms of **impact**.



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Role of the CHIST-ERA Support

(Too early to say)

Delays:

- Between EU notification and national procedures
- Between official final (national) notification and project start
 - Recruitment issues

Some lack of flexibility in setting a common starting date

- Different national agencies put different constraints

Support for (coordinated) recruitment/hiring might be valuable



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Responsible Research & Innovation

We have *aspirations and documented intentions* based on our proposals

- **Gender** ← trying but difficult
- **Open Science:** We all have Open Science Coordinators and some of us commit to open source and open access
- **Education and Public Engagement:** School visits, makers fairs, social media
- **Ethics:** Important and we will arrange as part of a workshop on this across the four proposals
- **Governance:** We have responsibilities so adopting formal processes around data protection, courses, data protection impact assessments.



Open Science

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No actual challenges so far

Open Science practices within the projects

→DMP, publications in OA, open data sharing, data repositories used, etc.

Gold/green publishing

→Ensure that publications in high quality outlets

Obstacles to cope with good OS practices.

→GDPR is potentially a challenge - DPIA can be challenging if DPU are unfamiliar with brain signal data

Costs of implementing the OS practices (when relevant).

→Institutional agreements with publishers (IEEE/ACM/Elsevier) help



Technology Transfer

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Biggest challenges linked to research results exploitation & licensing/intellectual property rights - None so far

Steps taken to commercialize (or exploit in another way) a technology - points in common within your topic - None so far

**Any tension felt between technology transfer and OS?
None so far**



Inadequate financing - varies according to country

Skills shortages - yes, recruitment challenges

Regulation that hinders innovation - European MDR potentially

Intellectual property right issues - None so far

Traditional value chains less keen to innovate - VR is very topical
so many companies seeking an edge/something new

Incompatibility between parts of systems (lack of standards) - Not
so much

Mismatch between market needs and the solution - Too early to
say



Questions?