Collective activities in immersive teleclinics for mental health prevention

Résumé / sujet de thèse

The PhD thesis of Jean-Charles Brunet takes place within the context of the European project **IPC4MH** (Immersive Prevention Centers for Mental Health), funded under the THCS (Transforming Health and Care Systems) call. The project, which brings together academic and industrial partners, as well as healthcare institutions from France, Switzerland, and Poland, aims to improve access to prevention, either secondary prevention (acting early at the onset of disorders to limit their impact) and tertiary prevention (reducing the risk of relapse), for both younger and older populations.
In this context, we will define and evaluate **mental health care pathway**s that include activities accessible in Virtual Reality (VR) from home or from local health centers. These activities will be held in "**immersive teleclinics**", that may include training or assessment exercises, conducted alone or in groups (e.g., collective exergame), as well as follow-up meetings with healthcare professionals, and group sessions with peers (e.g., group talk, focus group, etc.). **Two 3 month-long experimentations will be carried out,** with junior / senior populations in 3 countries, both with VR HMD at home and in local centers, so as to test the engagement of the patients and the feasibility of this type of care.

The main scientific objective of the thesis, cofunded by IPC4MH and Région Pays de la Loire, in the field of human-computer interaction for health, is to **design and evaluate immersive collective activities and tools for remediation and assessment in mental health prevention, both with and without practitioner supervision, integrated into care pathways that include multiple sessions and appointments with practitioners**.
The PhD candidate will pay particular attention to:

- **The relationships between individual, collective, and collaborative activities**, for example, how an individual activity can be adapted to be performed collaboratively with others, the different possible degrees of engagement in a collaborative activity, and the role of healthcare professionals during these activities.
- **The tools used during the activities,** for example, how dashboards can help sustain patient and group motivation while providing healthcare professionals with a means to track progress or to manage a group talk.
- **The collaboration between patients and healthcare professionals,** for example, how a healthcare professional engages with and supports multiple patients at once, or how a healthcare team manages coordination between patients across different practitioners and activities.

The first year will be dedicated to a literature review on collective activities for mental health, which should allow the building of a taxonomy and the writing of a survey paper, as well as observations and possibly experiments with group talks in VR. In the second year, the student

will design and develop one or more collective environments aimed at target populations (isolated elderly at risk / young people with ASD), focused on different approaches (games, exergames, simulations, situational activities, group talks, etc.), and evaluate these environments with healthy participants and in clinical studies, before publication. The third year will deal with the design of methodological principles for collective therapeutic activities in general, and for the targeted populations in particular, and the publication of a methodological paper, as well as the writing of the PhD dissertation.

Nature de la collaboration numérique

The IPC4MH project is tasked with building and evaluating **immersive teleclinics** (i.e., a series of seamlessly connected virtual spaces dedicated to mental health prevention). This PhD thesis is focused on **collective / collaborative** activities for patients in the teleclinic, that may or may not be supervised by practitioners (e.g., psychologists, neuro-psychologists, ergotherapists, etc. There are at least two temporal levels of collaboration to consider:

- the **synchronous collaboration sessions** between patients inside immersive environments mirroring activities used in real-life prevention (e.g., green care, exposition, music therapy, relaxation, group talks, role play, etc.), with or without the supervision of clinicians, who may have special tools to help them manage the activity.
- the **long term collaboration** between patients (and practitioners) due to the recurring sessions, and the fact that they may interact outside of the virtual teleclinic, either in health facilities (e.g., clinics or hospitals) or using digital means such as mail or social networks.

The main focus of the proposals will be on the **design of the activities** and the **tools to supervise the synchronous collaborative sessions**, studying the group dynamics and activity in these environments. Nevertheless, we will also study what happens between the sessions, and take special care ensuring that the long term collaboration is also maintained between patients, but also with the practitioners in relation to the therapeutic alliance. This will be facilitated by the 3 month-long studies of the IPC4MH project, in which there should be recurring collective sessions with the same patients.

Contribution à la collaboration numérique : Résultats attendus et impact

The PhD is expected to produce contributions at different levels:

- on the **theoretical** level: a model of Mental-Health related group activity in VR, notably describing how such activities are organized (phases, tasks, dynamics, co-activity/collective activity/collaboration, etc.) and of the supervision means

associated.

- on the **methodological** level: guidelines on how to transform solo VR health activities into collaborative ones, how to implement real group activities in social VR, and on how to design tools for supervision of collective health activity by practitioners.
- on the **technical** level: several multi-user VR environments in which collaborative activities can be conducted, and the tools for practitioners to supervise those activities.
- on the **empirical** level: results of the experimentations with healthy participants and with patients / practitioners within the IPC4MH studies, focusing on the usability, the group dynamic, and the acceptance of those technologies for group activity and group activity monitoring and animation.

Positionnement dans le programme eNSEMBLE

This thesis is mostly related to PC1 of the PEPr eNSEMBLE program because it is concerned with the **design and evaluation of social virtual reality collaboration spaces for patients' synchronous collaborative activity**, possibly with practitioners monitoring the situation or animating the activity. An important point is that we will address two populations of patients (juniors with ASD, seniors with depression), and that situations will vary, ranging from very controlled tasks to free ones, with varying degrees of collaboration, in presence or absence of a health professional, etc. From this diversity, and by applying the same principles across cases, we should be able to identify more generally what works, and what does not, in collaborative spaces dedicated to mental health.

The thesis is also related to PC2, because we will consider **how the relations between the patients and between patients and practitioners evolve along the experimental program**, in relation to other activities (solo activities, meeting with professionals, meetings in reality, etc.) and to organisational constraints, so as to determine the effect those factors can have on synchronous sessions.