



THE RISK MANAGEMENT LETTER

This article is excerpted from
The Risk Management Letter
(ISSN 1070-0102), a publication
of Warren, McVeigh & Griffin, Inc.,
independent risk management
consultants.

The Risk Management Letter
focuses on important news and
information for professionals
involved with risk and insurance
issues.

Warren, McVeigh & Griffin, Inc.
1420 Bristol Street North
Suite 220
Newport Beach, CA 92660
Tel 949/752-1058
Fax 949/955-1929

©Warren, McVeigh & Griffin, Inc.
Reproduction of all or part
of The Risk Management Letter
may be made only with
permission of the publisher.

Virtual Reality Liability—Part II

In June 1996, THE RISK MANAGEMENT LETTER featured an article that examined the side effects and potential liability issues associated with virtual reality (VR). Since then, VR manufacturers and distributors have made technological advancements that appear to have minimized some problems of VR usage. Yet, other problems described in the 1996 article are still a concern, and have only become more controversial with recent improvements in the technology.

Volume 19, Issue 7 (1998)

BY PAUL PARAY

Since the 1980s, experts have been speculating that virtual reality (VR) technology will become a fundamental aspect of daily business, aiding corporations in everything from virtual corporate meetings to training new employees to carrying out simulated dangerous situations for risk assessment.¹ Although the anticipated boom in VR technology never fully materialized because of early technological barriers and liability concerns, a renewed interest by large consumer companies such as Disney, Olympus and Sony has led to research projects that may solve some problems associated with VR usage. In particular, these projects have focused on the factors that cause specific VR side effects, such as VR motion sickness and physical ergonomic effects.² Their findings have enabled certain companies to make technological improvements and eliminate some of the liability concerns associated with VR usage. While the most common VR side effects appear to have been solved, some perceived risks still linger and could create serious exposures for corporations.

The Current State Of VR Technology

Virtual environments (VE) are realistic, interactive, immersive simulations of places and scenes that are created with advanced software, computers, and immersive input devices such as head-mounted displays (HMDs). Current VR technology relies primarily on the combination of a tracking device and a computer system that together generate real-time experiences for a subject. Tracking devices enable a user to interact in simulated environments with the aid of such input devices as joy sticks, 6-D mice, or wired gloves. Sensors placed above both the HMD and control device track their respective movements and transmit this information back to a computer. Sound and graphics within the HMD provide the user with a position in cyberspace. The degree to which users feel they are actually in cyberspace is called the "level of immersion." Various problems become more pronounced with deeper levels of immersion.

Sim-Sickness

The most common physical complaint attributed to the use of VR products is simulation motion sickness, also known as sim-sickness. VR sim-sickness symptoms include nausea, headaches and vomiting. In addition, dizziness and disorientation can be triggered hours

after the VR experience. The main reason users experience sim-sickness relates to technological shortcomings in VR systems, including:

1. Lack of actual physical motion that corresponds with the visual cues of motion in the VE
2. Time lag between when a user moves his or her head and when the computer generates a new scene that corresponds to the new head position

These shortcomings can disrupt inner ear functions and cause sim-sickness. Most researchers now believe that further advancements in VR technology will likely eliminate most of the symptoms associated with sim-sickness. Subsequently, many of the corporations involved in marketing VR technology have reacted with improvements in VR software and hardware.

A Solution to Sim-Sickness?

The Walt Disney Co. is the highest-profile consumer company to take an interest in VR systems and has apparently chosen to tackle sim-sickness concerns by improving the technology used to create a simulation. In June 1998, Disney unveiled DisneyQuest, a 100,000 square foot interactive theme park estimated to cost \$85 million. Disney expects to open 20 to 30 such installations worldwide. Several of the rides, including Ride the Comix and Aladdin's Magic Carpet Ride, utilize HMDs. The likelihood of sim-sickness to users, however, has been greatly diminished due to Disney's use of high-performance rendering computers to reduce the lag time between head movement and image generation in the VE. To further reduce the potential of sim-sickness, these rides are designed to physically simulate the motion that the user sees in the VE, minimizing inner ear disturbances.

Other manufacturers have recently released less immersive HMDs that function solely as display screens. In Spring 1998, Sony and Olympus both released their liquid crystal display (LCD) HMDs in Japan, which mimic the effect of viewing a 50-60 inch television screen from seven feet away. Unlike traditional HMDs, these models greatly minimize the risk of sim-sickness because they function as video devices without the means of tracking a user's current position and/or orientation in real space. They look and feel more like conventional eyeglasses than the bulky head goggles still made by most HMD manufacturers. Both models weigh less than five ounces and allow the user to keep track of the real-world environment while being immersed in a non-interactive VE. Sony and Olympus appear to have carefully studied the causes of sim-sickness, including head strain caused by heavy HMDs so that sim-sickness and physical ergonomic effects will not be a problem.

Still Controversial

With the elimination of sim-sickness and some of the ergonomic liability concerns, VR manufacturers appear to have solved the most common problems associated with VR usage. Yet other risk concerns have remained controversial and overshadow the progress of VE technology. The following side effects have been both confirmed and denied by various scientists and researchers.

Sopite Syndrome

The US National Research Council released a report in 1994 that suggested that VR usage could cause chronic fatigue, drowsiness and lethargy that may persist after the more

immediate reactions to sim-sickness (nausea and vomiting) have disappeared. Although the Council gave these symptoms the name Sople Syndrome and admitted the need for more research, there has been no universal acceptance of its existence. Some researchers say that the symptoms are no more than an extension of sim-sickness, and as the causes of sim-sickness are eliminated by technological advancements, so-called Sople Syndrome may disappear as well.

Addiction and Abuse

The possibility that individuals will be more interested in participating in their virtual lives than in their actual ones also has raised concerns. So far, most VR users are able to enter a virtual environment and leave without such side effects. Yet, because VR has the potential to create and motivate addictive behavior, some users may not be willing or able to leave the VE (just as other addicts are unable to stop their addictive behavior).

Flashbacks

Some researchers, such as Dr. Tom Furness,³ have reported the potential for "VR Flashbacks," which is a sudden onset of the sim-sickness symptoms hours after the user has left the VE. This could be a particularly sensitive liability concern for corporations that utilize VR technology. An affected individual, whether an employee or third party, could have a flashback while driving a car or operating dangerous machinery. Although little public research has been done on flashbacks, the legitimacy of the phenomenon has been confirmed by the military and their protocols, which prohibit pilots from operating an aircraft if they have used VR training (flight simulators) within the past 18 hours.

Related Concerns

There are other concerns that are not a direct result of VR technology, but rather relate to modern technology. These risks may further complicate the issues surrounding VR liability:

Repetitive Stress Syndrome

The continual repeated movements of the hands may result in repetitive-stress injuries. Some researchers fear that the rapid carpal and metacarpal movements used for VR movement can have the same damaging effects as repetitive-stress injuries related to joystick and keyboard usage.⁴ Repetitive-stress injury is purported to cause a plethora of conditions, including tendonitis, fibrous tissue hyperplasia, and ligamentous injury resulting in functional disability. These conditions are not always chronic, but may cause active or rest pain and prevent the victim from returning to normal everyday activities.

Electromagnetic Field (EMF)

After years of extensive research, evidence linking EMFs to any known health hazard remains inconclusive. Scientists are still in disagreement as to whether exposure to an extremely low frequency electromagnetic field (30-300 Hertz range), such as those present in HMDs, can cause medical conditions such as leukemia, brain cancer, melatonin irregularities, and chemical sensitivity syndrome. Although HMDs only operate at a power frequency of 60 Hertz (as do most appliances and devices in North American homes), VE product manufacturers and distributors should be keenly aware of perceived physical effects of HMDs and electromagnetic tracking devices placed near the body. Recently various EMF lawsuits have appeared against cellular phone manufacturers, including several alleging that the close proximity of the EMF emitter

(cellular phone) to the head causes brain cancer. If companies such as Sony, Olympus and Disney open the door to more widespread consumer usage of VR technology, it is possible that HMDs will come under scrutiny by those pursuing EMF lawsuits.

Conclusion

With the recent advancements in VR technology, certain health and liability concerns have eased. By creating virtual worlds that are realistic and that have deep levels of immersion, some symptoms of simulator sickness have been eliminated. Yet, this same technology may heighten the possibility for new health and safety issues. Some researchers postulate that as VR worlds become more immersive, a whole host of psychological problems ranging from addiction to flashbacks will emerge. Whether such hazards materialize remains speculative. In the meantime, risk managers and others involved in the development, implementation and merchandising of VR technology will likely continue to concentrate on simulator sickness, ergonomic and possible EMF concerns. ☞

Paul Paray has a technology law practice in Berkeley Heights, New Jersey. His web presence is located at www.paray.com and he can be reached at paul@paray.com.

John Wilson, director of VIRART, a research team in the UK concerned with ergonomic, health and safety issues of VEs, contributed most of the technical data in this article. Visit RML Interactive at www.griffincom.com for more information on VIRART.

NOTES

- 1 See *The Risk Management Letter*, Volume 19, Issue 7, "asterisk."
- 2 Visit RML Interactive at www.griffincom.com to see VIRART research.
- 3 Director of the Human Interface Technology Laboratory at the University of Washington, Seattle.
- 4 Medical Informatics Project.

FURTHER READING

To review previous discussions in *The Risk Management Letter* on topics related to this article, please refer to the following issues:

- "Ready For Virtual Reality Liability?" (Volume 17, Issue 5)
- "Key Issues In EMF Liability—Part I" (Volume 15, Issue 5)
- "Key Issues In EMF Liability—Part II" (Volume 15, Issue 6)