

## Current issues

# Virtual reality and tourism: fact or fantasy?

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**Virtual reality (VR) experiences have been the subject of speculation for computer programmers, futurists and scientists for many years. More recently there has been considerable media hype and discussion about the possible uses of virtual reality throughout society. This article will highlight some of the potential uses of VR within the tourism industry, but also address the realistic shortcomings of VR technology. In addition, some future developments will be identified, to determine when and whether VR is likely to offer the potential it promises.**

It would appear that any media story about new technological developments is not complete unless virtual reality (VR) and its implications are explored. However, the term 'virtual reality' is by no means new. It was coined by Myron Kruger as far back as the mid-1970s when he used it to describe a theoretical approach to understanding the human/computer interface. What is new is that the theoretical has begun to shift towards the practical. It is the implications of that continuing shift that are important for the tourism industry to consider.

Virtual reality can be defined in a number of ways. Walser<sup>1</sup> sees that VR is 'an emerging paradigm that re-defines the relationship between humans and computers'. He goes on to note that, 'One manifestation of the paradigm is a new medium called cyberspace, that provides people with virtual bodies in virtual realities that emerge from simulations of three dimensional (3-D) worlds'. These illusionary 3-D worlds are created through a combination of visual, audio and kinetic effects where VR participants are able to see, hear and touch real-life images which make them believe they are actually ex-

periencing the real thing. In the future it is predicted that VR technology will be capable of recreating illusions of other human senses such as smell and even taste.

VR has the technological potential to re-create events for participants, such as playing in the tennis finals of Wimbledon, or to creating totally new images, events and experiences. As John Lennon imagined in his 'Lucy in the Sky with Diamonds' lyrics:

Picture yourself in a boat on a river, with  
tangerine dreams and marmalade skies.  
Somebody calls you, you answer quite slowly  
a girl with kaleidoscope eyes.

Already it has been observed that 'No self-respecting science fiction novel of the near future seems able to ignore the idea that an alternative virtual world will become commonplace' and that 'predicted leisure uses range far beyond advanced video games to virtual holidays and virtual sex'.<sup>2</sup>

But rather than concentrating on definitions and speculation to understand VR, it is perhaps better to

understand in practical terms what VR is – and what it is not. Simply put, there are many ‘grey areas’ surrounding what actually constitutes real VR. The amusement arcade businesses and home video games producers have been promoting so-called ‘virtual reality games’ for some time now, and would have the public believe that is what they are offering. But they are not. Consequently there is much confusion and many misconceptions about just what VR actually comprises. While the link with these consumer electronics and computer games industries cannot be ignored, VR encompasses a much more complex technology than simple arcade and video games.

Cruz-Neira *et al*<sup>3</sup> outline three key elements of a VR experience which distinguish it from computer games, amusement arcades and video games. These are:

1. *Visualization* components, such as: stereoscopic vision (3-D), visual acuity (resolution), linearity of vision, a look-around capability, and the ability to see other VR participants in the experience. This is usually achieved by the use of a head-mounted display (HMD) unit.
2. *Immersion* into the experience is a key factor. Immersion is the degree of suspension of disbelief by the VR participant and is created through a field of view, panorama surrounding the participant), viewer-centred perspective (where images react to the head and body movements), and a body or physical representation of objects.
3. *Interactivity* involved in the experience. That is, the degree of control the participant has over the experience. Kinetic effects such as sensors, joysticks and graphical manipulators help the VR participant to interact and create a feeling of presence. The combination of these three factors creates the degree of ‘realism’ in the experience. The greater the number and quality of each element, the more realistic the experience. The purpose of these components is to ‘trick’ the human senses into making people believe and sustain an illusion where VR participants become so immersed in the experience, they actually believe it is real.

## Virtual reality and tourism

In initial papers looking at the potential impacts of virtual reality on tourism,<sup>4,5</sup> the authors have also had to explore and challenge several underlying premises. These have included how we view the relationship between technology and tourism, as well as how we define tourism and the tourism experience. This has been essential in helping to understand how replication or creation of tourism experiences through VR technology will impact on the industry. In the first paper,<sup>4</sup> it was noted that the

relationship between technology and the tourism industry has been evolving rapidly. The computer has moved from its humble beginnings as a back-room work-horse, through being a front-of-house service tool, to playing an indispensable role in management, marketing and financial analysis. But computer-based technology has now taken another step in its evolution: it has reached the point where in the future it can act as creator and initiator of experiences.

In the second paper,<sup>5</sup> it was observed that the tourism industry was essentially about providing people with experiences. But as the tourism industry has been unable to deliver on its promised ‘dream-like’ experiences, it has had to provide not only alternative, but also substitute and surrogate experiences and destinations. The industry has even encouraged their development, for example by building theme parks modelled on foreign destinations. Viewing this change from a sociological and historical perspective, Boorstin<sup>6</sup> has noted that the ideas of the early traveller, which were to seek out and be involved in authentic tourism experiences, have largely been lost as mass tourism has evolved. He saw a natural progression from this towards the development of tourist attractions that ‘serve their purpose best when they are pseudo-events’ which can then be repeated on demand. Papsen<sup>7</sup> has already put forward the view that the tourism industry has, in many cases, already created a ‘spurious reality’ in many destinations, where fake events and history have been created for tourists to experience and consume.

It would appear that consumers are content with such tourism-related experiences, already visiting simulated environments such as theme parks in record numbers. As Caproni<sup>8</sup> has observed, ‘The fourth most popular destination didn’t even exist 25 years ago, and today it attracts more visitors than Italy, Great Britain and Germany, Australia Canada, Japan . . . you name the country. I’m talking about Disney World, of course, with 28.5 million visitors. Add to that the 12.9 million who visit Disneyland in Anaheim and the estimated 12 million of Tokyo’s Disneyland and you come up with 53.4 million visitors a year to these let’s pretend worlds.’ Viewed from this perspective, VR is then no more than another logical step down a path whereby tourism experiences are manufactured for consumption to the wishes of the consumer. The advantage of VR is that the consumer will be able to choose and tailor those experiences to a degree that has not been possible until now.

## Impacts on the tourism industry

In looking at how the tourism industry will use VR technology, or will be challenged by VR technology, three broad areas can be identified as follows.

### *The creation of virtual theme parks*

Theme parks are typically constrained by their large land use and their distance from large populations, as well as heavy investments in current ride technologies. But a new generation of smaller, more adaptable 'virtual theme parks' or location-based entertainment (LBE) centres using VR technology is now evolving. It is claimed that virtual theme parks are smaller, cheaper to build and therefore they can be built in densely populated areas, immediately opening up new markets.<sup>9</sup>

Already such LBEs have been built in Japan and the USA. The Cinetropolis in Connecticut, USA is marketed as 'a downsized Disney World', with VR rides, cinemas and 3-D theatres. All rides are re-programmable and are thus potentially more cost-effective than the huge investment rides like the 'Star Tours' ride at Disneyland. Another 30 Cinetropolis centres are planned for the USA market over the next few years.<sup>10</sup> The Japanese company Sega opened their first 'Sega World' indoor theme parks in Osaka and Yokohama in 1994. They plan the development of another 50 virtual theme parks across the Asia-Pacific area by 1997.<sup>11</sup> In its first investment outside Japan, Sega is planning to invest US\$60 million in Australia. It is proposing to build a 20 000 m<sup>2</sup> park in Sydney's Darling Harbour. The park will have a 32-person virtual reality platform, an underwater simulator and more traditional theme park rides such as an indoor roller-coaster.<sup>12</sup> Other VR-related theme parks have been proposed on cruise ships by P&O,<sup>13</sup> and a US\$40 million 'Sportopia' VR sports park is planned for Branson, MO, USA.<sup>14</sup>

### *Use of VR as a sales and promotions tool*

From a marketing perspective, VR has the potential to revolutionize the promotion and selling of tourism. Tour operators and travel agents will have the ability to offer potential tourists a simulated experience of their planned trip. Unlike brochures and videos which are passive tools, VR offers the ability to offer an interactive experience. However, the advantage travel agents might have could be short lived. Using VR for sales and promotion of travel would not only be expensive for travel agencies, but would also involve them in a totally new type of technology. As the technology evolves, it could eventually offer full VR trips which might then compete with what travel agents are offering.<sup>15</sup>

### *The creation of artificial tourism*

With the continued evolution of VR technology, it will be possible theoretically for complete travel experiences to be taken through virtual reality. Consequently it could challenge our understanding of the entire travel and tourism industry. For example, it will be possible for British VR participants to take a holiday in Spain, even though they have never

left the UK. Australian and American businessmen could gather in virtual offices for a meeting, never actually having to travel anywhere to meet each other.<sup>16</sup> Clearly there will be specific benefits of the technology. For example, the physically disabled could use virtual bodies to overcome their handicap.<sup>17</sup> In sensitive tourist areas of the world where it is necessary to restrict access of tourists (such as wetlands and the inner chambers of the Pyramids), VR could allow unlimited access.<sup>18</sup> In addition the VR tourism experience can be guaranteed; bad weather and traffic jams will no longer be problems for 'VR tourists' to deal with.

The challenge facing the tourism industry is when VR technology moves from being a complement to tourism (as in the case of the use of VR as a travel agency promotional tool) to being a competitor. With the development of a full VR tourism experience, the tourism industry will then have to address the issue of the existence of 'artificial tourism'. As the authors asked in a previous paper, 'Is it entertainment when you can experience travelling around the Himalayas from the privacy of your own living room – or is it tourism?'.<sup>19</sup>

### **Waiting for a revolution**

Despite all the hype surrounding VR, it is clear that the VR revolution has yet to happen. Even though local amusement arcades and theme parks claim to be offering VR, most do not. As Corliss<sup>20</sup> has pointed out, 'not all the effects fit the strict definition of VR. Only a few make use of the computer helmet that guides your wrap around view, and allows you to "move" objects in cyberspace. Most are only virtually virtual: variations on arcade games or tweakings of Disney's Star Tours ride.' Simply put, most current VR experiences are poor imitations of what a true VR experience should entail. It must also be questioned whether the quality of current VR experiences is acceptable to the public. In an analysis of VR, *The Economist*<sup>21</sup> rightly observed that, 'although ever faster computer chips are starting to make virtual reality more lifelike, its images are still too fuzzy and slow moving. . . . Virtual audio, which creates the illusion of 3-D sound, is still too costly for the entertainment market. And virtual touch, which would allow users to "feel" objects, has yet to make it out of research laboratories.' The conclusion was that realistic VR experiences are still at least a decade away, and that VR is a clever idea with few serious applications beyond 'electronic LSD'.

A 1994 report by the US National Research Council (NRC) concurred and noted that 'there is a substantial gap between the technology that is available and the technology that is needed to realize the potential of [VR] systems'.<sup>22</sup> The report added that as most VR researchers are primarily interested in

**Table 1** Major developments in consumer electronics by decade

Decade	Technology adopted
1920s	Gramophone
1930s	Radio
1950s	Black-and-white TV
1960s	Colour TV
1970s	Hi-fi equipment
1980s	VCR
1990s	Home computer/TV video games
2000s	Virtual reality?

Source: Adapted from *The Economist*<sup>27</sup>

graphics software, 'the importance of adequate hardware, without which the VR field will never come close to realizing its potential, tends to be underplayed by the VR community'. Virtual environments will not feel real until you can reach out and touch them. However, despite touch and 'immersion' being critical to a VR experience, they are the most difficult to achieve. Various computer-controlled devices for simulating force and texture have been tried, but they are still very primitive and most future kinetic technology such as 'data gloves' and 'body suits' for VR participants is still very much in the developmental stage. The reality is that VR hardware technology has a long way to go. In addition, realistic problems that plague other computer-based systems will continue to persist. As Henry Soizeral, a researcher at Boeing Computer Services, USA, has pointed out, 'if you slam your hand down on a virtual table, the device needs multiple horsepower motors to make it feel like you've hit a table top. . . . Well, multiple horsepower is enough to break your arm if someone has written the program wrong'.<sup>22</sup>

In addition, current VR experiences may have potentially dangerous health risks for users. It has been found that wearing an HMD helmet induces motion sickness in users. Nausea and headaches can also occur, and the NRC report also notes a more severe problem: the sopite syndrome. This refers to the chronic fatigue, lack of initiative, drowsiness, lethargy, apathy and irritability that can persist for prolonged periods. Other concerns relate to the psychological damage participants may incur as a result of traumatic VR experiences they may undergo. Before VR's potential can be realized, such health risks will also need to be more fully addressed and researched.

### A more likely evolution

It is likely that VR will continue to evolve slowly as the technology and costs come down. It should be recognized that much of the initial development of VR technology was undertaken by the military establishment, who could see VR would bring sub-

stantial savings on the training of key military personnel, such as pilots and tank crews. But such initial developments have not been cheap. The release of much of that technology by military contractors into commercial applications has been as result of such companies looking for a profitable return on massive research and development investments.<sup>23</sup> The question now is whether those companies will continue to make such substantial and continued R&D investments now that the military is less willing to underwrite them. It is likely that the next stages in the development of VR technology will slow down, until commercially acceptable returns on such high-risk investments appear realistic.

The high development costs of VR technology will ensure that it will develop initially with industrial applications (such as car design) and out-of-home entertainment markets in mind. It has been shown throughout the 1980 and 1990s, that there is considerable demand for in-home entertainment. It is also the only market that will be able to offer the required returns on the further massive investments that are needed to develop the technology fully. As has already been seen, additional in-home services are already being offered through links to communication systems to the home, such as television cable channels, tele-shopping, tele-banking, video-on-demand.

Initially VR participants will only be able to have solo or joint VR experiences at an LBE centre. But as the technology evolves, they will be able to be linked through a home network.<sup>24</sup> Evidence of the potential of VR on the in-home entertainment market is starting to appear with the arrival of 'Desktop VR'. Although much of it does not meet the definitions of a full VR experience, it already provides a stepping-stone towards an in-home full VR. Beyond the visual aids, other developments are already being launched. A 'home simulator seat'<sup>25</sup> which adds the sensation of 'feel' to images shown on the HMD unit will be launched in 1996. Other companies such as Nintendo, Sega, Virtuality and Martin Marietta (a defence contractor that makes VR simulations) are already chasing the potentially lucrative consumer electronics market with various developments. A recent joint partnership between Steven Spielberg (co-founder of Dreamworks Entertainment) and Bill Gates (of Microsoft Corp.) has been announced with the aim of producing interactive entertainment for this emerging market.<sup>26</sup>

It should be recognized that in-home entertainment technology has played a crucial role in how people spend their leisure time. When looking at consumer electronics from a historical perspective, we can trace the major developments by decade (see *Table 1*). However, until the first decade of the new millennium, it is unlikely that some advanced form of home VR simulations will become a reality for the home market. Complete VR experiences that will be

able to interact with all the human senses are likely to be many more years away.

## Conclusion

Undoubtedly VR will bring a whole range of impacts with it, not only to the tourism industry, but also to the entertainment industry and to society. Nevertheless, whilst it is relatively easy to predict various theoretical impacts, it is much harder to predict practical and realistic impacts. As Douglas Trumbell (the special effects specialist behind films such as *2001: A Space Odyssey* and *Bladerunner*) pointed out at the 1994 Maastricht Technology in Leisure and Entertainment (TiLE) conference, 'The movie on screen is just a replacement for live performers under the proscenium arch of classic theatre, you're a non-participating voyeur-observer of a drama'. But with VR technology, 'you're going to be inside that experience, become a participant and have a direct relationship with the performers. It's a whole new art form and no one really knows anything about it yet'.<sup>28</sup>

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