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Second Demonstration of Inhabited Television

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Deliverable 7a.2

Second Demonstration of Inhabited Television

ABSTRACT

This deliverable continues the story of our practical exploration of inhabited television following the *Out of This World (OOTW)* experiment that was described in the previous deliverable D7a.1, and presents an early snapshot of the progress made on a further public experiment with inhabited television that was provisionally entitled 2525 and is now continuing under the name of *[.tv]world* with the additional collaboration of Sky channel [.tv] (pronounced “dot-tv”). We describe the process of introducing Sky, summarising our discussions with broadcasters and describing the [.tv] channel. We then describe the software platforms that will support *[.tv]world*: Microsoft *Virtual Worlds* and Nottingham’s *MASSIVE-3*, and offer a snapshot of our current virtual world designs.

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1. Introduction

This deliverable continues the story of our practical exploration of inhabited television following the *Out of This World (OOTW)* experiment that was described in the previous deliverable, D7a.1, and presents an early snapshot of progress made on a further public experiment with inhabited television that was provisionally entitled 2525 and is now continuing under the name of *[.tv]world* (pronounced “dot-tv world”).

[.tv]world differs from *OOTW* in four key aspects:

- We will focus on producing engaging content, both for inhabitants and for viewers. Our approach is to first establish a committed on-line community of inhabitants who actively contribute to the development of virtual worlds and who establish strong characters and a communal history. We will then develop broadcast material based on this community by involving the inhabitants in a number of evolving plots.
- We will conduct a long-term experiment that will involve public access for a period of at least three months (*OOTW* ran over two days).
- Inhabitants and viewers will participate in *[.tv]world* from their homes, the former using commodity PCs and Internet connections and the latter using digital and analogue television.
- We have involved a commercial broadcaster in the experiment. This is Sky through their *[.tv]* channel. This provides us with a realistic operating environment and will allow us to explore the commercial issues involved in deploying inhabited TV.

[.tv]world has been divided into two distinct phases. The first phase involves establishing the initial community and virtual worlds in association with *[.tv]*. This will involve producing some non-live broadcast material to be shown on *[.tv]*. The design of this phase has been underway since March 1999 and will go public between September and December 1999. The second phase will involve creating specific, possibly live, broadcasts based on the community and worlds with richer plots and narratives. This will occur between January 2000 and the end of the eRENA project in August 2000. The nature of this phase depends entirely on the results of the first phase and so is currently open.

This timescale involves some divergence from our initial workplan, where we had intended to stage the next public experiment by September 1999. We will now be beginning it then. This delay is due to the time taken to integrate *[.tv]* and to plan for what is a more ambitious experiment than was originally proposed. Some part of this time was also taken up with discussions of inhabited TV with other broadcasters (see section 2). We argue that the delay is more than out-weighted by the increase in scope and ambition of the resulting experiment. However, it does have to be borne in mind that this deliverable only offers a snapshot of our initial design when it is at a formative stage. There has not yet been any public access or evaluation and the design itself will no doubt

change drastically by September. We anticipate presenting the public version at the i³ conference in Sienna in October.

This deliverable is structured as follows:

- Section 2 describes the process of introducing Sky, summarising our discussions with broadcasters and describing the [.tv] channel.
- Section 3 discusses the software platforms that will support [.tv]world: Microsoft *Virtual Worlds* and Nottingham's *MASSIVE-3*.
- Section 4 offers a snapshot of our current virtual world designs.

In addition to [.tv]/Sky, we would also like to acknowledge the involvement of several other groups in 2525. Students in new media at New York University are contributing to world design while on summer placements at BT Laboratories, where they are working alongside a team of experienced designers who have worked on two previous Inhabited TV demonstrations, *The Mirror* and *Heaven and Hell Live*. Finally, Microsoft have provided the *Virtual Worlds* software at no costs and have committed support from their Seattle research labs for this specific project.

2. Introducing a broadcaster

Industry Context

The development of Inhabited Television over the past three years has taken place against a background of rapid and fundamental change in British and international television. Little more than a decade ago, television in the United Kingdom was restricted to four terrestrial channels, each with significant public service obligations. The licence-fee funded services BBC1 and BBC2 were complemented by the network of commercial ITV companies and by Channel 4, established in 1982 as a publicly-owned advertising-funded “publisher” of programming.

The 1990s have seen the arrival of a new terrestrial service, the populist Channel 5, and also the introduction of numerous new services distributed by satellite (most notably BSkyB’s news, sport, feature film and general interest channels) and by cable, including a host of niche channels organised around a particular interest such as cookery, cars or indeed computers.

At the end of the decade, broadcasters and producers are facing the challenges and potential of digital transmission systems, of alternative distribution technologies such as the Internet or ADSL, of enhanced television and interactivity, and of the broad field of forces bundled together as convergence. Transmissions to digital televisions and the streaming of video and audio signals to domestic computers are perceived to offer the potential of media forms, the shape of which remain very open, which utilise the full integration of broadcast, computer and telecommunication technologies.

The BBC, under their outgoing Director-General John Birt, is perceived to have embraced these possibilities with vision, establishing – although not without controversy – a number of new digital channels (BBC Choice, BBC Knowledge and a number of joint ventures with Flextech, including UK Arena) and in BBC Online one of Europe’s most successful and most visited Web sites. Other terrestrial channels have been less engaged with leading these changes and, as with Channel 4, their response has been cautious and piecemeal.

On its debut in 1982, Channel 4 created an independent production industry in Britain for the first time, and more than 1,000 small and medium-size companies now regularly produce programming for the terrestrial broadcasters (almost all of Channel 4’s output, 25% of the BBC’s and ITV’s) and for the cable and satellite channels. A partner in the

eRENA project, Illuminations Television, is one such independent, ranked 30th in a recent industry poll in terms of size, turnover and reputation.

In common with the industry as a whole Illuminations Television has had to respond to current changes, broadening its programme-making base from a traditional focus on arts documentaries and seeking new outlets beyond its main clients of BBC2 and Channel 4. Illuminations Television has also recognised the rapid fall in budgets in many parts of the industry. The cost per hour offered for production by the new services is perhaps one twentieth of that previously available from the terrestrial channels. The availability of new, significantly cheaper cameras and non-linear editing systems in part makes such budgets workable, but production in this context also demands new ways of working grounded in volume production.

In the summer of 1998 Illuminations Television established a subsidiary company, Illumina Ltd., to concentrate on low-cost, volume production for new services and to begin to develop skills for the next generation of convergent programming. Illumina's clients in the first year have included BSkyB's [.tv] channel, which is dedicated to computers and new technologies, as well as UK Arena and BBC Knowledge. Average production costs for original programming in this context is around 10K Euros per hour.

Inhabited Television is perceived by Illuminations Television and the other partners in the eRENA consortium as both a form and a production process which is exceptionally well-suited for exploitation in this emerging low-budget, multi-channel convergent media environment.

The Mode: Fashion and Style

Following on from the consortium's earlier experiments with Inhabited Television, including *Heaven and Hell – Live* and *Out of This World* (reference earlier Deliverable), the partners have formulated three related projects for the further elaboration of the form: *The Mode*, 2525 and [.tv]world. At the time of writing, the third of these is in production, with the intention of going online in late September 1999 and with a concentration of related broadcast activity in November and December 1999. Components of the other two projects have been accommodated into [.tv]world, and the completion of either of these is unlikely.

The Mode was conceived by Illuminations Television and BT Laboratories for Channel 4 Television as a follow-up to the broadcast of *Heaven and Hell – Live*. In an attempt to move beyond the largely uncontrollable anarchy of the earlier live broadcast, *The Mode* was designed to combine a real world presenter and guest in a television studio with links

to virtual correspondents in a shared online virtual world of fashion and style called *Modeworld*.

Recognising the unique nature of *Heaven and Hell – Live*, and the difficulties of scheduling and promoting such a programme, *The Mode* as a television broadcast was constructed as a comparatively conventional late-night magazine show about fashion and style. The familiarity of both form and content in television terms was thought to be essential to its likely acceptance by a broadcaster like Channel 4. So too was the inclusion of pre-recorded features from the real world on the themes of fashion and body design, once again to strengthen familiar and controllable aspects of the broadcast.

At the same time, the proposal to Channel 4 for *The Mode* stressed the participatory aspects of the project, with an online audience which would be expected to create their own looks and styles for a catwalk show. As a consequence, avatar design in *Modeworld*, both by real-world designers and by members of the audience, was seen as a central element. And because Channel 4 was concerned that viewers watching the broadcast but not taking part in the virtual world might feel excluded in some way, it was also envisaged that this audience could take part in a telephone vote which would affect elements within the virtual world.

The nexus of fashion and style was selected as a focus for *The Mode* in part because of its familiarity for television but also because of its closeness to many of the underlying concerns of virtual world and internet culture.

The fashion commentator Ted Polhemus notes that fashion at the end of the 1990s is defined by ‘style surfing’. Whereas before there were powerful groups such as the Mods, the Rockers, the Hippies and the Punks which ran their course in a linear fashion, now a diverse set of styles is “mixed and matched”. There is no longer a single dominating look, rather a set of ‘hyper-linked’ styles which are constantly evolving and reinventing themselves. *The Mode* was intended to celebrate this new multiplicity of styles by allowing inhabitants to create and recreate their identities by both plundering from past decades and creating new looks for the third millennium.

It may also be argued that fashion complements the notion of ‘bubble up’, participatory media which is a central imperative of Inhabited Television. It has been style born on the streets which has filtered upwards to the catwalks of the fashion world. The DIY approach of Punk, for example, with its cheap trashy fabrics, and use of household items such as razor blades and safety pins was instantly appropriated by fashion designers.

The Mode was intended to empower the public to create their own individual looks at home on their PC’s but also provide a people’s catwalk to allow the public to parade their own creations alongside well-known designers.

One of the key findings of previous Inhabited Television projects has been the need to establish a sense of community within the world. This facilitates better understanding between the inhabitants and stimulates more engaging interactions. Fashion and style as the theme of *The Mode* was intended to catalyse this process of community building. In the way that a fancy dress party breaks down social inhibitions in the real world *Modeworld* inhabitants would have a shared talking point at the outset.

Finally, as with much activity in virtual worlds, fashion and style is about playing with notions of identity – and increasingly in the world today with ideas of gender.

Four spaces were designed as the main areas of *Modeworld*: the Salon, the Hybrid Club, the Ark Bar and, the centre of these, the Catwalk.

- The Salon is a functional supermarket of style with rows of items including outfits, hair, ears and noses. There is a colouring area where clothes and body colours can be altered and there is the swapping zone with ‘transparent’ cubicles where identities are swapped.
- The Hybrid Club is a darker space of mixed styles from the last fifty years of fashion and style. Mopeds, huge safety pins and chains are included in the layout.
- The Ark Bar is a bright, modern open space with some famous works of art including sculptures and paintings which celebrate the notion of couples. There is plenty of open groundspace for the partners to be identified and to be seen.
- The Catwalk is a luxurious area of rich blues and deep reds. It has a large set of sliding screens at the end which pull back to allow the ‘models’ to move onto the platform. There are flashguns which can be triggered around the edges.

The Mode was developed by BT Laboratories and Illuminations Television in response to a request from Channel 4 Television for a new Inhabited Television project. Conceptualisation and initial designs were done in August 1998 in the context of the MultiMedia Lab, a residential seminar at Bore Place, Kent, organised by the Performing Arts Lab and ARTEC. The results of this work were presented to Channel 4 Television in the autumn of 1998, but Channel 4 decided not to take the proposal into production.

Channel 4’s decision not to proceed was in part because of a change of executive in charge of the commissioning group which had supported *Heaven and Hell – Live*. It also reflected the re-focussing of the channel’s primary objectives away from the support of innovative output (an obligation which is enshrined in the broadcaster’s licence from the regulatory authority, the Independent Television Commission) and more towards mainstream commercially-driven programming.

Channel 4 has also been uncertain about its strategy for the development of digital media, and previously has been prepared to experiment with quirky, comparatively low-risk projects like *Heaven and Hell – Live*. By the end of 1998, the broadcaster was much more clearly focussed on the creation of digital projects with an apparent medium-term revenue-generating potential. They did not perceive Inhabited Television to possess this potential.

2525

Following the mounting of *Out of this World* in September 1998, the project team outlined a number of principles which the next Inhabited Television project should specifically address.

- Focus on developing appropriate forms of content using stable platform(s) - the main goal to see whether we can produce an Inhabited Television show that is entertaining and engaging, both as an inhabitant and as a viewer
- Aim to build a community and then establish a series of shows around them in order to give the shows some legend, history and strong characters
- Explore narrative structures that involve repeated visits to an (apparently) persistent environment, perhaps combined with some kind of spatially distributed narrative where the story is simultaneously unfolding at several locations
- Explore issues of how globally visible performers might emerge from inhabitants and viewers (i.e., some notion of progression through the layers of participation according to commitment/interest/popularity)
- The target audience will be teenagers at schools and colleges (age 13-17?) and the focus will be loosely educational, addressing broad "life skills" themes
- Address some specific technical issues including: more expressive avatars, better quality audio and enhanced production software (e.g., better virtual camera interfaces, virtual microphones and software mixing)
- In parallel to the demonstrator, develop new underlying platforms for future demonstrations. These will address core technical challenges such as support for scalability and persistence

Responding to these broad objectives, a second conceptualisation of an Inhabited Television project was undertaken in early 1999 by Illuminations Television, BT and the University of Nottingham. 2525 was to be aimed at involving young people aged 15 – 18

in an experiment in collaborative virtual environments and their relationship to broadcast TV.

The concept of 2525 was one of a virtual online world which depicts vision of how the world might be halfway through the next millennium. It is a world largely created through consultation sessions with participating schools who become the inhabitants in the world. A set of real world performers would play virtual characters in the world in order to provide a narrative thread.

It was imagined that the producers would provide three half hour television programmes to feature the discussions and debates between participants as they decide how to operate within the world and the issues they face in choosing their identities and organising the world's structure. These debates were intended to reflect their views on world and local issues which concern them now and how these relate to their future vision.

The television audience gets to know the characters involved and is prepared for a live broadcast from the world. The shows include informative but friendly features on the creation of the world as well as contributions from experts on the future. The fourth show is a live broadcast from within the world. The aim of 2525 was not only to portray a disconnected fantasy world of the future but rather to stimulate broader discussion about where we are now in relation to that vision.

2525 was conceived as a response to the interest in exploring narrative within shared virtual environments. This was identified as a key research project *after Out of this World*. The overall narrative of 2525 was intended to generate itself as the various groups interact and the rules of the world emerge. It could, for example, be that several tribes emerge which cautiously trade or barter with each other in a global economic system or maybe the group are already homogenous but need to work out if they still need a hierarchical structure.

As previous Inhabited Television experiments have shown us there is also the need for a producer-led narrative to provide structure and flow and to draw the inhabitants into focussed behaviour at appropriate times.

This key narrative in 2525 would be led by a group of rehearsed virtual performers (operated by a real world theatre group) who appear as avatars within the world.

Scenarios could include that the performers represent the last community surviving who have refused to be part of the society, and take the role of rebellious outcasts. Another could be that they represent an unusual minority group whose rights and traditions need to be preserved for future generations to learn from and appreciate. They need to be carefully wooed by the other inhabitants.

Approaches to co-develop 2525 were made to BBC Education, the BBC department involved in the Inhabited Television project in 1997 *The Mirror*, to the recently-established digital channel BBC Choice, and to UK TV, the group of channels for cable and satellite distribution operated as a joint venture between the BBC and the cable operator Flextech. Unfortunately it proved impossible to persuade these groups of the interest and significance of the project and of Inhabited Television in general.

Although detailed feedback was not given, it was clear that these departments of the BBC saw Inhabited Television as, at best, a marginal activity with few clear benefits and considerable problems relating particularly to governance of activities within the virtual world. Each preferred to devote their limited resources for online enhancement of linear programming elsewhere.

A similar approach was made to Channel 4 Television. Again the project was rejected, with a range of critical and dismissive comments made during a presentation to five of the company's key executives responsible for aspects of its digital strategy. In this meeting the Channel 4 group focussed on the question of what would TV viewers want to watch in an inhabited television project, and they were unconvinced the project team's consideration of this. Channel 4 applied rigorous ratings-driven criteria to the ideas, and found them wanting in this context. "Why should we broadcast this?" was the key question asked.

Channel 4 also felt that networked games (with faster, more detailed graphics) will more successfully achieve the participatory qualities of Inhabited Television, and that there will be little interest in watching a linear, non-participatory version of this on television. Attempts to enthuse the executives with a broader, social vision of the potential of Inhabited Television failed.

"I feel that the fundamental nut that needs to be cracked," wrote Channel 4's Jonathan Kingsbury in a follow-up e-mail, "is not why should people take part - it obviously is a lot of fun for people playing and totally immersed - but why television viewers should watch. We ask this question of everything that gets commissioned here at Channel 4 (I hope), and inhabited tv should not be an exception. I've thought a lot about this overnight and the question I keep coming back to is what makes a game show (for example) compelling television to those not taking part. Surely if inhabited tv can try to meet those attractions, it'd be a long way down the road to being a truly innovative event." Sophie Walpole, responsible for Channel 4's online presence added, "Personally I AM interested in 3-D worlds and the notion of Inhabited TV but I just don't know where the *fit* is with C4 in order to drive your ideas forward."

BSkyB's [.tv]

A far more productive discussion was initiated in March 1999 with BskyB's channel [.tv]. Prior to its re-branding in early 1998, this service had operated as The Computer Channel, and Illuminations Television was involved in extensive discussions to provide programming. This arrangement had not been taken forward, but it was revived in the summer of 1998 when Illumina was commissioned to provide for [.tv] five hours each week of low-cost programming about new technologies.

(Another production company provides the other five hours of origination which the channel commissions.)

[.tv] describes itself as "the first and only UK channel devoted entirely to new technology as an essential part of daily life. In a world of increasing technological sophistication, consumers require reliable technical information and credible advice, delivered in an easy to understand informal and entertaining environment. [.tv] is ideally placed to take advantage of this need."

"[.tv] boasts ten hours of original programming each week which appeals to a variety of consumer groups. The channel arranges its programming into easily identified theme nights in order to cater to these viewers; [business.tv], [family.tv], [internet.tv], [consumer.tv] and [creative.tv]. [.tv] broadcasts from 6-8pm in analogue and noon-midnight in digital every day."

"Our influence extends beyond our twelve hours a day on-air. [.tv] is available 24 hours a day via our website at www.tvchannel.co.uk. An important part of the [.tv] ethos and strategy, our website fully supports and extends the [.tv] experience to our viewers and potential viewers alike. Pages of back-up information run in conjunction with on-air programming, detailed listings, programme reviews, up and coming events, forums and chat rooms, the ability to communicate directly with our programme hosts and production teams are all available at the click of a button."

Approached to be the broadcast partner in an Inhabited Television experiment, [.tv] responded with enthusiasm, and has been a significant partner in the re-shaping of many of the ideas driving 2525 in a new project, *[.tv] worlds*. The channel recognised a close fit between the interests of the Inhabited Television group and its own concerns to extend the experience of broadcasting. It also felt that there would be enthusiasm and take-up amongst the channel's modest but committed audience, which is skewed heavily male and predominantly 18-35.

The channel is strongly interested in the research results which will be developed from *[.tv]world*, and brings a rigorous consumer focus which to date has not been a major component of the project. A further important factor for [.tv] is the potential which

Inhabited Television offers for marketing and differentiation of the channel, both within a highly competitive multi-channel broadcasting environment and also internal within the BskyB group of companies.

3. Software platforms for [.tv]world

Choosing a software platform in which to realise [.tv]world has been difficult due to the need to simultaneously meet two key requirements. First, the platform should support public access over low-bandwidth Internet connections (e.g., using dial-up modems) so as to support access from the home. Second, it should allow for rich and dynamic interaction among participants and should offer the kinds of sophisticated management and broadcast facilities such as the dynamic movement constraints and specialised virtual camera interfaces that were used in *OOTW* (see deliverable D 7a.1).

Given that rich interaction may require integrated audio and video communication and sophisticated articulated avatars driven by tracking systems, all of which generate high volumes of network traffic, these two requirements conflict to some extent. It is therefore not surprising that there is no currently available software platform that meets both of them. Nottingham's *MASSIVE-2* platform that was used for *OOTW* supports rich interaction and production support, but has not been engineered to run over modem connections. Commercially available collaborative virtual environments may support relatively large numbers of users over modem connections, but are typically limited to graphics and text and possibly very limited audio.

Our solution to this problem has been to work with a low-bandwidth commercial platform, *Microsoft Virtual Worlds*, in the first community building phase of [.tv]world, while simultaneously developing a new higher-functionality platform, *MASSIVE-3*, that might either be run alongside it to support live broadcasts or that might even meet both requirements. The first phase will mainly focus on world and community building, with text chat being used between inhabitants in the world. Any broadcasts will not be live and careful editing should create pace for the viewer. Audio might even be overdubbed during postproduction. The second phase will focus more on rich interaction and live broadcasts. *MASSIVE-3*, like *MASSIVE-2*, will support these with real-time audio communication, embedded video views, immersive interfaces and dedicated production and virtual camera interfaces.

The key issue then becomes how the two platforms work together. Possible solutions, in order of increasing sophistication, are:

- Worlds, objects and avatars are imported from *Virtual Worlds* into *MASSIVE-3* and then used to create separate environments for live broadcasts. Key inhabitants are selected to travel to a physical inhabited TV to take part in the live show. The selection process may take place within the *Virtual Worlds* environment.
- As above, except that the selected inhabitants travel to physically distributed sites that are equipped with good facilities, including higher-bandwidth network connections. Examples might be local universities connected to research networks or specially established sites with dedicated ISDN connections.
- Some form of live link is made between *Virtual Worlds* and *MASSIVE-3*. For example, pseudo broadcasts might be created between the two, enabling inhabitants

in *Virtual Worlds* to see and hear a single view of the action in *MASSIVE-3* and vice versa.

- One integrated system might be developed to meet both requirements. In fact, this is our eventual aim in developing *MASSIVE-3*; to engineer a system that can support both large-scale public access, rich and dynamic communication and management and production facilities. The software techniques required to support this will be reported and demonstrated in year three of eRENA.

The following sections present brief overviews of *Virtual Worlds* and *MASSIVE-3*.

Virtual Worlds

Microsoft *Virtual Worlds* is a software platform for build collaborative virtual environments in two or three dimensions. The platform supports text, graphics, voice, video, and many other media types. Worlds and objects can be created using wizards and standard content. Changes end-users make to the world persist between sessions, and objects, content, and behaviors in the world can be changed while the world is running. The interface is customizable with DHTML and VBScript, and creation and control of objects and their behaviors can also be scripted.

The interface consists of the follow features which allow you to:

- Customize your avatar's information in the *Avatar Profile Dialog Box*.
- Change your angle on the world by adjusting your *Camera Views*.
- Change worlds with the *Directory Dialog Box*.
- Toggle the sound, adjust the hardware acceleration, and fine tune the performance of Virtual Worlds in the *Options Dialog Box*.
- Explore your world with the *Avatars Tab*, the *Things in Room Tab*, the *My Things Tab*, and the *Authoring Tools Tab*.

The scripting and authoring tools allow you to:

- Create new worlds and run current worlds in the *Virtual Worlds Server Application*.
- Customize your avatar in the *Avatar Construction Kit*.
- Create, move, modify, and delete boundaries in the *Boundary Editor*.
- Enter script into the Command Window.
- Customize the appearance and behavior of your objects with the *Geometry Editor*.
- Go directly to the scripting heart of Virtual Worlds with the *Object Explorer*
- Create new objects with the *Object Wizard*.
- Create new rooms with the *Room Wizard*
- Create new worlds with the *Create a World Wizard*

As can be seen in Figure 1, the user interface is presented as a partitioned window within Microsoft Internet Explorer. A graphical view-port shows the objects and avatars. The optional toolbar across the top of the view-port allows control of zoom and other view-port parameters, and indication of selection of an object in the world. To the right is a set of four tabs, currently showing the Avatars tab, which lists all avatars in the world provides a set of buttons which can be selected to control your avatar's expression/behaviour, for which there are 11 choices. When an expression is selected, your avatar performs a short animation. Below the view-port is a chat box that can be used to type text messages to other users and read the text and obtain feedback about the behaviours of other users and objects in the world. In the screen shot shown in Figure 1, the user's avatar named Allison is in front of the avatar of Sarah, who is presenting her 'flirt' expression. At the same time the chat box is showing the words 'sarah flirts'. Allison has chosen a third person camera view so she sees her own avatar in the graphical view-port.

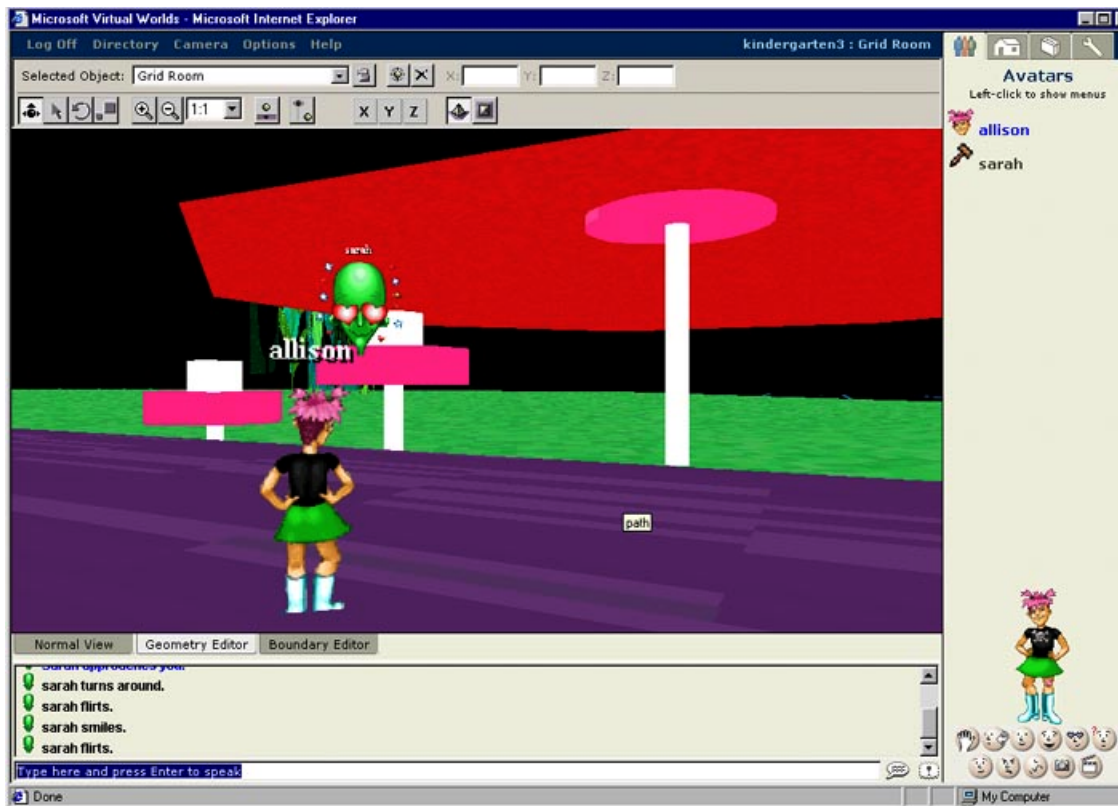


Figure 1 The Microsoft Virtual Worlds client interface

MASSIVE-3

MASSIVE-3 is the ongoing development at the University of Nottingham of the HIVE project's distributed VR Kernel, HIVEK.

MASSIVE-3 is a distributed multi-user virtual reality system, current features of which include:

- multiple users communicating via a combination of 3D graphics and real-time packet audio;
- scalability, world-composition and distribution based on Locales (originated in MERL's Spline);
- message handling supporting application-defined causality and advance communication of events implementing work from the University of Reading.
- a library-based implementation;
- current (interim) networking via TCP client-server style (to be combined with multicast).

MASSIVE-3 is a multi-user collaborative virtual environment system. As such, it allows multiple users to view and become embodied in a 3D audio-graphical virtual world. It supports real-time audio communication between users, and dynamic modification of virtual worlds.

Virtual worlds are constructed from "locales"; each locale is a region of virtual space with its own set of contents and users. A locale might correspond to a room, a building, a region, or a whole virtual world. Locales can be joined together using "boundaries", which create links between locales. Users can typically see through boundaries - to see the locale on the other side - and can also traverse boundaries - to jump to the locale on the other side. Note that these boundaries can have complicated geometric transformations associated with them so that, for example, the inside of a building can be larger than the outside, or a boundary can act like a mirror.

MASSIVE-3 is primarily structured as a library of C++ classes which provide standard data distribution and other facilities (e.g. rendering). Programmers can use this library to create their own interoperating applications. There are also a number of applications provided with the standard distribution which provide system services or standard application functionality.

At least in its current form MASSIVE-3 uses parts of the CRGSHARE library system used by MASSIVE-2. Rendering is currently provided by the DGL component of that library over GL. MASSIVE-3 currently runs on SG IRIX 5.3 and above, and Windows NT 4.0.

Extensive further information is available from the MASSIVE-3 / HIVEK section of the University of Nottingham's Communications Research Group web-site:

<http://www.crg.cs.nott.ac.uk/research/systems/MASSIVE-3/>

4. World designs

This section presents some initial sketches of world designs for *[.tv]world*. As noted in the introduction, these can be expected to change considerably by September 1999.

The overall initial concept driving the design of the world was the “The Seven Ages if Personhood”; the inhabitants would progress through a series of virtual worlds that reflect stages in their lives within the environment. The worlds were intended to provide contrasting moods and display a variety of designs and to reflect growing knowledge and capabilities of inhabitants. Each world would include a number of engaging artefacts intended to draw in visitors, although of course, our primary goal is to encourage social interaction among them. We had originally intended there to be seven worlds:

- Kindergarten – an introductory world where inhabitants learn the skills of navigation, interaction and collaboration. A colourful, simple, playful and fun world. There are no real consequences from inhabitants’ actions, but they also have no real power.
- Robot wars - all about individual and team competition. It represents adolescence in terms of development, following the comforting first steps in kindergarten, and coming just before (and leading into) the awkward social steps that follow.
- Behaviour shift – the teenage years – changing space, distorted reality, distrust and anti-social behaviour.
- Hedonism – by the time users reach this world they should have grasped a full understanding of the interface. This world will very much be an adults playground where all that can be expected is the unexpected ... but beware there will be a consequences for actions.
- Trade and Power – here the focus is on accumulating wealth and status symbols.
- Travel and discovery – a world that focuses on self-discovery, and discovering things about others. The world reflects the idea of going on a journey – the path to enlightenment.
- Nirvana – where the enlightened acquire alternative perception and new powers.

Drawing on the lessons from *Out of this World*, graphical and interaction design has been driven by the following general principles:

Leave plenty of space for the virtual cameras so that they can frame overview shots, can dramatically zoom in and out and can operate without being obscured.

Design interaction with objects with virtual cameras in mind. For example, require inhabitants to move close to objects in order to interact with them so that both they and the object will be framed in a single shot. A second example is to avoid too much hidden interaction at the user interface that is not displayed in the world (e.g., the use of buttons and menus that might be easy to use but that remain invisible to the cameras).

Prototype designs were created for all of the 7 worlds. However, due to time considerations, it was decided to reduce the number of worlds to four of these: Kindergarten; Behaviour Shift, Trade and Power; Nirvana, and rename the show ‘Ages of Avatar’.

The remainder of this section presents our current design details for the four worlds:

Kindergarten

Kindergarten, the first world the user will encounter, is a whimsical and engaging play space (see Figure 2). In this brightly-coloured world, users learn the basics of navigation and interaction in a virtual world. Users are encouraged both to move around the three-dimensional space and to interact with other avatars, inhabitants, and worlds objects. Elements of the world include animal ‘bots’ that can become your own personal pet, a collaborative and dynamic musical sculpture, flower lifts that carry you to platforms in the sky, and a labyrinth with hidden treasures inside.

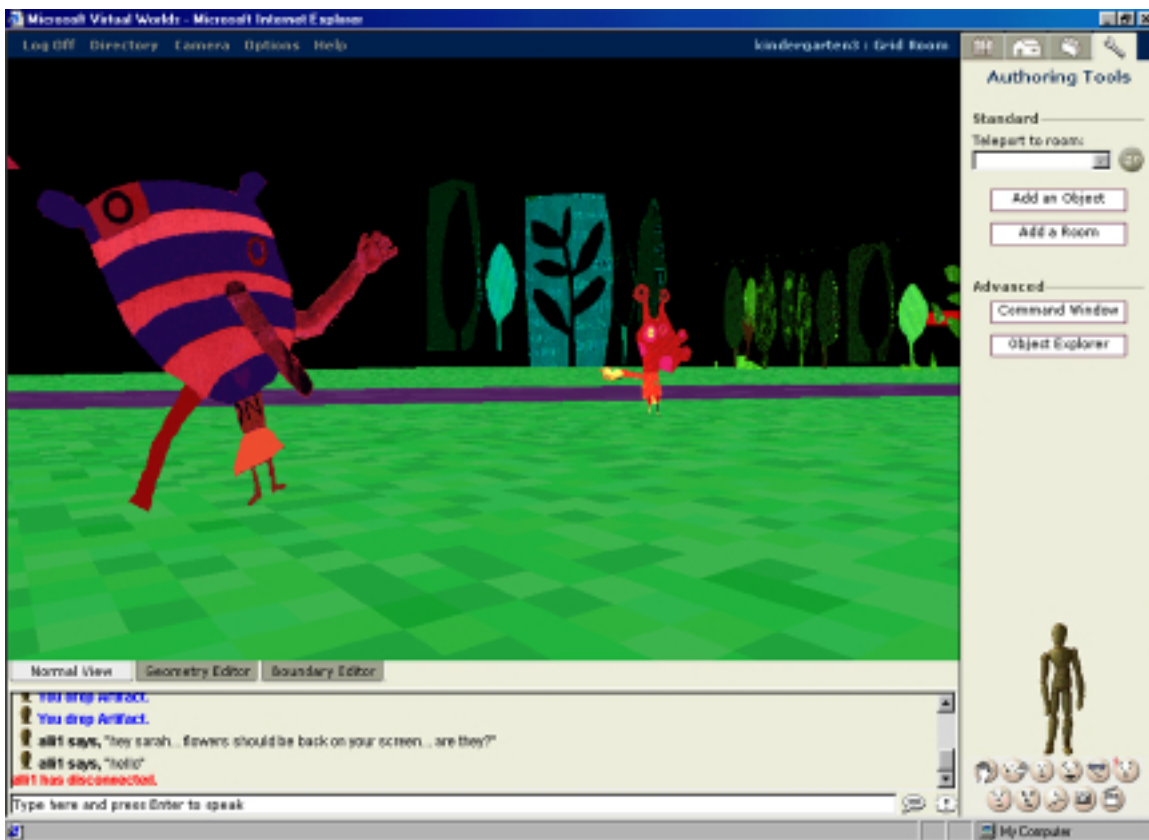


Figure 2 Design idea for Kindergarten showing interactive ‘bots’.

Behaviour shift

Behaviour Shift is the world which focuses on the second age of avatar. It is a teenage world of confusion and uncertainty in which the normal rules of space don't apply (see Figure 3). In this world you can become famous or infamous, spread gossip and rumours and experience new ways of looking at the world. There are several environments to explore: a stage, a giant keyboard, a top hat, a home space and even a psychiatrists office. Inhabitants will be able to eat and drink with their friends, play music, take part in special events and interact with bots to stimulate discussion and help them make friends.



Figure 3 An inside view of the home space in Behaviour Shift

Trade and power

The third "era" participants experience in the Ages of Avatar, Trade & Power World is designed to integrate electronic commerce content and commercial sponsorship into a virtual world and to facilitate networking among professionals who share similar interests

in communications, new media and business. Through billboards located throughout Trade & Power world, users can access e-commerce sites and online content from [.tv] and its sponsors. Avatars will have the opportunity to create virtual business cards so that they can easily exchange information and ideas with their colleagues in the space. The world is also structured to provide opportunities for special events, such as guest presenters and product promotions. Aesthetically, Trade & Power is a subdued, angular world of extreme scale-exaggerated, soaring skyscrapers, etc.--designed to evoke the canyons of a modern financial capital. The space will give users the exhilarating and



dynamic feel of commerce as they navigate around its close streets and open plazas.

Figure 4 An avatar looks out over the Trade & Power citiscape

Nirvana

Nirvana is the final world and represents the age of spiritual enlightenment. The user will initially appear in the middle of a stone henge construction, with surrounding trees. Moving around the henge in a continuous circle will cause the ground texture to cycle through the seasons and the sky texture to cycle through day and night. Surrounding the henge are 4 stone gateways, each with symbols carved into them representing the 4 classical elements of earth, air, fire and water. Users passing through the earth or air gates

will be faced with a number of large floating rock platforms, each of which is home to a stone tablet. The tablets contain questions and if the correct answer is spoken (using text chat), users are transported to the next platform. The final (and largest) platform supports a greek-style temple. Within this temple are 2 rows of plinths which hold carved tablets of stone. Each tablet contains "Words of Wisdom" from users who have solved all the questions. At the far end of the temple, a scribe's desk allows users to enter their quotes, which will then appear on the tablets. The final area of Nirvana can be accessed through the water and fire gates. This area consists of an oriental-style garden situated in the middle of a pond, with access available across a set of stepping stones. The garden will contain raked sand and large stones, offering a meditative setting. Each of the large stones in the garden will emit a sound, and users may push these around to alter the sounds and the volumes accordingly.

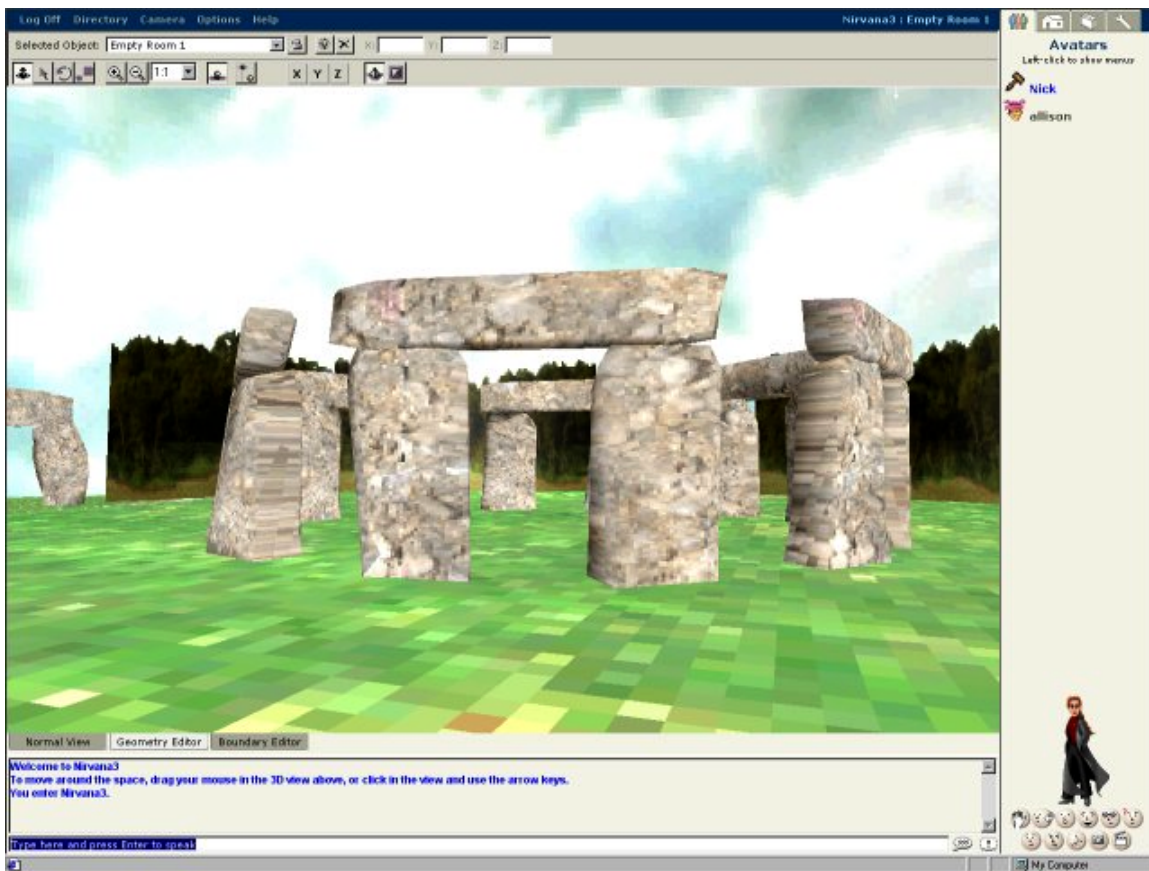


Figure 5 The stone henge centrepiece of Nirvana

5. Conclusions

We have described the work continued after *OOTW* towards our next public experiment of Inhabited TV. Work on the four worlds and accompanying [.tv] web-site which will introduce [.tv] viewers to the experiment is continuing towards the September opening.

Appendix A: Supporting video

Taken from [.tv] promotional video, Illumina material for [.tv] and early test material for the worlds.