Evaluated VR-Application for Use in Alcohol Therapy and Implementation Guideline

Output 4.4 from the BGI project

Interreg Baltic Sea Region

EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

This handbook on the evaluated VR-application for use in alcohol therapy and implementation serves as a guideline on how to plan, implement and uphold the usage of VR within the daily practice of alcohol treatment and rehab, and what factors are to be taken into consideration. It accounts for country-specific and transnational conditions.

Author

Prof. Dr. Simone Kühn

Universitätsklinikum Hamburg-Eppendorf

Martinistrasse 52

DE – 20246 Hamburg

phone: +49 (30) 824 066 75

skuehn@uke.de

www.uke.de/index.html

Editor

BGZ Berliner Gesellschaft
für internationale Zusammenarbeit mbH

Pohlstraße 67

D – 10785 Berlin

phone: +49 (30) 809941-0

fax: +49 (30) 809941-20

info@bgz-berlin.de

www.bgz-berlin.de

_____

Berlin, March 2020

Content

Introduction

Within the scope of the project "Baltic Game Industry - Empowering a Booster for Regional Development" (BGI)[1], a major aim is to further investigate general framework conditions that have to be met, and provide recommendations, in order to aid the development and implementation of Virtual Reality (VR) applications in non-game sectors. In this output we report on our main achievements, mainly citing from our user manual: **A requirement catalogue and guide for VR-application development and establishment for usage in clinical (hospital) settings exemplified by an application to treat alcohol use disorder - "AlcAvoid".** This user manual is currently being further refined for its final release during the second half of 2020 on the basis of our ongoing work at the clinics.

The application developer, the HTW Berlin University of Applied Sciences[2], in communication with research experts in the field of addiction (from the partnering clinics, see below) provided application prototypes for AlcAvoid. These have been successfully implemented and evaluated by the researchers and further personnel (e.g. medical doctors, psychotherapists, psychology students, and a study nurse) from the different hospital sites:

- University Medical Center Hamburg-Eppendorf (UKE)[3] in Hamburg, Germany,
- Institute of Psychiatry and Neurology (IPiN)[4] in Warsaw, Poland
- Unit of Clinical Alcohol Research, Clinical Institute (UCAR)[5] in Odense, Denmark.
- Pomeranian Medical University in Szczecin (PMU)[6] in Szczecin, Poland.

Detailed written and oral feedback was provided to the developers, **resulting in the implementation of a final product that satisfied both scientific and user requirements for clinical sites**. Recommendations for the future app development for treatments in hospital and associated clinical research were derived from this process, and also included in the pre-final draft of the manual.

[1] Baltic Game Industry (BGI): http://baltic-games.eu.
[2] HTW Berlin University of Applied Sciences: www.htw-berlin.de.
[3] University Medical Center Hamburg-Eppendorf (UKE): www.uke.de/index.html.
[4] Institute of Psychiatry and Neurology (IPiN): https://www.ipin.edu.pl/.
[5] Unit of Clinical Alcohol Research, Clinical Institute (UCAR): http://www.sdu.dk/en/om_sdu/institutter_centre/klinisk_institut.
[6] Pomeranian Medical University in Szczecin (PMU): https://www.pum.edu.pl/.

In addition, all partnering sites have now conducted initial research on the feasibility of the final clinical VR application in patients, following recommendations from the manual. The initial draft was generated in collaboration between the application developer (HTW Berlin) and researchers from the leading clinical partnering site, UKE. Following the user manual, all sites were successful in reaching significant cornerstones, as recommended in the manual for the establishment of the VR-app.

As a result, **AlcAvoid is now a fully operative and available software**, and is currently being used further with more patients at each of the sites.

In this present report, we will summarise the different chapters of the user manual and point out the **most important considerations and recommendations for the development, establishment and usage of VR in hospital/ clinical settings**. **After final refinements, the manual will be made fully publicly available.**

The following central topics and associated recommendations (organised as chapters in the manual) are most relevant, and will be elaborated in the present report:

(1) VR-application (software) development for usage in hospital (research) settings
(2) Hardware and infrastructure implementation
(3) Local stakeholders and promotion
(4) Software handling and user training
(5) Patient engagement
(6) Sanitation requirements and regulations
(7) Statutory regulations and data protection
(8) Ethical aspects

Key Aspects of our Requirement Catalogue and User Guide

(1) VR-application (software) development for usage in hospital (research) settings

For an application/game developer, it is crucial to establish collaboration with researchers or therapists that work in the field of interest (i.e. research and therapy with target group/problem that is to be addressed by the app). Another possible approach is to contact clinic directors or leading researchers/medical doctors directly and ask for relevant target groups and target clinical problems that may benefit from a VR-application. In order to elicit further interest, the general attractiveness and effectiveness (by citing scientific evidence) of VR-interventions for patients and their potential to extend beyond restrictions of the hospital setting needs to be communicated. In chapter three we further elaborate on this issue.

In any case we recommend that researchers and experienced therapists are contacted for advice. They should be asked to give scientific/expert input concerning the most important features of the application in order to assure its effectiveness. Furthermore, they can discuss the mechanisms of the problem-specific therapy, and how this would be ideally targeted.

As an example from our project, researchers explained to the VR-developers a promising hypothetical target mechanism in AUD: automated, craving-elicited approach behaviour towards alcohol, that happens mainly without conscious control. 'Overwriting' this automated approach tendency can be achieved by reversing the reaction towards alcohol: instead of an approach movement (grabbing and pulling the beverage) the opposite behaviour is instructed and repeatedly trained (pushing the beverage away), while patients are trained to pull non-alcoholic beverages towards them. Previously implemented research used a normal PC and a joystick for the movements. Zooming into or away from the virtual representation of the alcoholic beverage was used as visual feedback. This type of training has been criticised as repetitive and boring, and scientific evidence of its effectiveness indicated rather small clinical effects. Hence, our novel app, AlcAvoid, has the advantage that the training takes place in a VR-bar environment – a typical drinking situation and hence likely potent in eliciting stronger craving. Training to push alcoholic beverages away in such an environment is likely more transferrable to everyday situations. We are currently further

evaluating this by contrasting both the PC-based and the VR-version in a multinational study with AUD patients.

Hence, communication with scientists and/or therapists allows developers to design and develop an application that incorporates known therapeutic mechanisms and combines them with the strength of the target medium (e.g. VR).

For the initial piloting, a partnering site is needed. Hence, it may be the best approach to identify professionals in the field of interest directly at a hospital site. These researchers (which would best be research group leaders and clinic directors) will then likely be willing to take on a leading role in mediating the communication process between software developers and the clinical site, and in conducting appropriate evaluation trials of the application for the purpose of optimisation. Alternatives to this approach can also be found in chapter three.

(2) Hardware and infrastructure implementation

Equipment

Although clinical sites may differ in a variety of aspects, we assume that, based on the experiences of our multinational project, some basic requirements must generally be met for successful implementation in a clinical setting. Taking economic considerations concerning cost-efficiency into account, the recommendations for basic equipment comprise (this needs to be updated as technologies change/progress):

- head-mounted display, controllers, and lighthouses (including height-adjustable tripods or a possibility to attach them to a wall) by HTC Vive Pro
- high performance gaming laptop (ideal; e.g. such as VR-ready gaming laptops provided by ASUS[7]).

In order to facilitate the general technical implementation as much as possible across different sites with different demands and financial resources, up-to-date alternative product lists and descriptions should be provided by the developers.

[7] ASUS "VR-Ready ROG Gaming Laptops": https://rog.asus.com/articles/g-series-gaming-laptops/vr-ready-rog-gaming-laptops/.

The minimal requirements of the application in terms of the processor speed, graphics card demands, RAM, operating system, and so on, must be provided, and cheapest but still operational options need to be presented. The app developers should be available and flexible concerning customised recommendations.

The app should be optimised to run under less cost-intensive conditions. Low acquisition costs should also help in the distribution of successfully applied applications to other clinical and research facilities - thus making a possibly effective treatment available to a greater number of patients.

Infrastructure

Providing spatial resources imposes a serious challenge on modern clinical practice as they are very limited at clinical sites. Often, no separate rooms are available for the use of VR-applications. VR-application setups cannot be easily implemented in regular therapy rooms. This is often due to tight treatment schedules on the one hand and the necessity to not change any existing room constellations (e.g. concerning furniture or any other arrangements of objects within the room). Implementing a stationary VR-environment in a designated room that is available at all times is most likely not an option due to spatial shortages.

Identifying larger, multifunctional rooms (e.g. rooms used for group therapy) where VR-applications could be used, is an optimal solution for this problem. However, in order to increase feasibility in this setting, VR-equipment must be easily portable to guarantee the multifunctionality of the respective rooms. We would therefore recommend relying on powerful gaming laptops and tripods for the lighthouses/sensors so that everything can be easily moved to other rooms. To enhance acceptance and avoid any conflicts due to competing spatial interests, communication and explaining the purpose of VR-training by local cooperation partners is key (see next chapter). Additionally, making use of existing scheduling systems to block rooms for VR-sessions way ahead within the hospitals' administrative systems can be useful. The requirements for the interior equipment of a room where patients are treated with VR-applications are generally lower than for standard use. Patients are taken into another world with the VR-technique, hence, ultimately even basement, unused storage rooms or other, may be - even without windows - suitable. However, we consider this a last resort, because interior design and equipment will affect patients immediately before and after applying the VR-technology.

(3) Local stakeholders and promotion

We recommend that the benefits of VR-technology are widely communicated. The target groups comprise clinical staff including medical doctors, psychologists, researchers, or nurses. Those would need to collaborate or assist, for instance in the scientific evaluation of the VR-application or in the recruitment and treatment of patients.

Generally, as VR-tools constitute a unique and novel approach to patient treatment, a prerequisite lies in convincing staff concerning its usefulness in a therapeutic context. This, primarily, is a matter of changing/influencing business culture and occupational roles rather than "simply" introducing yet another method for patient treatment, as VR-applications are still strongly considered as "fun" and "suited for recreational purposes only".

Experiences in other fields concerning change management have shown that profound changes are most successfully achieved if they are supported and instructed by leading superiors. In a clinical setting, this means that clinic directors and management should approve VR-technique in patient treatment in order to facilitate implementation. In order to convince leading staff, it is usually helpful to establish in person/direct contact, and provide:

1) Exemplary scientific evidence for the success of treatment methods that are enabled by the application of VR-technology

2) An explanation how VR-technologies can go beyond limitations/boundaries of classical treatments (to be aware of the use and success of VR in exposure therapy for treating anxiety disorders is of advantage here)

3) Provide an overview of costs and being able to provide an outlook on further implementation at the site (our manual is a good starting point for this)

We also recommend providing information concerning the availability and usefulness of a new therapeutic approach readily available to staff, for example by placing appealing brochures or posters at disposal in staff meeting rooms.

For supporting on-site motivation, repeatedly informing staff at meetings or internal trainings is recommended. Especially, if information was presented by superiors who convey active engagement and interest in establishing VR-applications in daily patient care. Staff should be informed that novel VR-technologies in a clinical setting bear the advantage of allowing for otherwise impossible but potentially highly effective therapeutic approaches. VR-technologies allow for bypassing limitations

of standard procedures such as limited resources and legal or ethical constraints. For instance, exposure to alcoholic cues and throwing such beverages away expressively in a bar environment to prevent relapse would not be feasible either within the clinic, nor doing in-vivo therapy outside the clinic, but this approach is possible in the VR-application AlcAvoid. Applying VR-technology, more treatment options become available.

(4) Software handling and user training

App developers need to provide instructions for how to successfully install the software and test its functionality, including transferring knowledge for safe and skilled usage of the equipment. The guidelines for software handling and setup from our AlcAvoid study will be later summarised in the appendix of the manual to provide an operating instruction example. Support in case of any technical problems should be provided at least via e-mail.

Besides the mere technical handling of the application with which users might not be readily familiar, some additional instructions are needed for staff that will actually work with the VR-application in daily patient care routine. In order to achieve this cost-efficiently, one could mainly rely on self-study based on written instructions (routines). These instructions should include instructions on structuring the VR-sessions, handling of the VR-application and instructing the patients.

The instructions should first be practiced by the motivated personnel, without any further personal instruction. However, it should be possible, that experiences with this self-study are feedbacked with the manual providers. We assume that once the VR-devices have been successfully implemented in ordinary day use at a site, extensive training of staff concerning recruiting and motivating patients becomes obsolete. This is especially worth mentioning from a cost-efficiency perspective.

Informing about hygiene regulations, however, will and must remain an indispensable additional component of staff training. Hygiene regulation training of staff must be routinised before implementation of the VR-application (see manual section 6 for details) and should also be available as written instructions.

For future and full implementation, we strongly recommend involving nursing staff into the use of VR-applications in a clinical setting, because this professional group has the most contact with patients and is usually highly open for taking responsible roles in advancing patient care - at least within psychiatric wards. However, one has to be aware of the fact that training can be time-consuming in the first place before any benefits of applying VR-technology to patients will emerge. We recommend turning to the promotional recommendations (last section) for motivating staff.

(5) Patient engagement

Generally, our experience is that patients are very open for and have a positive attitude towards VR-intervention. This can be further enhanced by:

- informing patients, medical and nursing staff about the innovation concerning VR-treatment, allowing for treatment possibilities which would not be feasible in standard care (e.g. exposure to and training in craving-eliciting environments, such as a bar)
- following the three therapeutic core conditions sensu Rogers: congruence/genuineness, unconditional positive regard, and empathy in the patient contact. Although not unique to VR-implementation projects, embracing these rules as inner attitude in every patient contact may facilitate encouraging patients to participate in a new and (at present still unusual) technology in a therapeutic setting.
- offer test/probe trials to patients in VR in order to reduce scepticism and provide support in learning to manipulate, e.g., the VR-controllers. Providing patients with the necessary know-how and practical training of how to use a VR-application before the actual treatment will enhance confidence with handling. In our experience, this has proven to increase their readiness to be part of a treatment group applying VR-technology.
- allow for individualised breaks during the VR whenever possible to enhance perceived control and reduce the risk of exhaustion.

(6) Sanitation requirements and regulations

Sanitation and infection control are a major concern because the devices are exposed to direct skin contact to each and every patient working with a VR-application. With respect to VR-goggles, especially bacterial and viral agents concerning eye infection are critical, as devices are used by different patients. We provide general hygienic rules in the following. We advise to further check local regulations.

A significant concern from the point of sanitation arises concerning the foam material used for cushioning on the head mounted display. Based on our experience, we recommend using synthetic leather for cushioning, which can, before and after each use, be cleaned easily with a disinfectant-cleaning wipe. This procedure is in line with clinical hygiene regulations and is sufficient for VR-application as a non-invasive, external device, with superficial dermal contact only. Based on the trials that we conducted so far, the material sustained repeated cleaning. This information will be updated in the final manual version.

One partner has decided to use disposable pads covering the cushion of the head-mounted display. These are for single-use only and need to be removed immediately after each session and then be replaced by a new pad when the next session takes place. The partner has also reported user comfort and good applicability of this method. So far, both options have proven equally successful in terms of maintaining the gear and sticking to current hygiene regulations, hence, sites interested in implementing VR-technology into their treatment offer would be free to choose which alternative suits them best.

VR-controllers should be disinfected after each usage using an appropriate cleaning wipe. Hand disinfection of staff before and after each session is mandatory. Regular disinfection of keyboards is recommended.

Although those hygiene requirements are relatively straightforward, compliance is crucial to prevent infections. Hence, either using disinfectant-cleaning wipe or disposable pads is a mandatory aspect in the application of VR-technology in any clinical setting

(7) Statutory regulations and Data Protection

We recommend that local data protection officers are contacted to ask for their advice. In Denmark, one is referred to the Danish Personal Data Act. No specific rules for the automatic collection of personal data for instance by VR or other health care technologies exist so far. The same is true for Germany and Poland. In order to gather information on which and how personal data is stored and/or transmitted during use of the VR-application, a short questionnaire was developed and sent to main VR-manufacturers. Of interest was if data about physical characteristics of users (e.g. movement profiles), data from active sensors (e.g. facial recognition), location related data (e.g. GPS), time related data (e.g. length of device use), or system environment data (e.g. network connectivity) are stored and/or transmitted (see Appendix for the detailed questionnaire). We were unable to get feedback on these sensitive issues from hardware manufacturers but recommend trying this in future projects.

Although we strongly urge to find a general solution in order to draft general guidelines in dealing with data protection issues, we circumvented this critical issue in the present project by taking the following three precautions that should also be feasible in the future:

1) Patients were informed in detail before participation about which and how data are stored and/or transmitted. As long as patients are informed and aware of the information they reveal, this should be no reason to prevent the usage of a VR-application in a hospital setting.

2) We use anonymous IDs for conducting the training, which patients then repeatedly use for their training sessions. This procedure prevents personal identification even if (parts of) the data is transmitted to third parties.

3) We apply offline data acquisition (i.e. no internet connection during the VR-training). The alternative option is to use an active data blocker (e.g. HTC Firewall Blocker) which has been developed for our needs by employees of Prof. Dr. Steinicke who is the head of the Department of Human-Computer Interaction at Hamburg University. This data blocker avoids the sharing of any information with the hardware producing company even if the device is online.

However, if VR-technology is planned to be implemented in clinical procedures on a large-scale basis, hardware providers need to be more transparent about stored data. From a data protection perspective, it is highly unlikely that VR-applications could be introduced as standard procedure tools in a therapeutic setting without clearly stating which data is stored and gathered by the manufacturers. Precautions taken in the present study can work in a scientific context but are likely not feasible when introducing a tool as standard in daily clinical practice. Clearly, the lack of information coming from the manufacturers is a critical obstacle for the general implementation of VR-applications in a non-gaming sector. Especially if it is planned to be implemented in highly sensitive environments such as hospitals.

(8) Ethical aspects

The problem of obtaining company feedback on data storage has not been resolved. Hence, according to our current knowledge, we recommend writing a study protocol, that has to be approved by a local ethics committee, before implementing VR-technology in clinical settings. This also needs to cover unexpected adversities and how to handle them, such as negative side effects imposed by VR (e.g. motion sickness, taking breaks or quitting the study) or general adversities (e.g. worsening of symptoms, informing responsible therapists/medical doctors for stabilisation). We can report that all of our studies received ethical approval from responsible local committees.

Unfortunately, we cannot report about how to address data protection issues at full length. At the very least, legal advice about data protection from local data protection officers should be individually sought. Any advice from ethical boards from appropriate institutions on site needs to be obtained individually and carefully considered.

Although this procedure would be time consuming and would lack a standardised approach, the good news is that partnering sites have obtained ethical approval, which indicates that the procedures described here are generally appropriate. However, it would be desirable to provide a solution that was independent of local decisions in every hospital but rather would represent a state-of-the-art standard procedure. To obtain this, however, detailed information about data assessed from manufactures would be needed in the future.

Conclusion

To summarise we state that, by following these general rules and recommendations, experiences at all partnering sites were promising and proved the acceptance and feasibility. A user-friendly VR-application (AlcAvoid), which is now under further scientific and practical evaluation at all partnering sites, was successfully developed, promoted, and established at the respective hospital sites. The app will be made publicly available and can then serve developers as an example for VR-applications in hospital settings.

We have developed and tested a first application manual draft, which we believe will be very useful for other projects. The manual will be further refined during the course of the project and ultimately be made publicly available for any developer or clinical site.

VR-developers should directly address hospital leaders or group leaders (senior researchers) at the hospitals, who are in the position to make extensive decisions and/or are interested in further testing, scientifically evaluating, and using the VR-application. As an important prerequisite and to provide a basis to motivate hospital leaders to take charge in order to address obstacles with VR-application implementation, evidence-based results showing positive effects of the use of VR-applications within therapeutic use are useful; which this project is currently actively engaged in for the field of alcohol addiction.

Collision with other treatments and competing interest in spatial resources can be prevented by using existing calendar/coordination systems, using multifunctional rooms, and movable equipment. For technical implementation, cost-effective hardware solutions and minimal requirements need to be communicated. App installation and test instructions need to be provided in written form, with the possibility of at least e-mail-based tech-support.

Acceptability among hospital personnel can be enhanced via promoting VR and its benefits. Along with the purely technological implementation comes additional training of staff and the organisation of premises which represents a challenge in almost every hospital. We recommend manualised self-training sessions that could be integrated into staff meetings or on-the-job trainings. Hygiene rules are mandatory and should be communicated within the initial training procedure, and routinely checked with respect to compliance.

Concerning data protection, basic data regulation guidelines are still pending; general baseline rules, however, are using anonymous IDs for training and conducting the trainings offline. Additional ethical consent from local boards should be obtained.

For the present project, the following crucial steps will be taken next at the partnering sites:

- monitoring of compliance with hygiene regulations and data protection across time
- recruitment of a sufficiently large patient sample to demonstrate the beneficial effect of the VR training to, hence, further increase motivation of VR-implementation in clinical settings
- sustainable establishment of quality routines for the training sessions of staff
- ensuring and enhancing motivation of collaborators within clinical sites, such as assistance with patient recruitment by responsible staff

References

ASUS “VR-Ready ROG Gaming Laptops”: https://rog.asus.com/articles/g-series-gaming-laptops/vr-ready-rog-gaming-laptops/

Baltic Game Industry (BGI): http://baltic-games.eu

HTW Berlin University of Applied Sciences: www.htw-berlin.de

Institute of Psychiatry and Neurology (IPiN): https://www.ipin.edu.pl/

Pomeranian Medical University in Szczecin (PMU): https://www.pum.edu.pl/

Unit of Clinical Alcohol Research, Clinical Institute (UCAR): http://www.sdu.dk/en/om_sdu/institutter_centre/klinisk_institut

University Medical Center Hamburg-Eppendorf (UKE): www.uke.de/index.html

Appendix

Questionnaire with detailed questions concerning possible storage and/or transmission of sensitive personal data during VR-application use

When asking about data transmission and storage in this survey, the question refers to transmission to, and storage of, data on any device other than the local PC/Smartphone/Standalone VR-device. E.g. transmission of data via Internet connection to a cloud server. If you answer one of the questions with yes, please specify the kind of data that is being transmitted and/or stored.

Questions for VR hardware manufacturers

- ☐ Do you transmit and/or store data about physical characteristics of the user?

  This may include data the user entered, such as gender, or data that can be derived from device usage patterns. For example: Body height, movement profiles, single- or two-handed usage, dominant hand, eye pictures taken via eye tracking, eyesight derived from usage of corrective add-on lenses or focal point adjustable optics.

- ☐ Do you transmit and/or store data from active sensors?

  This may include direct transmission of life data, such as a camera video stream or microphone audio stream. It may also include recordings, such as pictures, video and audio files, as well as data derived from processing the sensor information, such as facial recognition, object recognition, speech recognition and 3D environment reconstruction.

- ☐ Can active sensors be disabled via hardware interfaces, e.g. physical buttons?
- ☐ Can the user tell if a sensor is active via hardware-based feedback, e.g. a glowing LED?
- ☐ Can active sensors be disabled via software interfaces, e.g. a setting menu?

- ☐ Do you transmit and/or store location related data?

  This may include GPS data, mobile phone signal derived location data, network identifications or 3D environment reconstruction of device position inside a building.

- ☐ Do you transmit and/or store time related data?

  This may include start/end/length of device usage sessions, as well as timestamped events such as turning on/off of auxiliary devices like motion controllers.

- Do you transmit and/or store usage related data?

  This may include the use of VR-software applications and any data derived from their use.

- Do you transmit and/or store system environment data?

  This may include information about system hardware, operation system, network connectivity, system user and installed software.

- Do you transmit and/or store other data that might be relevant in the context of professional use of VR-hardware in areas where sensitive data may be generated?

  Some examples to consider when answering the question would be the use of the VR device in hospitals, in research & development departments of high-tech companies, in government agencies or in operation centres for critical infrastructure.

- If you transmit and/or store any kind of data of the kind asked in the previous questions, please describe who in your company has access to the data.

- Does your VR-device/do your VR-devices require an Internet connection in order to be used?

- Does your VR-device/do your VR-devices automatically create a connection and/or login to some kind of user account when it is in use?

- What options does a user of your VR-device/devices have to control the kind of data transmitted and/or stored?

  When asking about data transmission and storage in this survey, the question refers to transmission to, and storage of, data on any device other than the local PC/Smartphone/Standalone VR-device. E.g. transmission of data via Internet connection to a cloud server. If you answer one of the questions with yes, please specify the kind of data that is being transmitted and/or stored.

Questions for VR-platform software developers & operators

For this survey, VR-platform software refers to all types of software required to run individual VR-applications. E.g. VR-drivers, SDKs, VR-software stores, launchers, digital distribution platforms and such.

- ☐ Do you transmit and/or store data about physical characteristics of the user?

  This may include data the user entered, such as gender, or data that can be derived from device usage patterns. For example: Body height, movement profiles, single- or two-handed usage, dominant hand, eye pictures taken via eye tracking, eyesight derived from usage of corrective add-on lenses or focal point adjustable optics.

- ☐ Do you transmit and/or store personally identifiable information?

  This may include name, address, email or social media account information, payment information and more.

- ☐ Do you transmit and/or store data from active sensors?

  This may include direct transmission of life data, such as a camera video stream or microphone audio stream. It may also include recordings, such as pictures, video and audio files, as well as data derived from processing the sensor information, such as facial recognition, object recognition, speech recognition and 3D environment reconstruction.

- ☐ Do you transmit and/or store location related data?

  This may include GPS data, mobile phone signal derived location data, network identifications or 3D environment reconstruction of device position inside a building.

- ☐ Do you transmit and/or store time related data?

  This may include start/end/length of device/VR-software/VR-experience usage, as well as timestamped events such as turning on/off of auxiliary devices like motion controllers. It may also include time spent in different menus/scenes, time spent with different types of content, local time of day when using the VR platform software and more.

- ☐ Do you transmit and/or store usage related data?

  This may include the use of VR-software applications and any data derived from their use. It may also include interaction events such as button presses, picking up and using virtual objects, using menus and interacting with system-generated content such as advertisements. It may include general usage patterns, eye-tracking derived information on what the user is looking at, search histories and more.

- Do you transmit and/or store communication between multiple users of your VR-platform software?

  This may include text chat, voice chat, video chat, virtual and mixed reality meetings, direct messages or messages posted to some common message board.

- Do you transmit and/or store system environment data?

  This may include information about system hardware, operation system, network connectivity, system user and installed software.

- Do you transmit and/or store other data that might be relevant in the context of professional use of VR-platform software in areas where sensitive data may be generated?

  Some examples to consider when answering the question would be the use of the VR-platform software in hospitals, in research & development departments of high-tech companies, in government agencies or in operation centres for critical infrastructure.

- If you transmit and/or store any kind of data of the kind asked in the previous questions, please describe who in your company has access to the data.

- Does your VR-platform software require an Internet connection in order to be used?

- Does your VR-platform software automatically create a connection and/or login to some kind of user account when it is in use?

- What options does a user of your VR-platform software have to control the kind of data transmitted and/or stored?

THE PROJECT

The project 'Baltic Game Industry' (BGI) aims to foster the game industry in the Baltic Sea region - turning an ambitious game developer scene into a competitive and attractive business sector with sound innovation potential and thus making the region a game hotspot with worldwide competitiveness.

The partnership works together on framework condition improvements, on making business support services fit for the special needs of game start-ups and finally on new business opportunities for game developers in other industry sectors, such as health care. The core element is the installation of durable game incubators, programmes and schemes for game start-ups across the region.

BGI effectively combines policy and business development. Tailor-made game business support fosters a durable economic growth of this innovative industry in the whole region. The introduction of VR technologies in non-game industries contributes to boosting innovation beyond games. The common branding of the Baltic Sea region as game innovation hotspot will attract international clients, investors, creative entrepreneurs and qualified workforce.

Read more at www.baltic-games.eu

PROJECT LEAD

BGZ Berliner Gesellschaft für internationale Zusammenarbeit mbH
Pohlstr. 67

DE – 10785 Berlin
phone: +49 (30) 80 99 41 11

fax: +49 (30) 80 99 41 20

info@bgz-berlin.de
www.bgz-berlin.de

Managing Director: Dr. Hilde Hansen
Chairman of the Supervisory Board: Jürgen Wittke
Shareholders: State of Berlin, Berlin Chamber of Skilled Crafts
Register court & number: Amtsgericht Berlin, AG Charlottenburg, HRB 21 292

PROJECT PARTNERS

- Denmark: Dania University of Applied Sciences, Norddjurs Municipality, University of Southern Denmark
- Estonia: Tartu Science Park Foundation, Tartu City Government
- Finland: Neogames Finland, Metropolia University of Applied Sciences, City of Helsinki
- Germany: Hamburg Institute of International Economics, HTW Berlin University of Applied Sciences, State of Berlin, University Medical Center Hamburg-Eppendorf
- Latvia: Foundation "Ventspils High Technology Park", AHK Service SIA, Ventspils City Municipal
- Lithuania: Kaunas Science and Technology Park, Lithuanian Innovation Centre
- Poland: Krakow Technology Park LLC, Institute of Psychiatry and Neurology
- Sweden: Swedish Games Industry Association, Invest Stockholm

---

The project "Baltic Game Industry" has been funded with support from the European Regional Development Fund. This publication reflects the views only of the author, and the ERDF cannot be held responsible for any use which may be made of the information contained therein.