

## The **blue-c** Team

The **blue-c** is designed by an interdisciplinary team of researchers, including people from the following ETH institutes:

Computer Graphics Group  
Department of Computer Science



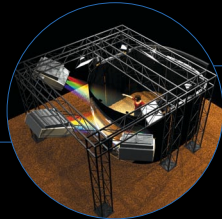
Center of Product Design  
Department of Mechanical and Process  
Engineering



Computer Vision Group  
Department of Electrical Engineering



Computer Aided Architectural Design Group  
Department of Architecture



The Future of

**C**ollaborative **V**irtual **R**eality

# Virtual Reality

Mastering the rapidly changing computing and communication resources is an essential key to personal and professional success in a global information society. The main challenge consists not only in accessing data, but rather in extracting relevant information and combining it into new structures. The efficient and collaborative deployment of applications becomes increasingly important the more complex and interactive tools we have at our disposal.

Today's technology enables information exchange and simple communication. However, it often fails in the promising field of computer-enhanced collaboration in virtual reality environments. Some improvements were made by coming-of-age virtual reality systems that offer a variety of instrumental tools for stand-alone visual analysis.

Nevertheless, the crucial interaction between humans and virtual objects is mostly neglected. Therefore successful models of truly computer supported collaborative work are still rare.



### Contact information

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**ETH**

Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich



## Computing - Communication - Collaboration

The **blue-c** system features:

- Full immersion of the participants in a virtual world
- Three-dimensionally rendered human inlays, supporting motion and speech in real-time
- New interaction metaphors between humans and simulated artifacts of functional and/or behavioral nature

## Real Humans in Virtual Worlds

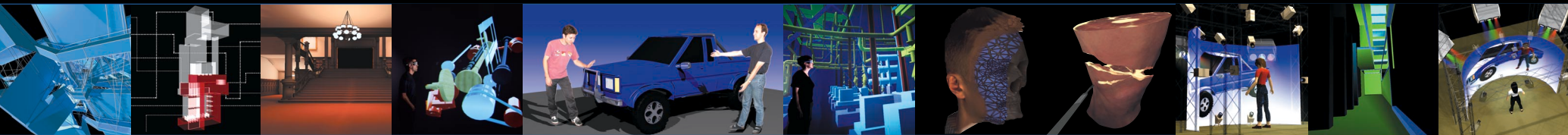
The **blue-c** project aims at investigating a new generation of virtual design, modeling and collaboration environments. Three-dimensional human representations will be integrated in real-time into virtual environments. The use of large screens and cutting edge projection technology creates the impression of total immersion. Thus unprecedented interaction and collaboration techniques among humans and virtual models will become feasible.

## The Future of VR

The **blue-c** system will leverage telepresence and virtual meetings to a new dimension of quality and immersion. **blue-c** prototypes are used for usability and performance assessment in selected application areas.

## The Technology

The **blue-c** system foresees simultaneous acquisition of live video streams and projection of virtual reality scenes. Color representations with depth information of the users will be generated using real-time image analysis. The computer-generated graphics will be projected onto wall-sized screens surrounding the user, allowing him to completely enter the virtual world. Multiple **blue-c** portals, connected by highspeed networks, will allow remotely located users to meet, communicate and collaborate in the same virtual space.



## Architectural Design

Today's architects work with both lowscale physical models and computer generated images of buildings. But the advantages of full immersion, involving visual, acoustic, and haptic senses remain widely unexplored.

The **blue-c** system will provide the technology for a variety of new collaborative design, management and refinement procedures between the architect, his customer and third-party experts.

## Next Generation Product Development

A new generation of development environments will emerge in the near future. The underlying metaphor is a virtual space which is adaptable to various scenarios and to different stages of the product development process. A network of globally distributed development spaces enables engineers and product managers, field technicians and sales consultants to meet and collaborate in one common virtual environment. We envision the **blue-c** technology as the product design space of the future.

## Computer-Aided Medicine

Collaborative diagnosis and telepresence open new possibilities in the field of computer-aided medicine. Remotely located experts can participate in the diagnostic process. Highly immersive virtual environments allow researchers and medical students to take interactive journeys into the human body.

The unprecedented quality of natural human interaction in a distributed environment makes the **blue-c** system an essential tool for future remote collaborative diagnosis.

The **blue-c** system will include:

- A fully immersive three-dimensional stereo projection theatre
- Real-time acquisition of multiple video streams
- Three-dimensional human inlays reconstructed from video images
- Voice and sound rendering
- Distributed computing architectures for real-time image processing and rendering
- A flexible communication layer adapting to network performance
- A scalable hard- and software architecture for both fixed and mobile installations
- An advanced application programming interface