

## Collaboration in VEs – fact or fiction?

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The growth of the Internet, and company intranets, fuelled by the promise of sophisticated on-line services, has raised expectations of rich collaborative virtual environments, in which humans can indulge in cooperative problem solving. Pioneering demonstrations, such as the work of NASA on rehearsing maintenance tasks for the Hubble telescope, and recent moves into on-line multi-user gaming, have given us a glimpse of what may be possible in a restricted context.

And yet, for most users the reality is somewhat different. Interaction in virtual environments is hard enough with only a single user. Add to this the problems of multiple users, collaborating over a network, and we still seem some way from having a really useful, or even usable, tool. The problems span technology (faster, lower latency networks will help, but will not, by themselves solve the problem), software architectures (just how do we ensure a coherent view of a shared environment for multiple users?), to psychology and human factors (we need experiments to quantify how well things work). Above all, how do we come up with solutions which not only work but are accessible to, and usable by, ordinary programmers and end-users? In this talk I will explore some of these problems and describe our own attempts at addressing them.