

How Useful are Virtual Worlds?

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Virtual worlds are highly interactive environments for experiencing and manipulating three-dimensional synthetic scenes. Such kinds of environments are referred to as real-time interactive graphics with three-dimensional models, when combined with a display technology, possibly including binaural sound, that gives the user immersion in the model world and direct manipulation. A virtual environment, thus, is not simply an improvement of conventional display techniques, but it is a new media of communication with novel kinds of challenges for computer and communication technology.

While the initial development of this technology was pushed through military and space research and its commercial use by entertainment industry, a wide field of application is now developing in science and industry, medicine, art, and architecture. Some examples for the use of virtual environments are interactive exploration models such as the "virtual wind tunnel" of NASA Ames, the "walkthrough environment" of the University of North Carolina, or the "responsive environments" of GMD Bonn, Germany. New applications are also discussed in telepresence and robotics, and in the design disciplines as urban planning and architectural modeling. Projects like "Virtual Sho - Invisible Site" of the performance artist George Coates or "Home of the Brain" of Monika Fleischmann and Wolfgang Strauss (Prix Ars Electronica 1992) have prepared the grounds for Virtual Reality technology in art and performance.

Along with sophisticated techniques for natural visualization and rapidly increasing computer power, virtual environments are becoming highly attractive for design and simulation. For example, the sensual experience of an office room or a building prior to its physical realization could help a designer to obtain a realistic impression of a construction while it is evolving and to give free way to imagination and creativity at the same time. The user should be able to move through the model, interact with objects in the model, and change the model interactively, e.g., by grasping and moving objects. As simulation of physical laws in virtual environments is progressing, such direct manipulation has become most attractive for virtual design. It is one of the aims, eventually, that a designer could be able to explore, and interact with, a manipulable environment without wasting physical matter and with the ability to readily change the immaterial model.

While there is no doubt about the fact that virtual worlds have begun to prove useful, there is still much work to be done. A list of the most pressing needs includes the development of software for design of and interaction with virtual worlds. The growing prominence of Virtual Reality for entertainment industry greatly promotes the amounts of efforts and money spent on the solution of technical problems. But there are as many problems to be solved with respect to the human user. The conditions, circumstances, and influences surrounding and affecting a participant user in a virtual world may greatly differ from natural experience. Issues of research necessary reach from perceptive features like vision, audition, and haptics to the understanding of sensory-motor adaptation and aftereffects associated with virtual environments such as motion sickness. On the other hand, virtual reality allows to expand sensory experiences to include a "real" grasp of information otherwise concealed to human senses, that is, human perception could be extended within and across sense modalities.

So, when addressing the question how useful virtual worlds are, we need to discuss possible benefits and as well as possible dangers which could be likely impacts of virtual reality technology. To name only a few aspects:

- Can virtual worlds help to better experience and exploit complex information by way of human senses?
- Can they save us money in achieving projects that would be inaffordable in "real reality?"
- Can they make "cold technology" better adapted to human expectations and needs?
- Can virtual worlds help to establish alternate forms of social life, e.g., for the handicapped?
- Are the prospects of realistic simulations overestimated (much overhead - little payoff)?
- Will experiences in virtual worlds be likely to interfere with experiences in real world?
- Could military action, put in effect through a virtual environment, become a matter of game and scoring, and detached from the regard of real effect?
- Will users be able to cope with the immersive (and possibly drug-like) aspects of virtual worlds?

These issues need to be addressed, along with current research and development, and preferably by those involved in the process of furthering this new, and apparently "hot," communication technology.