3D VisA

3D Visualisation
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3DVisA Bulletin

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Edited by Anna Bentkowska–Kafel

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Editorial

"*Why is it that we visualise*?" There is no common understanding of digital 3D visualisation, nor will there ever be. Computer Vision offers different possibilities in different creative pursuits. The role of 3DVisA is to give voice to this richness of cognitive and methodological perspectives, and serve as a forum for discussion and exchange of knowledge.

This issue focuses on the illusion of reality in virtual representations. The familiar *topos* about two Greek painters: Zeuxis – who fooled birds with his lifelike rendition of grapes, and Parrhasius who in turn deceived his colleague with a depiction of a curtain that Zeuxis tried to draw – sums up the ambition of illusion in pictorial representation. In her response to the articles on photorealism published in two preceding issues of the 3DVisA Bulletin, Daniela Sirbu argues for the recognition of the role of the artist behind 3D computer visualisation. She also considers the debt of digital tools to traditional media, such as painting and photography, and the multiple sensory engagement that is a particular feature of virtual environments. The visual perception, or the Zeuxis effect, is no longer preferential.

In the March 2007 issue of the *Bulletin* Luciana Bordoni and Sandro Rubino presented the project Cerveteri Reborn. The authors stressed the value of the **experience** of this Etruscan site, made possible by digital visualisation. This contradicted the view expressed earlier by the artist, Christian Nold, that 'it is not possible for Virtual Reality to reconstruct the experience of place'.

Problems of experience and reality are at the heart of phenomenological interests. I have, therefore, turned for a commentary to the philosopher, Professor Hanna Buczyńska-Garewicz, whose two latest books deal with the experience of time and space. I am delighted that she has accepted the invitation from 3DVisA, and is willing to share her thoughts on virtual visualisation of heritage,

assessing such digital experiences from the position of her discipline. The work of the nineteenth-century German philosopher and historian, Wilhelm Dilthey, may seem an unexpected recommendation for further reading, but as Buczyńska-Garewicz points out, his notions of historical understanding and empathy 'may be very helpful for 3D visualisation of the past'.

3D visualisation is possibly at its most creative in computer games. Governed by an enviable demand and favourable market forces, they enable 'a rendered view of the world' that is free from the constraints encountered in historical reconstructions. The world of computer games is bewildering. Maria Sifniotis's overview of their development, generously illustrated with examples and copious references, is very helpful indeed. She looks at the use of game engines, explaining what they are and how they have been employed in education and research. This overview provides an interesting background to four new educational projects in Second Life, supported by the UK Eduserv Foundation.

Andy Powell, Head of Development at Eduserv, explains the rationale behind this initiative and the attempt 'to try and look past the hype that surrounds Second Life in order to try and form a balanced view of its capabilities in the context of education.' 3DVisA will follow the progress of the projects and report on their outcomes.

The Joint Information Systems Committee (JISC) has recognised the potential of computer games technology to facilitate communication, learning and research by commissioning a new study in this area. The current *Bulletin* includes a link to this report, *Learning in Immersive Worlds. A Review of Game-Based Learning*, by Sara de Freitas, published online by the JISC e-Learning Programme.

3D visualisation was one of the subjects of the Electronic Visualisation and the Arts (EVA) conference held in London in July 2007. Graeme Earl reports on select presentations and on a JISC workshop focusing on e-Science and visual perceptions. The latter was followed by a discussion which addressed the role of the proposed *London Charter for the Use of 3D Visualisation of Cultural Heritage* (www.londoncharter.org). The debate continues.

I hope you will enjoy reading the articles which appear here in abridged form. Full text versions and more illustrations are available online. I wish to thank all the authors for their engaging and stimulating contributions. UK students are reminded about the 3DVisA Visualisation Award. Details are available on the 3DVisA website. The deadline is 15 October 2007. Please do keep sending comments and contributions to future issues. ■

Featured 3D Method

3D VISUALISATION USING GAME PLATFORMS by Maria Sifniotis

A game engine is software which makes up the core of a computer game. It handles rendering (2D or 3D), physics, AI, collision, and other aspects of game mechanics. The game engine co-ordinates the physics, graphics rendering and other elements, in order to present a rendered view of the world to the player.

Engines usually feature level-building tools that allow to quickly create playable areas for a game. Additionally most engines contain scripting capabilities; a high-level engine-specific language which allows for a wide range of modifications and customisations to the game.

The use of game engines and game mechanics as a medium for three-dimensional representations is a relatively new direction for archaeology, but not for other disciplines. Their application in scientific modelling and simulation, and in primary education has been well documented, having reached a point where national organisations, such as the British Educational Communication and Technology Agency (BECTA), actively research the potential of computer games in school education. Further work in other areas includes the concept of 'serious games' – where game technology is used in non-entertainment scenarios. A successful example is the game America's Army; it has been used for training US soldiers for actual rifle range tests.

Architectural applications have also been around for many years, finding in game editing a way to quickly visualise buildings and perspective constructions with a low cost approach. A number of projects use the Unreal engine for architectural scenarios to promote estate buildings; exhibit a protected natural park and raise ecological awareness; or navigate through a virtual office. Researchers at the University of Auckland, New Zealand, use the Torque game engine to create a Collaborative Virtual Environment (CVE) to support architectural education. Through the CVE users can interact and share data in a common environment and concurrently explore shared architectural projects.

Jeffrey Jacobson has created a set of modifications for the Unreal engine which allows visualisation in a customised CAVE environment incorporating multi-screen displays. These customisations make the creation of a low-cost CAVE possible, thus enabling VR applications that would require an immersive setting to also use the extensive features of a game engine.

The Notre Dame Cathedral project (2000), funded by UNESCO and based on the Unreal 2.0™ engine, showed first how a complex historical architectural

structure could be imported into a game engine. Working together with French historians, the authors created the architectural pieces and incorporated textures from the actual site. The game was completed by adding a virtual monk, a guide to the church, controlled by the game's customisable AI.

Erik Champion explores the notion of cultural presence in a virtual world by using aspects of gaming in his research. He investigates how a cultural heritage virtual scenario can evoke a sense of belonging to its users, by focusing on an ancient Mayan site at Palenque, Mexico. This is achieved by combining elements as storytelling, maps, dynamic environments and user tasks. Users were divided to interact with the environment in three distinct ways: as observers, inquiring travellers or active participants. In the first case, users locate objects and retrieve information; in the second they are assisted or guided by in-game avatars; in the third they are in charge of manipulating and interacting with the world in order to discover. Preliminary results indicated that the environment played a stronger role in the sense of presence, rather than the inclusion of an interaction mode.

The AERIA project (2003) attempted to create archaeological reconstructions without the use of expensive CAD software. The authors used the Quake 2, HalfLife and Morrorwind engines to reconstruct the palace of Nestor in Pylos and the throne of Apollo, respectively. They recognise that game engines have come 'of age' and offer a low cost but powerful tool for heritage visualisation.

A similar approach is followed by Anderson who further suggests that the game industry will keep investing in its own technology, thus keeping it updated also for heritage use. He used the Quake 3 engine to recreate a Pompeian house from archaeological plans. Limitations that were encountered include the inability to access the game engine's source code, Quake's strict CSG modelling approach, and the inaccuracy of the game units. The Quake engine is also used by researchers from the University of Aizu, Japan. They have modelled a Japanese temple which can be explored by the player, and added a custom code to the engine in order to support human animation, basic physics. ■

More at www.viznet.ac.uk/3dvisa

3DVisA Discussion Forum

BEYOND PHOTOREALISM IN 3D COMPUTER APPLICATIONS

Daniela Sirbu responds to Angela Geary

Photorealism in 3D graphics, as the main criterion for evaluating the artistic production in this area, has surfaced on our discussion forum with the first two issues of the *3DVisA Bulletin* through the articles of Michael Greenhalgh and Angela Geary. Why focus on photorealism when no true photo camera is involved? Why not speak about realism instead?

3D digital reconstruction of Teatro Olimpico by Andrea Palladio (work in progress). The two renderings illustrate the effect of different lighting schemes applied to the same 3D environment. © Daniela Sirbu, Virtual Reality Lab, University of Lethbridge, Canada.

In this article the term realism refers to emulating the natural world in a 3D computer environment where several senses, and not only the visual sense, are involved in the perception of the illusion of the physical reality. In accordance with Bolter and Grusin's theory of remediation (1999), the emerging media have always remediated older media. The presence of older media has been strongly felt in film until grammar of the film language has been established and the film has acquired the status of a distinctive form of artistic expression.

We must not forget McLuhan's well known argument, 'the medium is the message'. It captures the idea that while we come to intimately understand a medium, and improve it, we also select and adapt the content to what the medium can do best. This goes up to the point where the content and how it is conveyed is dictated by the medium. When the medium is mature and used at its best, it becomes invisible for the audience. Understanding where 3D computer graphics has arrived from may help us foresee where the domain is heading.

Photography and film have both been based on recording reality. Camera recording techniques are emulated within 3D computer programs: filtering, blurring, lens distortions, etc. There is still a deeper interconnection between photography, film, and 3D computer graphics, explaining the interest in photorealism. While film and photography used to record reality, 3D computer graphics produce the content using the perspective representation system as employed by specialised 3D programs. Having the challenging problem of perspective automatically solved by the computer, the creation of representations as illusion of

the real world is significantly simplified. Traditional media – painting and drawing in particular – heavily employed the system based on perspective representation. The production of 3D-based visual content has naturally found immediate connections with photography, film and other traditional media. We can see that photography and film also remediate painting: simple recordings of raw reality with the photo and video camera may not be satisfactory unless plotted by the artist.

Behind the eye is the mind that organises what we see, discarding detail and focusing on what is important at the given moment. Behind the camera is the artist working with light, distribution of tone and colour, size relationships, and a myriad of detail. He attempts to give us an organised and meaningful glimpse at the real world through the picture recorded with the camera. The 3D artist shares with the painter and photographer a common type of experience and a common art vocabulary, but also uses concepts and tools specific to the 3D computer medium. Working with light and colour has a different logic in the digital medium than it has in real life, in painting, or in photography and film. However, the experience coming from these older and better-known media is very helpful.

From the close interconnections established in the process of remediation between the medium of 3D computer graphics and the older media, it becomes apparent why we are often inclined to talk about photorealism rather than realism as an evaluation criterion of the 3D virtual environments. Trying to operate with the means of a medium and emulate its output into a different medium will naturally result in a series of inconsistencies. This might be one of the reasons for which Michael Greenhalgh will always find the photorealistic quality of images produced with a photo camera to be superior to the attempts at photorealistic images rendered from 3D programs.

There are some significant examples to demonstrate that even in the early days of 3D technology artists and architects have been able to render excellent photorealistic images from digital reconstructions of architecture. I mention here Kent Larson's 3D reconstructions of Louis Kahn's unbuilt architecture, and Takehico Nagakura's 3D visualisation during design stages of the Gushikawa Orchid Center. As 3D computer graphics mature, real-time interactivity and immersion become more prevalent features. These give the specific dynamic character of the new medium and are not to be found in photography, film, and traditional art.

For example, Virtual Reality applications based on CAVE and similar systems, are meant to create the illusion of full immersion in the virtual space. Such systems attempt to induce the feeling that the user can actually move around in the computer generated environment, and while the movement happens the environment, as seen by the user, changes in accordance with the new view points assumed in the space at every given moment. The natural integration of the user within such environments requires working with the entire human perception system and not only with visual and auditory perception. The surface quality and the hardness and softness of objects are not only seen, but can also be felt through the sense of touch, using specialised haptic interfaces.

It is not my purpose to describe such applications accurately or in any detail. I only want to emphasise that photorealism is a restrictive and unsatisfactory criterion in evaluating the quality achieved in emulating the real world inside Virtual Reality environments. The illusion of the physical world as we try to create in such environments must engage all five senses and photorealism is addressing preferentially the visual perception. As we step from photorealism to realism in the sense used in this article, we move closer to the specific core of 3D computer graphics applications. ■

More at www.viznet.ac.uk/3dvisa

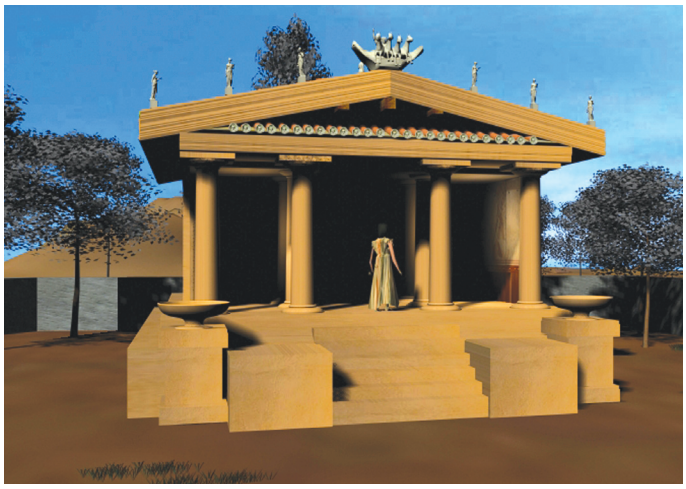
ILLUSIONS OF VIRTUAL REALITY
by Hanna Buczyńska-Garewicz

The experience of a moment of time or of a fragment of space is essentially an act of understanding in the human sense. Our temporal and spatial experience is never simply given as a pure sensual perception (vision, touch, sound, etc.) but its sensual aspect is always dominated by intellectual and emotional meanings. In other words, the sensual is conveying the spiritual. Moreover, in our perception of the time past our imagination or empathy is frequently at work. We see and feel more than is really present: in a magical way, due to the ability of emphatic understanding the non-present is presencing itself as well. This presencing of the non-present is originated by an observer, never by the physical thing itself. Without our 'colouring' by the emphatic historical understanding it has no spiritual content at all. The greatest pleasure of travel in territories with a long and rich history consists of the emphatic insights into something which is physically absent and can be experienced only due to our spiritual ability. Empathy brings back, i.e. is presencing, something absent.

The new technologies of computer simulation and the use of 3D visualisation help us to recreate the past of places lost. Thus the illusion is born that the computer can 'visualise the invisible'. Can it really? Or,

more precisely, what can be visualised and what cannot? What are the limitations of 3D from the point of view of human experience of time and space? Here are some sceptical notions regarding the utilisation of 3D visualisation.

Certainly, the achievements of this technology are impressive. And the computer modelling will get better. However, basic philosophical problems concerning virtual reconstruction cannot be overcome and solved through technical improvements. My doubting deals with the devastation (sic!) of human historical experience which is brought by this new visualisation. The visit to the ruins of Forum Romanum and the emphatic experience of the real place (now only ruins) is cognitively and emotionally more fruitful than the vision of the possibly best computer model of the presumably 'original and past' shape of the place. The virtual reality constituted by computer pretends to be 'the reality as it truly was'. So, illusion replaces reality. My objections to the numerous abuses (not use, but abuse) of the 3D visualisations of cultural historical heritage are against the pretentious claim that the model is (or can be) a faithful and complete copy of a no longer existing reality, and the impoverishment of human experience of time and space by an attempt to 'visualise the invisible'. *Re-create* stays in opposition to *interpret* or to *understand*. In terms of romantic enjoyment of ruins it means to replace the still real ruin by a newly constructed product. This product is supposed to be 'better' than the surviving original fragment (a ruin) because it offers a totality and leaves no uncertainty. There are two hidden presumptions taken for granted in recreation of historic spaces. First, that the totality has a higher value than a fragment. And second, that certainty with no gap left for doubt is needed and welcome.



Digital reconstruction of an Etruscan temple at Cerveteri
© Cerveteri Reborn Project

3D visualisation pretends to recreate historical spaces. The project Cerveteri Reborn speaks about 'making a virtual entity believable and perceived as objective'. In other words, it intends to present its own creation (computer model), which is only an interpretation, as a 'true reality'. This is a false claim. It constitutes an illusion that the past in its totality can be brought back, that the invisible – the no longer present past – can become again present and alive due to visualisation; that it can be 'reborn' technologically. A model is presented 'as if' the real Cerveteri. Certainly, there is nothing wrong with the attempts to reconstruct. But false and illusive is the claim that reconstruction can replace the real reality, that Cerveteri can be 'reborn'. There are at least two main arguments here. Technological tools are mediating in the process and they make all the process of recreation only a case of interpretation, i.e. one of many possible presentations, not certain and not absolute. Second, the space of human culture is not only a purely physical phenomenon, but this is a lived space with all its spiritual (cognitive and emotional) meanings and this aspect of it is missed in the 'reborn Cerveteri'.

The digital reconstruction does not mean bringing closer to us the historical space but, by eliminating a distance between the past and the present, means annihilating the past. So, 3D visualisation, practically useful because it simplifies the past, brings with itself also some cultural dangers.

In contemporary philosophy it was the school of phenomenology – Husserl and Heidegger – who elucidated the sense of lived time and space as different from, but not contradictory to, physical concepts. Their analyses of conceptual problems of modernity are as well very helpful for understanding some present, postmodern, questions. The rich and broad phenomenological analysis of diversified plurality of human acts of mind, in which space and time experience is given, provides good lenses to see many problems related to computer science. And for 3D visualisation of the past the works of Dilthey and his notions on historical understanding and empathy may be very helpful. Phenomenology has the theoretical tools to put the sense of virtual reality in a broader perspective. ■

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Featured 3D Project

VIRTUAL WORLDS, REAL LEARNING?
Education in Second Life *by Andy Powell*

At the beginning of 2007 the Eduserv Foundation, a UK self-funding charity with the mission to realise the benefits of ICT for learning and research, announced its annual call for research grants. Eduserv asked for bids in three areas, one of which was the teaching and

learning opportunities offered by 3D virtual worlds such as Second Life. Of the 96 bids received, 92 were in the area of 3D virtual worlds. It was obvious that we had tapped into something of significant interest to the academic community in the UK.

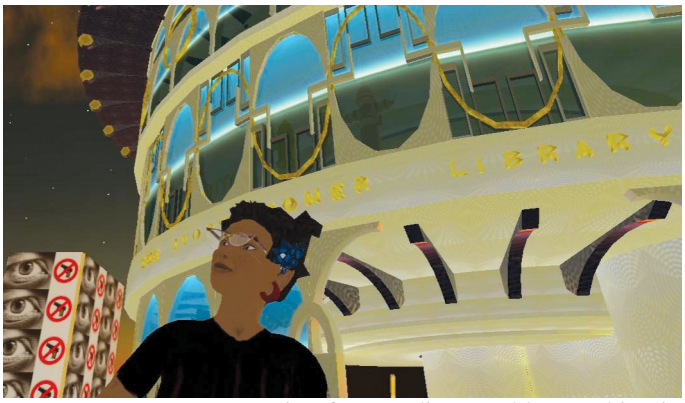
Given the obvious interest in the use of 3D virtual worlds within the education community, the Eduserv annual symposium in 2007 focused on that topic. *Virtual worlds, real learning*? took place at the Congress Centre in London on 10th May, attracting around 130 delegates to the real-world event, with about 75 people attending in three virtual venues in Second Life.

Although billed as focusing generically on 3D virtual worlds, the event concentrated primarily on Second Life. The day started with Jim Purbrick from Linden Lab (the makers of Second Life) and included Roo Reynolds from IBM, Hamish Macleod from Edinburgh University, Gilly Salmon from Leicester University and Joanna Scott from the Nature Publishing Group. Finally, there was a more sceptical opinion on Second Life given by Stephen Downes from the National Research Council of Canada. The event finished with a Panel Session including all the speakers and Sara de Freitas from Birkbeck College, London, who has recently completed a study on game-based learning. The symposium made delegates more aware of the capabilities of 3D virtual worlds such as Second Life in education.

Eduserv funded four projects, three of which are directly concerned with using Second Life to support learning. The forth project is primarily about the use of Web 2.0 approaches to building social networks in the area of computer modelling but offers significant possibilities for embedding those models within Second Life at some point in the future.

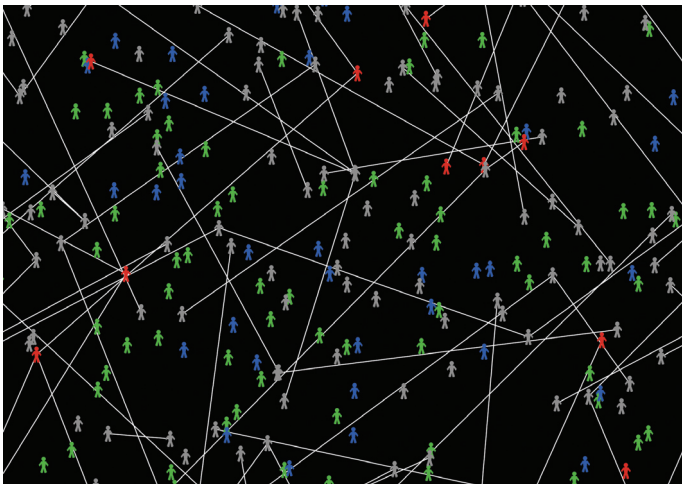
SLEUTH – Second Life Educational Undertakings in Theatre History, is a 24 month project, led by Richard Beacham of the King's Visualisation Lab, King's College London. It will construct 20 historic theatres in Second Life, creating an extensive, content-rich range of research-based virtual environments, and generating highly innovative, interactive teaching and learning resources. The project will combine the pedagogical, research, technical and methodological expertise of a group of national and international leaders in their fields, including the Higher Education Subject Centres for English, and for Dance, Drama and Music, as well as members of the communities that they serve.

Learning from Online Worlds; Teaching in Second Life, a 12 month project led by Diane Carr of the London Knowledge Lab, will research and theorise learning in two online social worlds, World of Warcraft and Second Life. The project will use this theory to develop practical recommendations for learning and teaching, and test these by teaching courses in Second Life.



Learning from Online Worlds; Teaching in Second Life: Outside the Ivory Tower of the Prim.

Online Learning with Immersive Virtual Environments using Sloodle, is a 12 month project, led by Dan Livingstone (University of Paisley) and involving Jeremy Kemp (San Jose State University). It will research and develop pedagogical theories relevant to multi-user 3D virtual worlds and use these to inform and lead the development of Sloodle and to support the growing community of educators using 3D virtual worlds.



A model of vaccinations built with the BehaviourComposer. © Ken Kahn

The forth project, Modelling4All, is concerned with the web services to enable non-programmers to collaboratively build and analyse computer models. Computer modelling is playing an increasingly important role in fields as varied as sociology, epidemiology, zoology, economics, archaeology, ecology, climate, and engineering. This project, led by Ken Kahn of the University of Oxford Computing Services, will attempt to make such modelling more widely accessible by developing easy to use Web 2.0 services for building, exploring and analysing models, encouraging the development of an online community where models and model components are shared, tagged, discussed, organised, and linked to other resources. Furthermore, the project will explore the possibilities of providing an immersive first-hand experience of the execution of models within Second Life.

It is clear that we have a long way to go in understanding the issues that surround the use of 3D virtual

worlds in education. The Eduserv Foundation sees Second Life as a valuable experimental test-bed for moving our understanding forward. It is not yet clear that Second Life will necessarily be the solution in the longer term, nor whether it is sensible to tie our institutional strategies too firmly to the current instantiations of these kinds of technologies. However, it does seem sensible for institutions to get some practical experience of what virtual worlds have to offer.

These are complex issues, well beyond the scope of a single symposium or a small number of research projects. Questions such as: 'What kinds of pedagogies work best in Second Life?' and 'What kinds of people tend to like Second Life?', will take time to answer. We hope that the meetings, projects and other Second Life activities supported by the Eduserv Foundation will go some way to help finding some of the answers in this area. ■

More at www.viznet.ac.uk/3dvisa

NEWS AND REVIEWS

3D Visualisation at EVA'07

A review by Graeme Earl

The *Electronic Information, the Visual Arts and Beyond* London conference was held at the London College of Communication on 9-13 July. EVA'07 provided a stimulating mixture for practitioners, academics and others from across the arts and the humanities, and indeed otherwise dispossessed members of the electronic cognoscenti. Differences between the many and varied groups represented could perhaps best be summarised by Gregory Sporton in his definition of *nogs* and *sogs*, terms derived from a stay at the University of Illinois and defining the distinction between those with access to resources (the *nogs* – those in the science faculty North of Green Street) and those without (the *sogs* – those working in the arts and humanities to the South). The conference demonstrated that as far as there is any 'ours', ours is a research environment fraught with variable access, variable focus and in many cases an indeterminate future. If we envisage an interdisciplinary environment to be one in which the best of various talents are combined and creatively intermingled then projects such as CSAGE, AMUC and work by Kia Ng demonstrated this in spades.

EVA London incorporated six separate workshops, addressing topics such as social networking within museums, three-dimensional modelling, and the ethics of digital image manipulation in the context of cultural heritage. The JISC and Arts and Humanities e-Science Support Centre-led workshop addressed new directions in e-Science and visual perceptions. A debate here on standards, prompted by a discussion of the London Charter brought to bear the considerable variability underlying our attempts at integration. Perhaps appropriately, when the issue of creative control and the authenticity of a given artistic or cultural heritage product was raised the audience was divided. What we do with our digital products, and indeed whether we should do anything with them for the long term, are not the clear cut issues one might surmise.

Elsewhere in the conference programme the breadth of digital visualisation strategies employed within the visual arts and beyond was made clear, together with their attendant epistemological and practical considerations. In papers of a more technological focus we were presented with the potential for three-dimensional representation of painted geometry and its possibilities for enhanced artistic interpretation and appreciation. In turn DiPaola presented a novel take on non photo-realistic rendering technologies employing the portrait painter's workflow within a computational system to great effect. EVA thus provided a variable focus on what is at times the daunting variety of digital media practice and outlined routes for collaboration and debate, and points of shared interest. ■

More at www.viznet.ac.uk/3dvisa

3DVisA Student Award 2007

Call for submissions

This award for an essay on an innovative application of 3D computer graphics in any area of study in the Arts and Humanities, is open to an undergraduate, postgraduate or Ph.D. student currently registered in the UK. The essay must be submitted by 1st October 2007. Further details at *www.viznet.ac.uk/3dvisa*

CONSULT The London Charter for the Use of 3D Visualisation in the Research and Communication of Cultural Heritage, *www.londoncharter.org*

COMMENT on the 3DVisA Report on the Needs of the 3D Community, *www.viznet.ac.uk/3dvisa*

CONTRIBUTE to 3DVisA resources. Submissions of academic papers and profiles of projects that involve 3D visualisation are invited.
Please contact anna.bentkowska@kcl.ac.uk for further details.

JOIN 3DVisA at *www.jiscmail.ac.uk/lists/visa-3d.html*

Who's Who in this Issue

Hanna Buczyńska-Garewicz is Professor Emerita of Philosophy at the Holy Cross College, Worcester, MA, USA; formerly at the University of New Mexico, University of Warsaw and the Polish Academy. She published extensively in the area of philosophy and semiotics. Several of her books are in second edition. Two recent ones are on the metaphysics of time (Universitas, 2003) and phenomenology of space (Universitas, 2006). Regrettably, few of her texts are available in English.

Graeme Earl Ph.D., is a Lecturer in the Archaeological Computing Research Group at the University of Southampton. His research interests are in computational applications to archaeological practice. His research explores the potential for 3D archaeological data capture, modelling, analysis and multimedia representation strategies. This work is currently focused on a survey and excavation at Portus, the ancient Port of Rome, and on the urban and rural Roman landscapes of southern Spain.

Andy Powell is Head of Development at the Eduserv Foundation, UK; previously at the University of Bath. His primary areas of interest include metadata, repositories and resource discovery; access and identity management; service architectures and Web 2.0; e-learning, e-portfolios and the use of 3D virtual worlds such as Second Life in education. He was the principle technical architect of the JISC Information Environment. He has been active in the Dublin Core Metadata Initiative for a number of years and is a member of the DC Advisory Board.

Maria Sifniotis is a research student at the Centre for Very-Large-Scale Integration (VLSI) and Computer Graphics, University of Sussex, UK. Her research interests focus on archaeological 3D visualisation and alternative reconstructions. Her thesis is concerned with the ways of representing archaeological uncertainty using possibility theory and 3D information visualisation techniques. She loves playing computer games and shooting virtually anything that moves!

Daniela Sirbu is an Associate Professor at the University of Lethbridge, Department of New Media, Faculty of Fine Arts, where she teaches Computer Graphics. She is a principal investigator for two projects: I-HEARD (Immersive Hybrid Environments for Architectural Research and Design) and MARVIS (Motion Analysis and Representation in Virtual Interactive Spaces), mainly funded by the Canada Foundation for Innovation. As an Artech Digital Entertainments artist she worked on contracts with Hasbro Interactive, Lucas Arts, Infogrames and Sony Interactive, and has credits on Star Wars Monopoly and other computer games.

URLs in this Issue

Eduserv *www.eduserv.org.uk*
Learning from Online Worlds; Teaching in Second Life *http://learningfromsocialworlds.wordpress.com/*
Learning in Immersive Worlds. A Review of Game-Based Learning, JISC e-Learning Programme Report by Sara de Freitas, *www.jisc.ac.uk/media/documents/programmes/elearning_innovation/gaming%20report_v3.3.pdf*
London Charter *www.londoncharter.org*
Modelling4All *http://modelling4all.wordpress.com/*
Second Life *www.secondlife.com*
SLEUTH Second Life Educational Undertakings in Theatre History
www.english.heacademy.ac.uk/explore/resources/technology/sims/index.php
Sloodle Learning System for Virtual Environments *www.sloodle.com*
VISA-3D List *www.jiscmail.ac.uk*

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