

PC VR Projects (1991 to 1997)

A Selection of VR Solutions / Virtual Presence Ltd's PC-Based VR Projects

Virtual Presence was one of the very first Beta Test Sites for Superscape's Virtual Reality Toolkit, VRT (Superscape originally trading as Dimension International Limited).



Virtual Presence's original northern office building (based on the campus of Salford University) was first publicly demonstrated using VRT on a 486 PC at the first British Virtual Reality event - *VR'91 - Impacts and Applications Conference*, held in the East of London, and was still in use up until 1995 by different organisations throughout the UK.



Since 1993, Virtual Presence has been instrumental in introducing PC-based VR into a number of user sites across the UK (with training), thereby enabling companies and organisations to develop their own basic expertise. Some of these organisations include:

British Nuclear Fuels plc;
Cooperative Wholesale Society;
M W Barber Ltd;
Barlow Shopfitters;
University of Salford;
City of Salford Council;
Manchester Royal Infirmary;

J Sainsbury plc;
University of Plymouth;
Defence Research Agency;
Development Board for Rural Wales;
English Heritage;
British Steel;
Peak Productions/Crown.

Virtual Presence was also a key member of the CEC Programme ETHOS (European Telematics Horizontal Observatory Service; 1995-1998), specialising in briefing the CEC (with demonstrations) on PC-based VR developments and applications.



Amongst Virtual Presence's early PC VR successes was a public planning demonstration for **Welsh Water** (based on Mount Street in Wrexham). This work, which was specifically carried out for a company involved in civil engineering project planning (M W Barber Ltd. of Romiley), showed how VR could be enhanced through integration with multimedia images - clicking one's mouse on symbols along the main street (see illustration above) elicited the appearance of on-screen photographic records of the condition of the sewer under that part of the pavement. Virtual Presence's expertise was instrumental in delivering subsequent projects, including work for South West Water (Exeter Cathedral drainage development) and a Thames Water proposal (Woolwich Pumping Station).



The **Cooperative Wholesale Society's** initial space planning project was based on VRT using a laptop. Similar work has been successfully carried out for **Sainsbury's**, both in an early PC-based store planning demonstrator and, more recently, a laptop-based stock performance visualisation system, where the user can interrogate stores, warehouses, shelves and even individual products simply by navigating

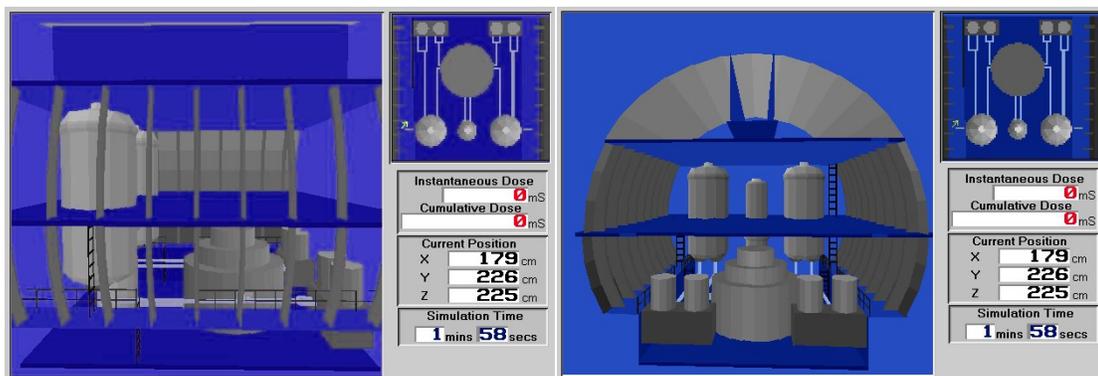
through a visually rich VR database representation.

A project carried out for the **Defence Research Agency** (Chertsey) concerned the development of tactile feedback interfaces for the human user of a military vehicle workstation simulator, prototyped using immersive VR techniques. The system delivered - the *TactGlove* - was a stand-alone tactile feedback glove demonstrator, consisting of a 3-digit sensory glove assembly (thumb, index and middle finger), equipped with PZT (lead zirconate titanate) piezo "sounders" to provide variable frequency tactile input. The glove was built to VR Solutions' specifications by the Electronic & Electrical Engineering Department of the University of Salford. A purpose-built interface card allowed the glove to be driven from a standard 486 or Pentium Personal Computer. For the purposes of demonstration, the *visual* interface was developed using Superscape VRT. This enabled the user to control, on-screen, the apparent 3D position of a schematic "hand". On making contact between the "hand" and

one of three virtual controls (a rotary knob, push-button and toggle switch), the appropriate “collision” signal was transmitted to one or more of the glove sensors. Actuating the control produced a perceptible change in the frequency of stimulation, higher or lower than the initial collision frequency. Thus, as the rotary knob was rotated counter-clockwise and clockwise, the frequency of stimulation decreased and increased.



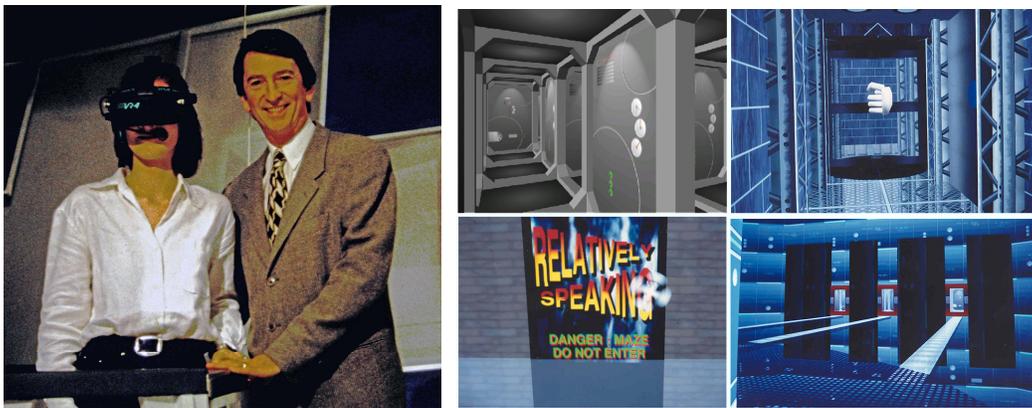
Another defence-related PC VR project was carried out under commission from Rolls-Royce & Associates of Derby. Their requirement was for a multi-window VRT system which could demonstrate the potential of VR in the submarine radiation safety training of naval personnel and defence health physicists. The final system took the form of a 3-window simulation, based on actual radiation measures provided by RR&A. One window allowed the user to navigate his way around any of the three decks of the submarine’s nuclear reactor compartment. Another provided a plan view of his position. The third window displayed instantaneous and cumulative radiation doses, together with the elapsed time and the user’s current x, y and z deck location.





Space planning has featured heavily in Virtual Presence's work for **British Nuclear Fuels Limited (BNFL)**. The Central Control Room for BNFL Sellafield's Mixed Oxide Plant (SMP) was entirely designed using Superscape VRT (for on-site use, complete with animated characters and detailed interactive VDU screen formats), prior to porting onto a higher-performance platform. Since that time (1993/1994), further nuclear facility control

rooms have benefited from the cost savings architectural and ergonomics prototyping in VR can bring, with BNFL personnel trained to develop models and simulations by the VP team.



One novel use of a PC VR system developed by Virtual Presence was featured on the 1996 **BBC TV** game show *Relatively Speaking*, hosted by Gordon Burns. Here, VRT was linked into a more sophisticated SG-based VR system (running *dVS/dVISE*) and used to generate a large video display of a 3D map to contestants, showing the location (via a Polhemus head tracking system) of their team member immersed inside a virtual maze.

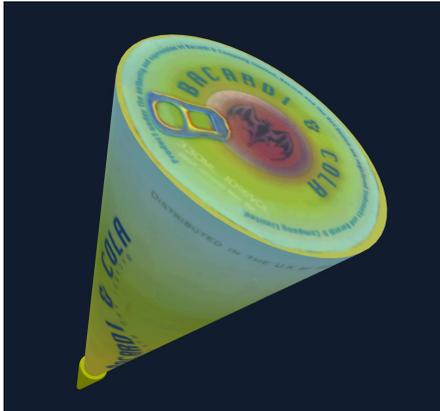


In 1996 **Salford Social Services** commissioned and took delivery of a comprehensive VRT model of the Barton Moss II juvenile offenders facility. This well-received project, which is one of the largest internal and external models ever attempted in VRT, is being used for the training of all Social Services staff who are permanently located in, or make regular visits to the site.



VR Solutions has, as well as the commonly available PC VR formats, been working closely with **Unilever, British Steel, Procter & Gamble** and the like to investigate developments which exploit Microsoft's ActiveX/DirectX Initiative, particularly in the retail and market research VR applications areas (see packaging pictures). With early 1997 well in mind, one cannot fail to ignore the potential of Microsoft's latest DirectX2/Direct3D Software Development Kit (SDK) for Windows 95. By delivering direct (real-time) access to

video and sound hardware for PC games developers (the current "target" market, if the trade press is anything to go by), DirectX2 promises to provide robust, high-quality and high-performance 3D programming and applications capabilities to Windows users, matching or exceeding performance on MS-DOS-based platforms or specific video gaming consoles. The important issue here is that, given the explosion of VR world building toolkits, object and texture libraries and VR run-time packages, all available free from Internet and WWW sites, home PC users will soon have a suite of extremely powerful tools at their fingertips.



Together with VRML2, ActiveX/DirectX will enable the development of shared virtual worlds and educational experiences over the Internet, facilitating "contributions" to the nature of those worlds and involvement in global virtual activities by the Internet users themselves, each having their own identity and existence as *avatars*. Until recently, this possibility only appeared to exist in the imagination of science fiction writers - witness Neal Stephenson's novel *Snowcrash*.



Virtual Stonehenge (complete with mathematically accurate night-time sky and real-time sunrise - two world firsts) was a project commissioned by **English Heritage** and **Intel**, and was destined to be hosted on a PC-compatible platform from the outset (due, obviously to Intel's involvement). Although at the time of the project (early Summer, 1996) the Intergraph TDZ/GLZ series represented an expensive generation of PC (designed around the Intel Pentium

Pro or "P6" processor), current Pentium 200 PCs are reaching a level of development capable of hosting what was described by *VR News* and in the supporting material for December's *Virtual Heritage Conference* as **"...the largest and most challenging PC-based heritage reconstruction carried out to date"**.

Designed in collaboration with Virtual Presence Limited of London, **MIST_{VR}** is a **Pentium PC-based**, part-task surgical skills trainer which provides a cost effective means of fostering basic perceptual-motor competencies for the "remote" handling of human tissue in minimally invasive procedures. **MIST_{VR}** further provides a comprehensive database system by which these skills can be recorded and used for certification purposes. Exploiting the real time interactive power of a popular VR applications development package - Sense8's *WorldToolKit* - within a multimedia presentation package, **MIST_{VR}** has been developed for use as a stand-alone training system, or used in conjunction with more conventional endo-trainers. Video, voice and text (AVI) elements have been integrated carefully to explain the importance and relevance of each stage in the training and assessment procedure to actual surgical practice;



VR Solutions' main and most successful retail effort to date was commissioned in 1996 by Sainsbury's. The project focused on the development of an accelerated PC-based store planning system, capable of "...displaying virtual images approaching the quality of Silicon Graphics machines, possessing the functionality of Superscape's VRT, and allowing a non-VR expert to

design a completely new store layout in 40-45 minutes". The **Concept_{VR}** System is the resultant Intergraph TDZ/GLZ-based concept store development package, which has been adopted by Sainsbury's as their **organisation-wide future standard method of store design**, refurbishment and planning. The *WorldToolKit* application allows users to lay out a store in 3D (importing objects from VRT where necessary), rotating, scaling and positioning elements freely within that store. Products can be added to the shelves in their correct positions and orientations (depending on the size of the product). Interior store colours can be altered readily and new designs tested.



Another well-received VRT project, commissioned by the **Development Board for Rural Wales**, was based on the concept of *VR in a Briefcase*. Here, a laptop, equipped with *i-Glasses* and Spacemouse, was delivered with another large external/internal site demonstration, this time based on a “for-leasehold” industrial unit development in Newtown.

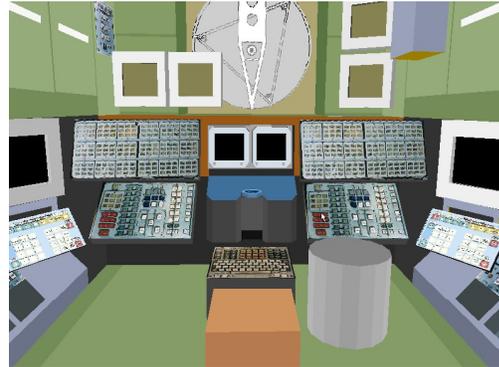
Simple key presses enable the user to move within a couple of seconds from the outside world into the target building, and further key presses change the interior from an empty warehouse to an open plan office, or to an industrial manufacturing facility, complete with animated robot work cells. Furthermore, by clicking one’s



mouse on nearly every feature in the building (power supply, ceiling, floor, heating, etc.) the potential leaseholder is presented with a multimedia insert, showing higher quality photographs and explanatory text of features VRT is unable to display in real-time at high quality. Animation features include robots, security doors, drawing board computer printer and a flooded Offa’s Dyke with weir (artistic license!);



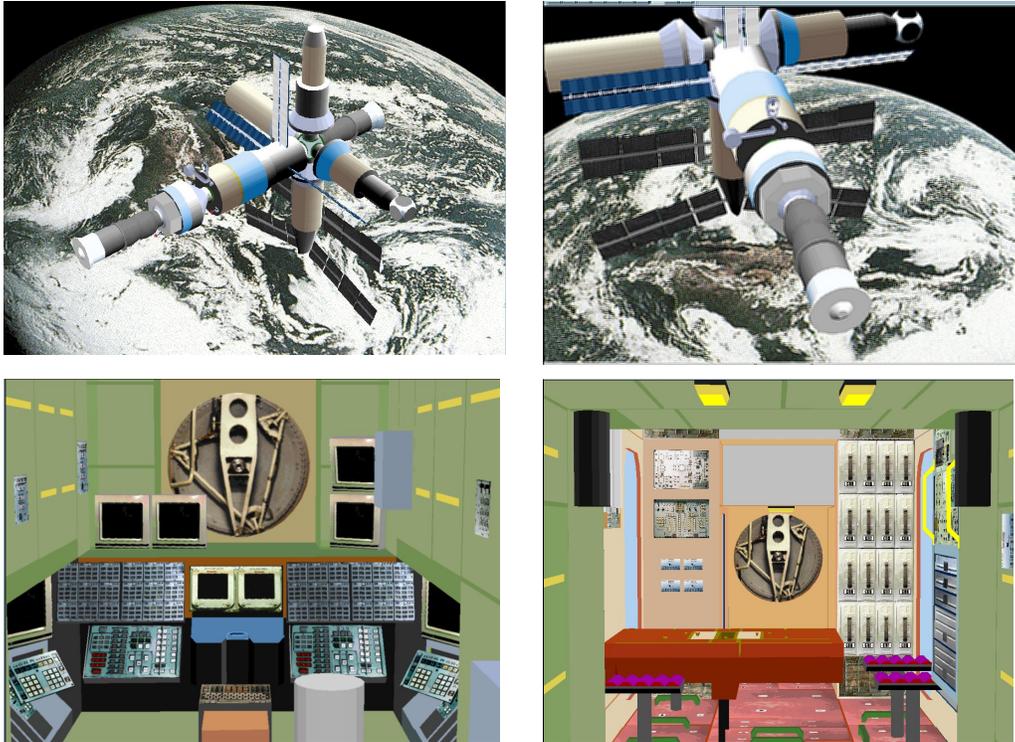
Virtual *Mir* Exterior



Virtual *Mir* Interior

In both an educational and business development rôle, Virtual Presence has been working closely with the **Moscow International Higher Education Academy of Sciences (IHEAS)** and the **Advanced Simulation Research & Development Centre (ASRDC)**. VR Solutions obtained a free copy of VRT for the IHEAS and ASRDC and helped both organisations to develop a comprehensive model of the *Mir* Space Station. As a result of this exercise, the Russian organisations will be implementing VR in some of their academic centres, not mention in developments in support of the International Space Station;

Following their visit to VR Solutions in 1995 for advice and training, in January 1997 a revamped version of the VRT model of *Mir* was delivered from the Russians which showed a remarkable improvement in both modelling quality (geometry, shading and texturing) and attention to good VRT modelling practice.



In October of 1996 the Greater Manchester Police (GMP) was considering spending some £50,000 on furnishing either (a) a large van or (b) a regional centre in order to present video demonstrations of such events as cashpoint muggings, separated infants, burglaries, accidents and the like to primary school children. The £50,000 was **not** inclusive of the actual hardware required to run the demonstrations. Concern was expressed within the GMP that the video-based solutions being considered could become quickly dated, were not sufficiently “high-tech” to capture the attention of school children and, in the case of the regional centre idea, would have serious impact on school timetables, transport costs and the like. They had not initially considered VR, due to a perception of very high costs. However, when they discovered that, for the same amount of money, it would be possible to develop multiple scenarios using a PC-based VR tool (Superscape), with a run-time license cost of only £90 per PC (or free if down-loaded from the Internet), suddenly they began to take VR seriously.

Crime Conquest was the resulting educational VR project, designed to assist the Greater Manchester Police in their attempts to highlight **societal** problems and encourage children at primary and secondary school level the importance of treating such issues as theft, drug abuse, public disturbances, personal safety and home security seriously and responsibly.



Early in 1998, some 320 CDs were be distributed free to schools in the Greater Manchester area. Each CD will possess a range of VR scenarios, allowing schoolchildren to make a typical house secure, decide on the safest route to walk home at night (having been to a disco), respond to youth disturbances outside an elderly person's house, identify drug abuse activities, accurately report shoplifting and joy-riding incidents, and so on.

