CHAPTER 19

Immersive Environments

What is meant by an "immersive environment?" What are some of the typical elements that have been called into play to create them? What are some of the more exotic elements?

What are some of the greatest challenges in creating a story-based experience for a virtual reality environment?

How can virtual reality and immersive environments be used for teaching and training?

SCIENCE FICTION TERRITORY

In real life, it is highly unlikely you'd get a chance to design and ride your own roller coaster, or fly a stunt plane, or engage in a sword fight with comic book villains. And unless you had a very large travel budget, you'd be hard-pressed to have the chance to tour a Hindu temple in India. And you'd need a magical time machine to be able to travel backwards in time to relive your earliest memories. But thanks to virtual reality (VR), you can experience all of these things simply by donning some special gear and stepping into a VR installation.

When we move into the world of VR, we are entering serious science fiction territory—but science fiction that has become entertainment fact. One of the most dramatic visions of this type of experience, as portrayed by the media, was given to us by the classic *Star Trek* TV series, with a device called the holodeck. In this make-believe vision of VR, the crew of the starship Enterprise and then Voyager could entertain themselves in their off hours by visiting the holodeck and immersing themselves in computer-generated dramas. These experiences were much like novels that had come to life, complete with props, sets, life-like characters, virtual food, and scenarios capable of inducing intense emotions. The holodeck was such a compelling vision of the possibilities of VR that Janet Murray even named her book on the future of storytelling after it, calling it *Hamlet on the Holodeck*. The idea of a computer-generated alternative reality has continued to fascinate storytellers. In more recent times, this concept played a major role in the *Matrix* movies. The plot of this epic revolved around the idea that the contemporary world was only a convincing fabrication, a VR simulation controlled by powerful machines for their own sinister purposes.

To date, of course, nothing as convincing and detailed as the alternate reality of the *Matrix* or *Star Trek* has been achieved here on Planet Earth. However, computer scientists and VR producers, progressing in small increments, are moving ever closer. Before we investigate what they've accomplished, and discuss the implications their work has for storytelling, let's first take a moment to pin down what we are talking about.

DEFINING VR, IMMERSIVE ENVIRONMENTS, AND LOCATION-BASED ENTERTAINMENT

What do we mean by VR and immersive environments, and how does a closely related construction, the location-based entertainment (LBE), fit in here? A true VR environment is an extreme form of cyberspace, a 3D artificial world generated by computers that seems believably real. Within such a space, one is able to move around and view the virtual structures and objects from any angle. But a VR world requires special hardware to be perceived. In one of its most common forms, visitors are outfitted with a helmet-like head-mounted display (HMD), earphones, and gloves, which give them the ability to perceive and manipulate the computer-generated representations. A second type of VR utilizes a device called a BOOM (Binocular Omni Orientation Monitor), which is like an HMD, but mounted on a rotating arm rather than on one's head. A third type of VR, the CAVE, surrounds the user with rear view projection screens and the 3D images

are seen through stereoscopic glasses. VR environments may also utilize motion and smell as well as video and audio, involving as many of the senses as possible.

It should be noted, however, that we are talking about immersive VR experiences here, and that VR is not necessarily a space that one enters. Some VR creations are designed just for observation purposes. They may be quite small, just of tabletop size. Such VR creations are chiefly constructed for scientific, engineering, or architectural purposes, not for entertainment. To make matters even a bit more complicated, the term "virtual reality" is often applied indiscriminately to experiences that have some, but not all, of the components of true VR. Furthermore, it is not always possible to draw a clear dividing line between immersive environments and VR; sometimes the terms are used interchangeably to refer to the same experience, and an immersive environment may include some VR components.

The goal of an immersive environment, as with VR, is to give users the impression that they are in a physical space that seems real, though it is, in fact, artificially created. However, immersive environments use a different palette of techniques than VR to create their fantasy worlds, and are less dependent upon the user wearing heavy-duty hardware. Sometimes the immersive effect is produced via a large curved screen in a specially equipped theatre, and the seats may move in synch with the story's action (motion base chairs). In this type of experience, called a "ridefilm," one stays seated and cannot move around as one can in a true VR space; it offers little or no opportunities for interaction. To further enhance the immersive experience and trick the senses, designers may call upon artificial smell, tactile stimulation, artificial weather effects, temperature change, sound effects, virtual characters, and animatronic figures. The vote for the most ingenious effect should possibly go to the *Honey, I Shrunk the Audience,* a 3D ridefilm attraction at Disneyland. Guests, who are under the illusion that they have been reduced to a tiny size, are confronted by a large dog, and when the dog suddenly sneezes at them, they are spritzed by a powerful mist (via a device built into the theatre's chairs).

A special branch of immersive environments is location-based entertainment. LBE, which often overlaps with immersive environments and may also include VR, is a large category of entertainment experiences that take place outside the home. It includes various kinds of theme park attractions and ridefilms as well as multiplayer interactive computer games, like racing simulations and outer space combats. It also includes immersive experiences set in museums, aquariums, and other cultural institutions.

While most individuals have had at least one experience inside an immersive environment, usually as a ride at a theme park, true VR installations are much harder to come by. Except for a small handful of theme parks, most VR is confined to the research divisions of academic, military, or industrial organizations.

WHERE DID VR COME FROM?

The first work in VR began with a pragmatic purpose: to provide a safe way to train pilots to fly. The notion of building what would eventually be called a flight simulator belonged to Edwin Link. In 1929, when he was only twenty-five, Link came up with the idea for a training device that would give inexperienced pilots

the feeling of operating a plane's controls, without the danger of crashing. But it took fifteen years for Link's concept to come to fruition, which it did during World War II, when the United States Air Force put Link's flight simulator to work to train military pilots.

Some years later, another milestone was achieved, a strikingly visionary one. Unlike the flight simulator, this VR construction was built entirely for entertainment purposes. Devised by Morton Heilig and patented in 1962, it was an arcade game called *"Sensorama."* It provided a multisensory experience utilizing motion, scents, moving images, and even an artificial breeze. One scenario had the participant riding a motorcycle through Brooklyn, with tactile feedback provided via the bike's handlebars. Another featured a belly dance performance—though what tactile experience was offered here, if any, has not been documented. The visuals for these experiences were provided by a special set of stereoscopic goggles, which provided 3D views. Unfortunately, Heilig's VR rides were far ahead of their time and failed to make any money.

The term "artificial reality" was coined many years after Morton Heilig invented his revolutionary rides. The first published use of the word was in a 1974 doctoral dissertation written by Myron Krueger, a student at the University of Wisconsin. In it, he explored the interaction between humans and machines as a possible art form. Later, in 1983, he published his ideas in a book called *Artificial Reality,* and described this concept as full-body participation in "computer-created telecommunications experiences." About a decade later, VR pioneer Jaron Lanier founded VPL Research, Inc., to help develop and produce VR products (VPL stands for Visual Programming Language). And it is Lanier who is credited with coming up with the term "virtual reality."

In 1989, Mattel marketed an interactive device, the Power Glove, to go with the Nintendo Entertainment System. The Power Glove was based on Lanier's work, and a far more high-end version of the glove was first used in the NASA space program. By slipping on the Power Glove, players could control certain Nintendo games and interact with the content in a life-like way. For example, they could make a fist and "sock" an enemy. The glove allowed them to control the action without using a joystick, and with greater dexterity. The Power Glove was the first VR device to be made available to consumers. Versions of this glove are used in many of today's VR installations as an interface device.

THE CAVE

Moving still closer to the fictional holodeck and the artificial world of the *Matrix,* we come to a room-sized installation called the CAVE, a kind of VR theatre that was premiered at the 1992 SIGGRAPH convention. (SIGGRAPH is an organization for professionals in computer graphics.) Participants donned a pair of stereo glasses, and when they stepped inside the CAVE, they were surrounded by 3D visuals and sound—they were truly inside a virtual world. They could wander around freely and the computer-generated images would still remain in focus. The CAVE was the creation of a team from the Electronic Visualization Laboratory (EVL) at the University of Illinois at Chicago. The name they gave it, the CAVE, stood for CAVE Automatic Virtual Environment, but it was also a nod to *Plato's Republic.* In this ancient work, the philosopher talks about how reality can be inferred from

the shadows projected on the walls of a cave. Eerily, the CAVE installation worked in much the same way, via images projected onto large rear-projector screens.

The CAVE was the first VR environment that could accommodate multiple users. It offered a large-angle of view, and users were not encumbered with bulky hardware, needing only to wear lightweight stereo glasses and wired sensors to track their heads and hands. As many as twelve people could fit into the CAVE at one time, though only one person at a time could actually drive the experience.

The CAVE, however, was not designed to be the next generation of video game platform or to serve as a new kind of flight simulator. Instead, it was created to be a tool for scientific visualization. At SIGGRAPH, it attracted the attention of numerous scientists in the fields of astrophysics, neuroscience, and other specialties. They recognized its potential for communicating ideas and for teaching, and this is the way the CAVE is often used. It now comes in different models and sizes—with four to six flat surfaces, with curved walls, and even in portable tabletop sizes. Participants inside the immersive models carry a wand, a device with three buttons, which allows them to grab objects and interact with the VR environment. A location sensor tracks their movements, and the digital images they see are corrected and updated as they move from place to place.

USING VR FOR ARTISTIC EXPRESSION AND STORYTELLING

Not only is the CAVE used for a variety of scientific, commercial, and technical endeavors, but it is also being used for artistic and story-based purposes. Most of this adventurous storytelling work takes place within academic institutions, where professors and students are keen to push the boundaries of this medium and have more latitude to experiment than they would in the outside world, where commercial considerations are often constricting. At Iowa State University, for example, faculty and students have worked together within the university's Virtual Reality Applications Center (VRAC) to produce two projects with strong narrative lines. In fact, VR research at Iowa State is headed up by one of the veterans of the original CAVE, Dr. Carolina Cruz-Neira.

One of these narrative projects, *Ashes to Ashes*, is an emotional memorial to the victims and survivors of the New York City terrorist attacks on 9/11. It was built for a six-sided CAVE called the C6, which offers 360-degree immersion (though the work actually made its debut in a more portable four-sided CAVE). In a C6, the ceiling, walls, and floor are all stereoscopic screens, and it has a 3D sound system as well. An extremely ambitious undertaking, *Ashes to Ashes* combined abstract dance, music, and narrative accounts of the survivors and witnesses, all in a technical environment which did not normally support any of these things. (See Figure 19.1.)

Nothing about the work was "off the shelf," especially the music. The experimental score was written by Assistant Professor of Music Anne Deane, who combined computer-generated sounds with a musical technique called "text painting"—the use of spoken words—to weave together an emotionally evocative composition. Music plays a particularly important role in this piece, Prof. Deane told me. As opposed to cinematic works, where music and sound design play a supporting role to the visual elements, the audio drives the experience here.

Figure 19.1 *Ashes to Ashes*, using music, dance, images, and eyewitness commentary, commemorates the devastating events of 9/11. Here, the viewers are listening to the final comments of the survivors surrounded by the rubble of the World Trade Towers. Image courtesy of the Virtual Reality Applications Center of Iowa State University.

"The script, visuals, and interactivity are integrated through the audio and support the drama found in the stories," she explained.

To help shape the work and give it a narrative cohesion, the VRAC team brought in writer Larry Tuch from Los Angeles. Tuch had had a positive experience working on the *DarkCon* VR project for the Army (described in detail in Chapters 5 and 6), and understood many of the challenges of story creation in a VR environment. The VRAC team, viewing everything in this piece in musical terms, termed what he would be constructing as the "libretto." And they saw the participants as being the work's conductors, triggering the dancers and the narrative elements with their baton-like wands.

CREATING A NARRATIVE PATH

Tuch found the project a tough nut to crack. He felt it "would not jell unless it had structure and meaning for the participant," he told me. And he wrestled with how to integrate all its disparate elements. "You have to decide what experience you want to offer people," he said, "and how you'll use these elements you have—the cube, the surround sound, the dancers, and so on—to give them that experience." He was also well aware of the risk of basing an experimental artistic work on such a well-known, profoundly emotional tragedy. If handled in the wrong way, he could inadvertently trivialize it. Yet, handled in the right way, the work had the potential to be truly cathartic.

Another tough challenge was the C6 itself, which to him seemed like an unnatural space for a narrative experience. "Who'd want to tell a story in a box?" he wondered. Designing for the cube meant taking everything into account, including the floor, which, like all the other walls, was a projection surface for digital images. But he didn't want the C6's shape to impose on the experience. "Literalness is the enemy," he said. "You aren't just doing it for four or six walls." In other words, you have to try to make those walls disappear, to push the experience beyond the physical boundaries. So he worked on devising ways to help participants forget they were in a cube.

Fortunately, he had one major asset going for him: Prof. Deane had made audiotapes of survivors giving eyewitness accounts of the event. From these, he shaped a through-line using the harrowing account of a fireman named Billy, with other survivor's stories branching out from it. The narrative line was divided into four major emotional beats, or acts: anticipation (the early morning activities of the victims-to-be); terror (the attacks); shock and response (the initial reaction of the survivors); and release (the aftermath). This yielded the framework that enabled participants to relive the drama of that fateful day.

THE VIRTUAL TEMPLE PROJECT

The second narrative-based project at Iowa State, *The Virtual Temple*, invited visitors to explore a Hindu temple and experience a traditional devotional ritual. *The Virtual Temple* was far less complex in terms of its content than *Ashes to Ashes*, though it had its own set of technical challenges. The project was initiated by Whitney Sanford, an associate professor of religion and philosophy at the university. She was intrigued by the possibilities of using VR to tell the story of the Hindu religion. She felt sure that a 3D immersive scenario would be far more effective than classroom lectures on the topic, and far more feasible than taking the students on a field trip to India.

Working with Cruz-Neira and a team of students, the project was developed for a four-sided VR system, considerably less costly than the six-sided C6. The centerpiece was to be a simulation of an actual temple in India, the Radharaman Temple. *The Virtual Temple* would include not just the temple structure, but also priests and worshippers engaged in religious ritual. The principal technical challenge was the requirement that everything be highly realistic, unlike *Ashes to Ashes*, which was an abstract piece. It required detailed 3D modeling of the temple building, based on video footage and photos.

An operational version of *The Virtual Temple* was demonstrated at the big SC2000 computer conference in Dallas, but Sanford still considers it a work in progress. In a report written for the VRAC website (*www.vrac.iastate.edu*), Sanford says she hopes to develop it to the point where participants can assume one of the roles in the narrative, or be guided through the ritual by a virtual friend. "In this version," she says, "it's almost like entering a story. As the technology improves, we'll be able to have it even more interactive." In discussing the possibilities of projects like this, she comments: "Digital storytelling is an exciting new field in which we can utilize the skills of the humanities and information technology." She feels that the techniques developed for *The Virtual Temple* could be utilized for many types of educational purposes. "Ultimately, with this concept of digital storytelling—creating narratives where people go into a site or an historical place—we can create an entire new generation of immersive scenarios that can be used in a variety of disciplines."

OTHER NARRATIVE EXPERIMENTS IN VR

As noted earlier, the majority of story-based VR projects are being developed within an academic or research context. Let's take a look at a couple of others, to see what creative areas the developers of such projects are exploring.

One project to emerge from academia is a piece called *The Thing Growing*. A work of pure interactive fiction, it was based on a short story written by its creator, Josephine Anstey, for her Master of Fine Arts thesis project at the University of Illinois. This university is the home of the original CAVE, and the project was built specifically for a CAVE environment. In doing this work, Anstey wanted to portray a particular type of relationship and personal struggle—one in which a person (the protagonist, or user) tries to escape a destructive, abusive relationship. The antagonist in this scenario is an abstract computer-generated creature made up of pyramid shapes, called the Thing. The participant in this installation is meant to feel the emotional claustrophobia of a destructive relationship, and is forced by the Thing to jump through a series of emotional hoops. Ultimately, the user participant can confront the Thing and put an end to the torment by shooting it. As with all classic drama, the piece is structured in three acts. Act One introduced the protagonist and the goal; Act Two centered on the struggle to reach the goal; and Act Three was the resolution.

Another project that sharply focuses on the emotions of the participant is *Memory Stairs*, a work in progress as of this writing. Its creator, Jacquelyn Ford Morie, is designing it as a part of her Ph.D. dissertation at the London Institute's Smart Lab. Morie is a fine artist, which very much informs her approach to VR. She's also the producer of the *DarkCon* military VR simulation which, like *Memory Stairs*, explores how emotions can be integrated into a VR experience. (The emotional components of *DarkCon* were previously discussed in Chapter 6.)

The physical centerpiece of *Memory Stairs* is a spiral staircase. (See Figure 19.2.) Each stair that the participant steps on will trigger a memory experience, nine recollections in all, from prebirth to old age. The stairway thus serves as a linear pathway, and the participant ascends it as if going on a chronological journey through key life experiences. Participants will wear HMDs and other devices to be able to see, hear, and smell the virtual memories, and use a joystick to maneuver through the 3D images.

Morie is creating the project in part to explore how personal memories can be translated into universal ones. Another important goal for her is to explore the possible "grammar"—artistic principles or rules—that can be employed in VR. She feels VR still relies heavily on older concepts borrowed from movies, video

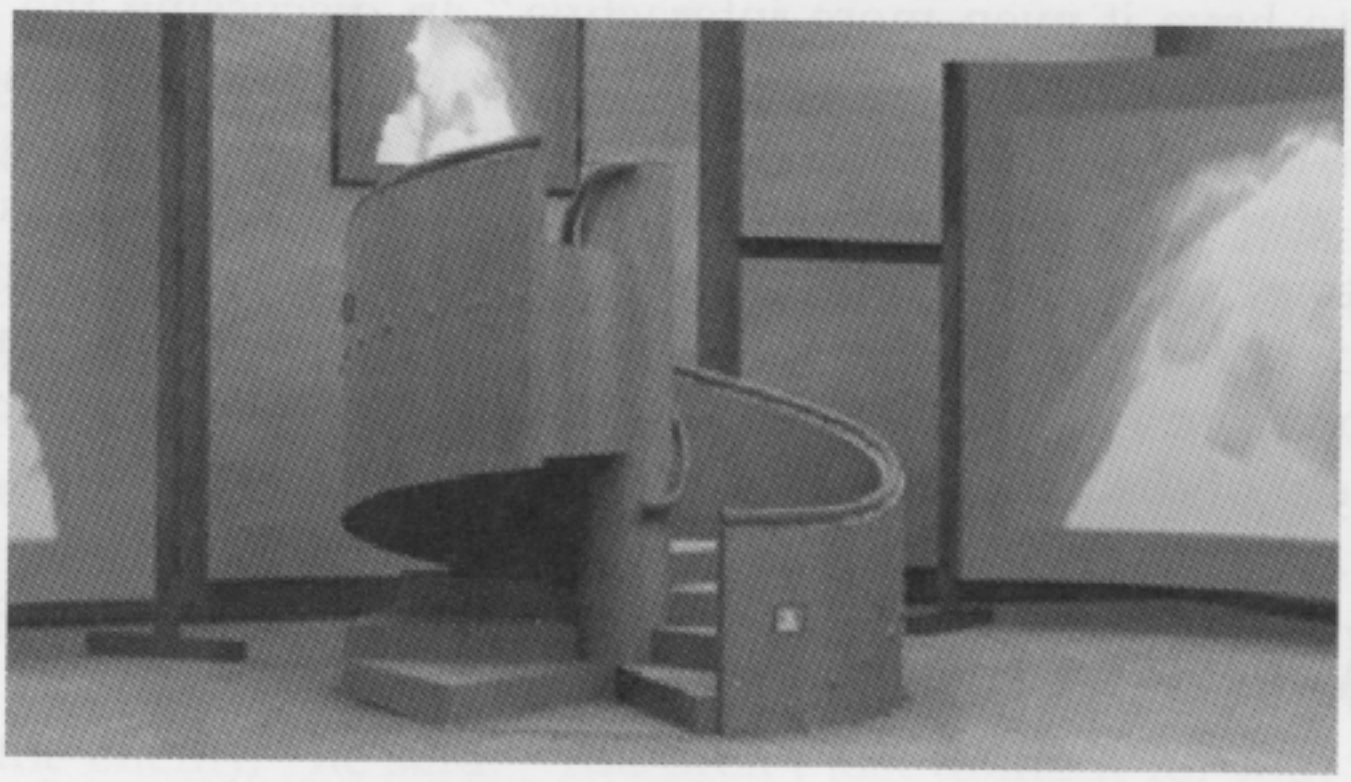

Figure 19.2 A concept rendering of the spiral stairway of *Memory Stairs*. Spectators can watch the screens on the sides to view the images that the participant is seeing. Computer concept rendering by Jared Leshin. Image courtesy of Jacquelyn Ford Morie.

games, and other forms of entertainment, in part because the practitioners in this field have placed more emphasis on developing hardware and software than on exploring content. As a result, it is short on artistic ideas that are specifically geared for VR's unique attributes. Every new medium requires its own artistic vocabulary, but that takes time to develop, and audiences often have trouble at first in interpreting what they are experiencing. For instance, when the jump cut was first introduced in the early development of cinema, people didn't understand what it meant. "We've gotten used to the tools of books and films," she told me, "but what is the equivalent of a 'jump cut' in VR? Can you do a break in time and make it work? When you have a persistent universe, can you do a shift in time? And is there a way for the participant to control time?" These are some of the questions Morie would like to see addressed in VR works. She feels that answers to these and other questions will come from the artists who are working in VR, not from the technologists. "I think the artists push more than the technologists," she asserted. "We are the ones demanding that the technology bend to the effects we want to achieve."

VR IN OTHER ENDEAVORS

Artists like Jackie Morie are not the only ones pushing content development in VR. Significant work is going on in three other areas:

1. TEACHING AND TRAINING: VR is being used by the military to prepare personnel for such things as leadership positions and potentially hazardous assignments. The military, as we saw, was actually one of the early adopters of VR, using it for flight training simulations. VR is also being used in the classroom to teach difficult subjects. For instance, a VR program on chemistry lets students play a game where they catch protons and electrons and make atoms.
2. PSYCHOTHERAPY: VR is being used by therapists to help patients overcome phobias, such as the fear of spiders, the fear of driving, and the fear of flying. By giving them the virtual experience in a non-threatening environment, the patients become desensitized to their fears.
3. PROMOTION: Several industries are using VR to promote themselves and their products and services. One company, Ferris Productions, specializes in producing VR applications for such marketing endeavors, and even makes a suitcase-sized portable VR unit that comes with an HMD device with a built-in scent dispenser. Buick commissioned such a unit from Ferris so it could take potential customers on a virtual test drive. The "drivers" are treated to the scent of fresh cut grass as they tool along the virtual road. Red Baron Pizza also commissioned a portable VR kit to give people an exciting ride in a stunt plane. And in Chapter 8, we saw how the German company, RAG Coal International, put a VR installation to work to promote itself.

It is quite possible that forward progress in one of these arenas, such as the suitcase-sized VR kits, could spur new advances in using VR for entertainment purposes.

VR IN ENTERTAINMENT

To an extremely limited degree, VR can also be found in commercial entertainment venues. Probably the most impressive example of this is the *DisneyQuest* indoor theme park. Within this five-story structure in Orlando, *DisneyQuest* offers a diverse array of VR amusements via HMDs, CAVE environments, and simulators. For example, visitors can take a ride on Aladdin's magic carpet, go on a jungle river-boat ride, or have a swashbuckling laser sword fight with super villains from the world of comic strips. They can even design their own roller coaster at a touch screen kiosk, and then, via a simulator, take a ride in it. But few commercial venues other than DisneyQuest are currently offering guests the opportunity to sample VR.

As we have seen from the various VR projects we've examined, developing story-based projects for VR can be difficult due to a number of factors, including:

- Creators must deal with an entirely new paradigm. In traditional media, such as movies, television, and theatre, viewers watch something that takes place in front of them. This is true even with video games. But in VR, the participant is *inside* the entertainment content and is surrounded by it. We do not yet have a body of experience to guide us in creating content for such a medium.
- VR tends to be a technology-centric field, with many of the developments in the area spurred by scientific interests, not by entertainment objectives, and technology has tended to dominate the field.
- Creators in the field have a lack of models to draw upon—few successful projects are available to serve as examples.
- The field still lacks a developed aesthetic grammar of its own, and has not yet found commonly recognized ways of dealing with creative issues.

All of these factors call for developers in this arena to stretch themselves creatively, and to be willing to break new artistic ground, as a number of people working within an academic framework are attempting to do.

IMMERSIVE ENVIRONMENTS

Unlike VR, the broader field of immersive environments is a robust area for entertainment-based projects and for projects with a strong narrative line. Immersive environments are less dependent than VR on cumbersome devices and equipment. Furthermore, projects using a large-screen format can draw upon cinematic tools that the creative community is already quite familiar with, and these large-screen experiences lend themselves well to taking participants on a fantasy journey. Immersive environments are used for everything from training simulations (where they are called immersive simulations) to pure leisure-time fun. Attractions featuring immersive environments can be found in theme parks, in urban entertainment centers, in cultural institutions like museums and science centers, and even in a few Las Vegas hotels.

One organization with a lively interest in immersive simulations is the United States Department of Defense (DOD). The military has for some time regarded

simulations as a low-cost, safe, and flexible way to train military personnel in a variety of skills. But it has also recognized that in order for simulations to be effective, they need to fully engage the trainees. . . in other words, they need to be entertaining. In 1996, this realization led to an historic event: a two-day workshop with leaders from Hollywood and the military world. The goal was to explore how these different communities, with extremely different cultures, might benefit by joining forces to work on immersive simulations. The workshop helped forge a working relationship between the entertainment and defense worlds and articulated how each could benefit from this collaboration. As the participants saw it, the military would gain access to experienced producers of entertainment and Hollywood would be able to utilize cutting-edge technology developed by the military for its own creative endeavors.

Not long after this meeting, the U.S. Army made a $45 million grant to the University of Southern California to establish the Institute for Creative Technologies (ICT), a research center to develop immersive simulation technologies. Hollywood professionals and members of the gaming community were to be heavily involved, as well. ICT's mandate was to devise experimental training prototypes, many of them using new techniques or technologies to develop virtual characters, AI, immersive sound, and VR.

HOLLYWOOD AND THE MILITARY: STRANGE BEDFELLOWS

Larry Tuch was one of the writers selected to work on ICT simulations, and he applied his Hollywood background—writing for primetime television and Paramount Pictures—to the task. He found that much of the work he did for ICT was not too different from what he might be doing on a TV show, particularly the job of creating well rounded characters and compelling storylines. The fact that he wasn't a technologist wasn't much of an obstacle, he said, though he admitted to me that sometimes constraints of technology—"the geek stuff"—got in the way of developing effective narratives.

Two of his projects, both produced by Paramount Simulations Group, were geared to teach trainees to deal with fast moving crises. One, *AltSim*, centered strictly on military scenarios; the other, *Crisis Decision 2008*, dealt with tense international situations in the world's trouble spots. Both simulations were played on networked computers and made use of communications tools the trainees would be familiar with, using some of the techniques of alternate reality games (ARGs) to make the scenarios seem real. Story elements were conveyed by email, voice mail, electronic video mail, intelligence and situation reports, briefing documents, and military maps. Story content was also delivered via realistic looking TV news broadcasts of a network called ZNN—closely modeled on CNN. The pacing was controlled by human Dungeon Masters (the instructors), who could toss in complications to heighten the pressure.

Two of Tuch's more unusual jobs were to lay traps in the scenarios for the trainees to fall into (to teach them not to rush into solutions) and to develop characters, some of them virtual, that would function effectively within these simulations. In *Crisis Decision 2008*, he wrote traditional Hollywood-style "character bibles," providing details that ranged from the characters' early years to their professional histories and included events that would shed light on their

Figure 19.3 *Mission Rehearsal*, an immersive simulation made for the U.S. Army, makes use of a large curved screen, surround sound, and virtual characters. Image courtesy of USC's Institute for Creative Technologies.

personalities and motivations. In *AltSim*, the character bibles focused specifically on the traits most likely to influence their decisions in a military operation. Tuch also created personal agendas for the characters—some of them hidden—that would add to the challenges facing the trainees.

Tuch's work for ICT included another, very different, kind of simulation. Called *Mission Rehearsal*, it used an entirely different set of components. Instead of being played on a computer, it utilized a giant curved screen and surround sound. The scenario was set in present day, war-ravaged Bosnia, and the trainee, a young officer, must make a series of decisions within a volatile situation involving a child who has been severely injured by a military vehicle. The trainee stands in a physical space surrounded by the life-like virtual characters on the screen and has the sense he's really in the midst of an emotionally charged situation. (See Figure 19.3.) To deal with the crisis, he actually talks with virtual computer-generated characters on the screen who understand him and respond.

In this project, Tuch found the characters didn't need nearly as deep a backstory or as fully developed emotional profiles as the other two projects. "We don't need to know that they had a bad childhood," he quipped. But they did need to have clear professional values, priorities, and personalities. The descriptions he wrote of the characters would be used as guides by the computer scientists who were doing the programming and he didn't want to just hand them a lifeless inventory of personality traits. So, to turn them into flesh and blood individuals, he wrote the profiles as mock interviews, letting the characters speak in their own words.

As part of the development work, Tuch needed to give each of the major onscreen characters a *task model*: a sequence of actions they had to perform in order to achieve their goals. The soldiers' task models included maintaining security, treating the injured boy, and getting him evacuated by helicopter. The TV cameraman's task model was to get good footage of the accident scene. But, in the case of the boy's mother, instead of a task model, she was given an emotional arc. It was a trajectory of behavior based on her concern for her injured child, and it

was driven by her interpretation of moment-by-moment developments and how they might affect her son.

A great deal of AI had to be crammed into the central onscreen figure, a platoon sergeant. Not only did he have to be given voice recognition and the ability to respond, but he also had to be able to recognize what people or vehicles were in the vicinity and know what they were doing. Furthermore, he had to know enough about the platoon's mission, procedures, and the unfolding crisis to be able to speak believably with the trainee.

With all three immersive simulations, events unfold at a relentless pace, with unexpected twists and turns. Unlike a TV set, it cannot be turned off. "You're inside the story," Tuch said, "and there's no pausing or doing it on your own time. It doesn't wait for you."

WALT DISNEY AND "DIMENSIONAL STORYTELLING"

Possibly the most expansive idea of all regarding immersive environments comes from the master storyteller himself, Walt Disney. According to Roger Holzberg, Senior Show Producer of Walt Disney Imagineering, Disney's concept of "dimensional storytelling" was the impetus behind the creation of Disneyland Park. Holzberg told me that Disney wanted parents and kids to be able to become a part of the stories he'd created—and Disneyland was a way to give them that experience.

Holzberg believes that everything done by Walt Disney Imagineering (the division of The Walt Disney Company that designs and builds the theme parks and attractions) is a story of some kind, "Though it isn't always traditional storytelling," he said, "it *is* storytelling. Writing, filmmaking, and interactive design are what the storytelling of today is all about." Holzberg noted that although the emotional and technical tools of immersive storytelling have advanced somewhat since the original Imagineers first began work on Disneyland, the heart of the concept remains unchanged, "still grounded by a cast of cherished characters, already known and loved—this is the emotional core." The tools now include ride systems, Audio-Animatronics, 3D cinema, motion-based platforms, live performers interacting with film, even smell. "In the eyes of a child," Holzberg said, "this type of immersive storytelling takes a story from make-believe to real, and there is nothing like it anywhere else on earth."

He then shared with me a moment at Disneyland that personally brought the concept of dimensional storytelling home to him. "I'll never forget my daughter, at age 4, pulling Alice in Wonderland down to the curb on MainStreet U.S.A., gripping her hands and asking, 'Did it tickle when you fell down the rabbit hole? Weren't you scared being away from your Mom and Dad?!' And Alice gave her the answers. And the story of Alice was no longer a story–it was real."

MAKING THE STORY COME TO LIFE

One of the hallmarks of an immersive experience at a Disney theme park is the way fantasy is brought to life. Sometimes this works so well that even the very big kids—the adults—are unable to accept that what they are experiencing is just

pretend. This was the case with a marine attraction Holzberg created called *DRU*, short for Dolphin Robotic Unit. As the name suggests, *DRU* is a life-like robotic dolphin, a free-swimming Audio-Animatronics puppet. It is the exact size and weight of a real dolphin and its swimming motions are precisely like a living dolphin as well. *DRU* is controlled by an operator using real-time puppetry. The puppet dolphin "communicates" with humans by nodding or shaking its head or opening its mouth and splashing water, all in a friendly manner.

DRU was tested as a potential enhancement to the six million-gallon aquarium at The Living Seas at Epcot, as a way of giving guests the experience of interacting with ocean creatures without having to capture real marine mammals and take them out of the ocean. Holzberg terms the concept "the next generation marine theme park." During performances, *DRU* swam around in the giant tank with real fish and a scuba diver and interacted with guests in the underwater viewing arena. The show built around *DRU* was classic edutainment. Visitors learned some interesting facts about dolphins and other forms of sea life, but also got the chance to operate the puppet dolphin's controls. Despite its highly realistic appearance and movements, however, Holzberg said *DRU* didn't fool the real dolphins at Epcot for one moment. They knew *DRU* wasn't real, and regarded him as a curious kind of play toy.

But a strange thing happened when *DRU* was taken out of the Epcot tank and given a chance to swim in the real ocean, as part of a prototype "swimming with the dolphins" attraction for snorkelers at Disney's private island, Castaway Cay. (See Figure 19.4.) As with all good immersive environments, a story was created to enhance the experience. Holzberg describes it as a mix of scientific fact and Disney fantasy. The idea was that a pod of intelligent dolphins lived just off the island's coast. By successfully summoning one of them (*DRU*, of course, who was actually controlled by an operator disguised as a fellow guest), the friendly animal would give the snorkelers a personal tour of the ocean from a dolphin's perspective. And even though all the swimmers had been told in advance that *DRU* was not a living creature, Holzberg says "every single human being who swam with the Audio-Animatronics dolphin believed it was real." He told me

Figure 19.4 *DRU*, an Audio-Animatronics dolphin project conceived and tested by Walt Disney Imagineers, on an ocean swim with a Disney cast member. Image courtesy of © Disney Enterprises, Inc.

that at one point they were considering adding a shark to the performance, but knowing how convincing *DRU* had been, they were afraid that the sudden appearance of a shark, up close and personal, might be a bit more than a swimming guest's comfort level could handle.

MAKING DREAMS REAL

Quite a different type of immersive experience was designed for an attraction called *One Man's Dream*, created for the Disney MGM Studios theme park to celebrate the centennial of Walt Disney's birth. Appropriately enough, Disney himself is the subject of this dimensional storytelling environment. *One Man's Dream* takes guests on a decade by decade interactive walkthrough of Disney's life and the company he built. One of its most popular features is an animatronic figure that children can actually operate, using a set of interactive controls to move the face, hips, and head. Six people at a time can operate the figure, creating their own little performance.

Summing up what *One Man's Dream* is all about, Holzberg said: "If there's one overall message, it's this: 'If you can dream it, you can do it.' Disney was one of the ultimate dreamers of the twentieth century, and this celebrates the dreamer in all of us."

CONCLUSION

More than any other set of technologies, immersive environments and VR give us the ability to make fantasies come to life in real physical space. But while immersive environments have become successful arenas for entertainment, the same has not yet been the case for VR. The VR technology is expensive, and the installations can only accommodate a few individuals at a time. Thus, profit-minded enterprises have little commercial incentive at present to develop VR attractions. If costs decrease, or if new techniques are developed that can make VR more of a mass entertainment experience, this may well change. After all, VR has all the components of other engaging forms of digital entertainment: It supports sound and moving images as well as interactivity and computer-generated intelligent characters. In addition, because it can involve so many of the senses, VR can offer powerfully immersive experiences. But, considering the technical and financial obstacles it poses, it will require visionary and pioneering individuals to devise ways to harness its potential for digital storytelling.

IDEA-GENERATING EXERCISES

1. Describe an immersive environment that you have personally visited. What about the experience made it seem believable to you? What about it did not feel like "real life?" If you could improve anything about this particular immersive environment, without having to consider cost or technical impediments, what would it be?
2. What kind of entertainment experience could you imagine creating via VR or an immersive environment? Sketch out this experience, describing

some of the visuals, sounds, and other elements it might contain. Describe how it would start and how it would end.

3. What kinds of educational or training situations do you think lend themselves particularly well to an immersive simulation approach? Choose one possible topic and sketch out the concept a little, describing its objectives, its target audience, and the elements it would include.
4. Can you think of any component or element that might be used for an immersive environment, but to your knowledge, has not thus far been used? How would you use this element? What kind of experience could it help create?