Australian Government
Department of Agriculture, Fisheries and Forestry

Report on phase 2 of virtual reality (VR) to support foot-and-mouth disease (FMD) preparedness

Trialling the upgraded experience

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

Aim of this report

This report is to document the findings of the phase 2 VR to support FMD training experience trials.

Key points

- Users unfamiliar with VR technology may experience more challenges with the experience.
- In general, the department's role should be to work with training providers to incorporate VR technology into relevant training modules where appropriate.
- In general VR should be used to augment other training modalities, rather than as the sole delivery method.
- It is most useful for giving people a sense of novel environments, examining 3d objects, and coarse hands-on motor skills.
- There are challenges with distribution of the experience, and also due to the rapid pace of development of the technology. These need to be overcome to make widespread use of this technology for training.

Introduction and background

Phase 1 was a report available on the departmental website and a virtual reality experience from Novus Res, based on the learning content of the EuFMD (The European Commission for the Control of Foot-and-Mouth Disease) online courses and real time training. This virtual reality experience was trialled within the department and received favourable feedback.

In view of the results of the trials, and the improvements in technology, a second phase was commissioned – an upgraded experience developed by Novus Res. This was subsequently trialled, and the learnings from these trials are detailed in this report.

Key deliverables and timeline

Phase 2 commenced in September 2021 and concludes with the publishing of this report. It includes:

- development of the upgraded experience, including:
    - more complex modules
    - more complex user interaction with objects
    - multiplayer capability
    - exploring the process for distribution of the experience.
- feedback on the content of the upgraded experience by a technical review group
- trials of the upgraded experience
- reporting on the findings of these trials.

The formal trials on the completed experience were held at the following times:

- EuFMD trials in June 2022
- Department of Agriculture, Fisheries and Forestry trials in September and October of 2022

A video of the upgraded experience can be found here: VR demonstration video

Key findings

DAFF Trials

The key findings for the departmental were developed from 19 user questionnaire responses and the debrief discussions that were held with the trial individuals at the conclusion of each trial session. The majority of users had used VR before. The key findings were as follows:

- The VR experience (headset wearing and moving through VR) was comfortable, and there were minimal concerns about motion sickness.
- VR for FMD training works best by supplementing other ways of training such as face to face training and online training, rather than being the sole training modality. This supplemental material may include pre-reading, debriefing and practical sessions.
- It would be helpful if the 3-dimensional content that VR training covered was also available via web-based portals that could be explored on a phone or computer. Although the VR method is usually more engaging for learning of 3-dimensional content, a phone or computer is likely to be more convenient.
- There are arguments for and against short VR sessions (10-15 minutes or less), and it largely depends on the individual user. Short sessions are more comfortable overall and allow time for breaks and other learnings. However, some users find that it breaks the immersion and learning, and their main discomfort is the disorientation of transitioning between the real and virtual world. A reasonable approach is several short sessions with short breaks between them – such as for reviewing content and debriefing – within a longer daily session.
- The aspects that the users would most like to see improved is increased simplicity of object manipulation and more gamified elements. VR is best for providing coarse manipulation of objects and letting people feel present in an environment.
- The training experiences that the users would be most interested in seeing would be hands-on biosecurity such as simulating a response, airport screening, learning about industry locations such as a piggery, conducting decontamination procedures, necropsies, sampling, and disease detection.
- Almost all users indicated that they thought that each virtual reality module improved their understanding of each topic area. Almost all would also recommend a training module based on this VR experience to colleagues to improve their understanding of FMD training. All would be willing to participate in VR trials in the future.

EuFMD Trials

The key findings from the 10 EuFMD trainees who used it were similar - although they were less positive about the experience. The key findings from the EuFMD trials were that:

- there was a mixed reaction to the experience with either strong positive feeling or negative feeling. Overall, there was positive score for the training experiences
- the highest positive score was for the module 1 – setting up a biosecurity control point
- several users would have preferred a physically simpler experience and only a small proportion of trainees had used VR before.

The EuFMD findings are more likely to be representative of the overall sentiment of a random cohort of trainees than the departmental trials. This is because most of the departmental trainees had already shown positive interest in VR before their trials.

Distribution

There were a number of challenges in trialling the distribution methods as follows.

- Meta (previously Facebook and Oculus) discontinued the business model, instead rolling into a consumer version that required a personal Meta login. This meant that there was no longer a fleet-based distribution system.
- The only methods of distribution are publicly available App Labs early-access store or private distribution through sending the experience to users and having them upload it to their headsets via side-loading. There was not the option of hosting it on a closed section of the App Lab store for private distribution.
- COVID required management during the trial period, including cleaning the headsets between each use and allowing a sufficient period of time to pass to mitigate the risks as per WHS advice.

Because of COVID and increased risk of travel, departmental trials were limited to Canberra. The experience was also distributed to EuFMD to trial.

In view of the potential legal risk, and administrative overhead of widely supporting the experience, public distribution through the App Lab was not pursued.

Trial methods

The internal departmental trials were held from September and October of 2022 in Canberra as per the following procedure:

- The people selected were predominately in department, from those who had volunteered in the previous phase 1 trials or had otherwise been recommended or expressed interest.
- It also did include limited trails with several staff from external organisations who had expressed interest.
- 20 people formally trialled the completed experience and filled out a feedback survey. One questionnaire was incomplete, so 19 questionnaires were processed.
- Additionally, an informal discussion session held immediately after the testing and comments from this discussion were also recorded.
- Only the single-player experience was trialled by the users. Due to the complexity of having users test the multiplayer module, it was decided not to proceed with formal testing of multiplayer.
- An observer guided the user through the process for safety and provided guidance in the experience. A health and safety usage sheet was reviewed before the experience, and a user guide was provided.
- COVID safe and hygiene procedures were followed. The guide wore a face mask. The user was also given this option if they wished. The user also wore an eye-mask to minimise contact with the headset, and the headsets and controller were both wiped with non-alcoholic cleaner between users.

The EuFMD trials were held from June 2022 and followed the following procedure:

- One section of their usual training cohort was selected for VR training. This likely made the positive and negative findings more representative of an overall population of potential VR trainees than the departmental trainees, who were largely self-selected.
- 10 people used the experience and provided formal written feedback using a modified form of the survey sheet used in the departmental trials.

Next steps

Virtual reality is an emerging field. The hardware and software for VR is still maturing, with several competitors that are rapidly evolving their products. It is likely to be several years before the technology has stabilised. Valuable lessons can also be learned from similar industries to biosecurity, such as emergency services, medical, and industrial VR training as well as education and gaming.

VR is of most benefit where it builds on a mature base of existing traditional (online, classroom, practical) training. Rather than wholesale experiences of VR training, it may best to see it as an additional way of exploring specific elements of traditional content that might benefit from the greater interactivity and visualisation of the 3D content. Creating 3D and especially VR content is a complex process.

Distribution of the experience is also complex. So, difficulty of overcoming these barriers should be clearly justified by the benefit of the VR experience for a particular piece of learning content. Two examples of potential good cases for use in VR noted by users were setting up of a biosecurity control point, and for exploring of 3D models of lesions.

It is hoped that this phase 2 report combined with the phase 1 report will provide a foundation of understanding for future VR developers. This is particularly for development of VR for biosecurity related fields. The timeframe for these developments depends on the risks and opportunities for training, technological progress, and speed of adoption in the wider community of VR.