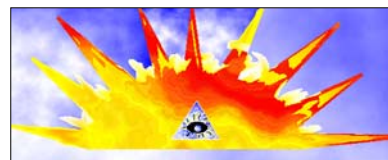
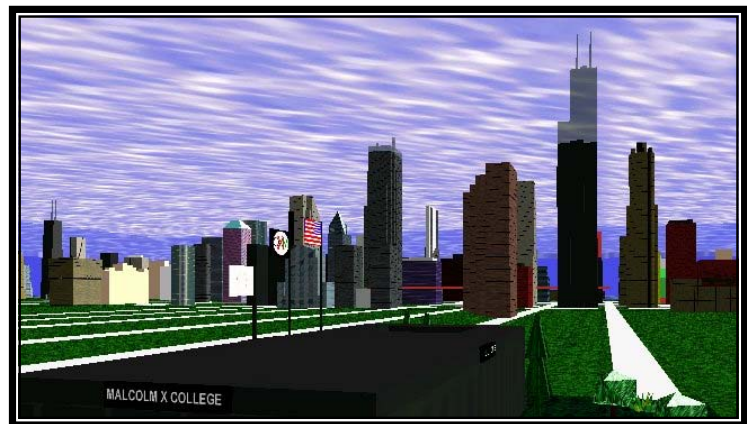


# Virtual Reality In Museums



Reading about the Patagonia region of Argentina can now include the sensory experience of being there.

-Nicholas Negroponte  
Being Digital



SUNRISE  
VIRTUAL REALITY

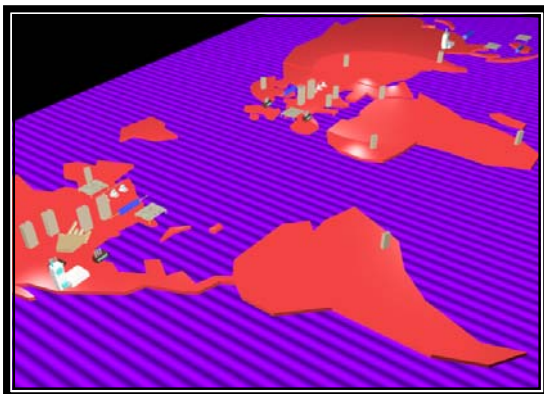
© 2003

The future is here, and it has come faster than any of us thought. From Day 1, museum exhibits were constructed with the most advanced technology of the day in effort to reconstruct the past, disseminate ideas, or demonstrate a new idea. Exhibit designers have been successfully creating virtual realities for hundreds, if not thousands of years. All of the tools available at the disposal of the exhibit designer are utilized with one goal in mind- to reconstruct the subject matter in a way the observer would feel she is actually taking part in the real thing, or push the observer closer to the actual experience. The last decade has seen the rapid proliferation of computers in museum exhibiting to accomplish this goal, and now the ultimate technology is upon us- virtual reality in museums.



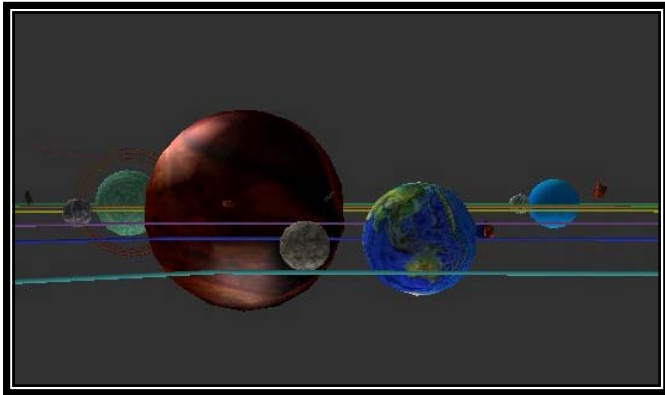
Virtual reality offers an exciting new cost-effective way to generate excitement for the museum and its exhibits, and increase guest participation. Additionally, guests will learn more about an exhibit than they even dreamed. Virtual reality allows guests to truly step inside of an exhibit. Instead of looking at pictures or watching videotape, guests enter and actively explore new worlds like foreign countries, ancient societies, a computer, or the human body. Virtual reality offers an extraordinarily compelling learning experience, an excellent addition to any exhibit.

The conventional wisdom about virtual reality is it is only possible in the “future.” The mere thought of the widespread use of virtual reality in museums conjures up visions of a Jetsons-like world, museum guests going from exhibit to exhibit, donning virtual reality visors to explore an exhibit in-depth- but only in 2180 A.D. The truth of the matter, however, is that cost-effective, sophisticated virtual reality is here, ready for museums to fascinate and engage a new generation of visitors like never before. The only missing ingredients are imagination and an open mind.



One of the realities of museums today is the constant need to search for new ways to educate, entertain, and excite museum guests. Even more pressing is the fact that annual attendance at many museums is falling. Young people, often the museum’s core audience, have markedly different attention spans from that of previous generations, and have radically different expectations. They seek out

places and experiences that meet this need. Many young people see museums as boring and irrelevant. Museums now compete with a truly bewildering array of “learning” destinations for market and mind share. To meet these challenges, museums must do what they’ve always done- innovate! Live on the cutting edge of learning.



Virtual reality is the world’s most engaging learning tool, capable of helping museums to solve these problems. What could compete with what museums do best, traditional exhibiting supplemented by a virtual reality trip into a world based around that exhibit?

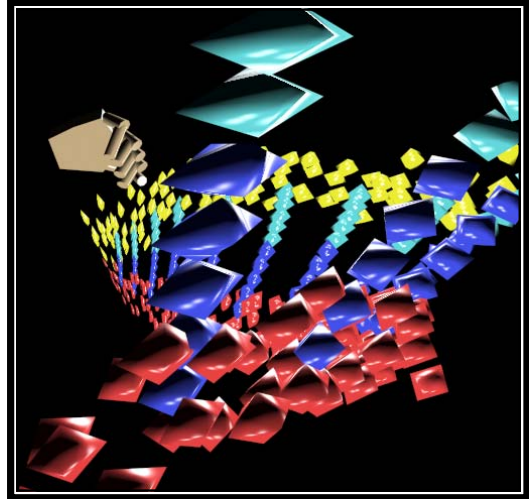
An exhibit based on the remains of dinosaur bones is exciting enough on its own. But what if it could be brought to life in virtual reality, with guests observing the dinosaur’s habitat, watching them feed, and even running from (!) carnivorous dinosaurs. A display is transformed into an experience, all the while disseminating the equivalent of reams of text. Traditional exhibiting supplemented by virtual reality is truly powerful learning tool surpassed by nothing else. CD-ROMs, television, video games, theme restaurants, and learning centers all pale in comparison. In the eternal quest to teach, engage, and fascinate, museums today have a unique historic opportunity to introduce virtual reality in the context of their museums, an unparalleled opportunity to enhance the image, reputation, and relevance of museums today.

“I hear and I forget. I see and I understand. I do and I remember.”  
-Confucius

Virtual reality is a cutting-edge technology that allows museum guests to step through the computer screen into a three-dimensional, interactive environment. By putting on a special headset and glove, it places guests inside of a simulated environment that really looks and feels like the real world. Through virtual reality, we’re convinced we’re in another world experiencing some event, and doing things that don’t physically exist.

A helpful analogy to better understand the learning promise of virtual reality is that of a child exploring a forest for the first time. A child will best learn about the forest not from reading about it or listening to a teacher lecture, but by walking into it- becoming a part of it. The child is free to explore the forest any way she likes. Self-guided discovery and experience become the best teacher- that’s what learning in virtual reality is all about.

In the past the main barrier to implementing virtual reality technology in museums has been expense, and cost-effective virtual reality is necessary for museums to take full advantage of its massive potential. Powerful new technology is wonderful, but it does few museums any good if it costs hundreds of thousands of dollars per *single* station. To date a few museums have used virtual reality in exhibits- but powered by \$300,000 computers. What if that cost could be cut by %90?



Today, the important breakthrough in virtual reality technology most relevant to museum uses is that virtual reality systems are now run by the same personal computers already in museums and homes. Coupled with powerful new graphics acceleration boards, a simple PC becomes a workstation-quality graphics generator. This is critical because to create high quality virtual reality, a computer must redraw a scene 30 times per second (faster than even video), and be responsive to the user's every movement. Because virtual reality is now PC-based, it is now easier to maintain and upgrade, further reducing the cost of using virtual reality in exhibits.

A typical virtual reality station used to supplement an exhibit consists of a specially configured PC, virtual reality headset, and glove or navigation device. The new generation of virtual reality technology is people-hardened, arcade-tested, and battle-ready. A main concern of museums using first-generation virtual reality technology was practicality- could such sophisticated equipment stand up to the rigors of daily usage by hundreds of screaming children? Today's virtual reality headsets are made of industrial-quality moldings, can be operated for eight hours a day, and are ideal for high-traffic exhibits.

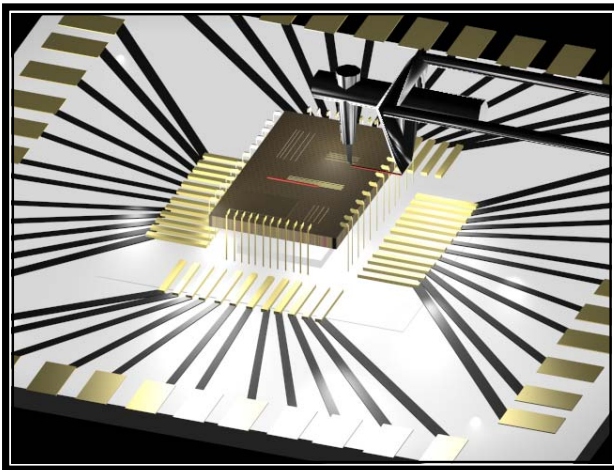
Installing virtual reality technology in an exhibit fortunately does not have to tax valuable exhibiting space. Users interact in virtual reality standing up, with "attract screens" above them, showing the viewpoint of current users. The effect is similar to a row of public telephones. A display in this design has the included benefit of quick and easy access by guests, and is self-explanatory.

An exhibit is best supplemented by a tightly controlled, 3-5 minute experience in the virtual world. The key to making virtual reality work as a supplement to an exhibit is to make the interaction simple enough for computer novices. Interacting in a virtual world is similar to the way we interact in the real world, much easier than using a computer. Anyone can learn to use VR in a matter of seconds. Guests simply put on the virtual reality visor and point in the direction they wish to travel. Because virtual worlds are not pre-generated, as

with CD-ROMs and traditional computers, the guest is free to explore the world however they choose. Every experience is unique and full of self-discovery.

Designing a virtual supplement to an exhibit is easier than one may think. Virtual worlds merely extend the metaphor of an exhibit. They allow the museum designer to do what is not possible physically in the museum, placing guests in places and situations to more fully comprehend the context of the exhibit.

The new advances in virtual reality technology promise to make the widespread use of virtual reality in museums a cost-effective way to capture the imaginations of guests for years to come. In addition to the low-cost, PC-based nature of virtual reality today, many grant programs are in existence to assist museums in funding such innovative projects, further delivering the age of virtual reality to the doorsteps of all museums. The largest such program, the TIIAP,



the Telecommunications and Information Infrastructure Assistance Program, promotes the widespread availability and use of advanced technologies such as virtual reality. TIIAP says, “partnerships involving museums are among the most exciting and promising projects in the program’s history.” To date, the program has provided over \$100 million in assistance, with an additional \$150 million coming in the form of local matching funds.

Virtual worlds based on new and existing museum exhibits could well be the “killer application” of museums in the early 21<sup>st</sup> Century, a powerful step in reestablishing museums as the world’s centerpiece of learning and exhibition. The multitude of challenges and competition facing museums today require truly innovative approaches on learning in the museum environment. Virtual reality is a sophisticated, easy way to capture the imagination of museum guests, a logical addition to the exhibiting process. Virtual reality can be employed in museums in many ways, from exhibiting to museum education. An unprecedented opportunity is here for museum professionals to explore and integrate new technology into museum environments. Harnessing the awesome power of virtual reality technology in museums signals a groundbreaking new approach to learning. Museums, with years of experience in reconstructing ancient life, animal habitats, and the human body, must be the harbingers of this future.

# Virtual Reality: Museum Uses and Exhibits

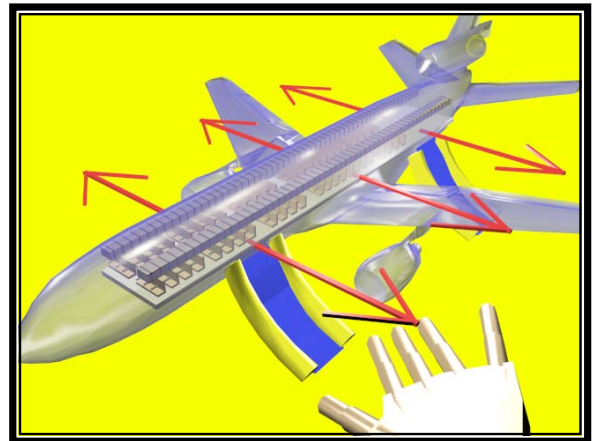
## 1) Historical Recreations

Virtual reality allows museum guests to travel back into time to great civilizations that don't exist today, and experience events as they occurred hundreds or thousands of years ago. Egyptian Civilization comes alive to visitors as they pass beneath the Sphinx. African Kingdoms, at the height of their grandeur can be visited and experienced. Museum guests can take a trip to Shakespeare's Globe Theater as it was in Elizabethan England, or watch the U.S. Constitutional Convention from inside of Independence Hall.



## 2) Virtual Reality to Supplement Other Exhibits

Supplementing an exhibit with virtual reality greatly increases guests' interactivity with the exhibit. They literally become a part of it. Guests pilot a virtual reality version of an aircraft or submarine being exhibited, whether it be landing in Paris in Charles Lindberg's Spirit of St. Louis among cheering throngs or searching out German U-Boats in WWII. An exhibit based on computer technology would now allow guests to travel inside of a computer (represented as a city) to learn how it works. The possibilities are endless, and, because it is virtual reality, we are limited only by our own imaginations.



## 3) The (Portable) Virtual Museum

The actual, physical museum and selected exhibits are recreated in virtual reality, creating a portable version of the museum, a new "annex." Guests simply put on the virtual reality visor to "enter" the museum. Such a new tool would greatly extend the reach of the museum, improving awareness and interest in the museum. With a portable PC and a briefcase, the museum can now be taken to schools, special events, prisons, other cities, and other countries. A

virtual museum is especially important for people who would otherwise not have access to the museum.

4) The Virtual Information Booth

A virtual reality information booth or kiosk would immerse guests in a three-dimensional, fully interactive map of the museum. Exploring a three-dimensional map of the museum results in a greater familiarity with the museum and its exhibits. For example, less attended exhibits could be further highlighted. A virtual information booth is also an ideal way to announce new museum programs and developments (in a 3-D, interactive way, of course).

5) Virtual Travel

Virtual reality takes museum visitors anywhere in the world, from the African savanna to the skyscrapers of Chicago or the dense vegetation of the Amazon rain forest- all in the same room. Furthermore, guests travel to another location without restrictions – visiting Mount Killimanjaro from the air, for example.



6) Exploring the Universe

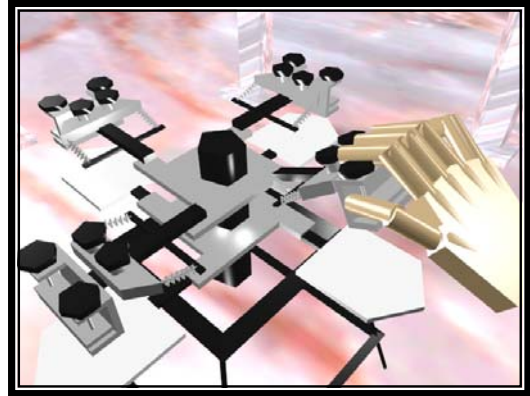
In virtual reality, there are no limitations of time and space. Guests can tour the Solar System, from the Sun's fiery corona, alongside Halley's Comet, to the surface of Jupiter's incredible moons, Europa and Io. Because virtual reality allows us to visualize what cannot be physically seen, guests can stand on the edge of a black hole or travel at the speed of light. Virtual reality provides an unprecedented opportunity to educate people as never before, and show people things that no human has actually seen.

7) Science

Virtual reality opens up a brave new world in science exhibits. To understand the human cell, guests now step inside of one, gazing up through a murky world at a massive nucleus, surrounded by floating organelles. Guests can finally comprehend the idea of molecular bonding by choosing two molecules and pushing them together to see what results. A virtual physics lab allows guests to understand physical forces on a pool table or on the moon

8) Process Demonstration

Hard to understand processes can be demonstrated, experienced, and understood in virtual reality. The complex inner workings of a machine may be deconstructed to see its components. By choosing their own vantage points, guests can view a complex process as a whole, or travel closer to see how two bolts are connected. In addition to demonstrating a new process, guests can operate a virtual version of the machine, take it apart, or put it back together.



9) Seasonal Programs

Virtual reality programs can be used to facilitate awareness of a seasonal event such as Black History Month. Traveling the Underground Railroad to freedom or taking part in the 1963 March on Washington in virtual reality has the unlimited potential to inspire and educate by placing guests in someone else's shoes. On the other hand, seasonal events could be just plain fun- like helping Santa Claus pilot his sleigh across the globe from the North Pole to learn geography.

10) Museum Education

Virtual reality programs can become a valuable part of museum education. A virtual reality lab with several stations is the ultimate classroom supplement/study resource for students. A virtual reality lab for museum education is similar to the way today's computer and language labs are used. Each class at different points uses the lab to supplement more traditional forms of learning. A rapidly growing library of courseware allows virtual reality learning materials to be used by dozens of different classes.

A virtual reality lab in museum education will bring great interest and excitement to a museum's educational efforts. It further differentiates museum education from other classes and summer/weekend programs. And, like the Virtual Museum, it can be taken on the road into schools and other places extending the reach of the museum and helping the museum to form innovative and lasting partnerships with local schools.



### **About the Authors:**

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### **About SUNRISE Virtual Reality:**

SUNRISE Virtual Reality is a software development and systems integration company pioneering the world's most advanced learning tools, a new generation of virtual reality-based education solutions based on off-the-shelf PCs.

SUNRISE technology is built on the assumption that people learn best by experience. Instead of teaching rules, students "travel" to a virtual recreation. They are "there." Through immersion in VR environments, first-person experience and activity becomes the best teacher.

SUNRISE VR programs have been demonstrated around the world at a number of education and technology conferences, including the International Society for Performance Improvement, TechEd, and the Influent Corporate Training World.

SUNRISE VR pilot software products have been used in the Chicago Public Schools and the City Colleges of Chicago. Results have been outstanding. We have obtained particularly outstanding research results with African-American students. Student and teacher response to VR has made it clear that VR technology has a promising future in education. Detailed information on Pilot results can be found in the Technological Horizon in Education article Virtual Reality: the Ultimate Educational Technology.