FROM ABSTRACT DATA MAPPING TO 3D PHOTOREALISM: UNDERSTANDING EMERGING INTERSECTIONS IN VISUALISATION PRACTICES AND TECHNIQUES

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Building bridges between computer modelling and simulation and games and virtual worlds communities

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The VizNet group includes academics representing very varied aspects of visualisation from games technologies to database management systems to large GIS systems. In preparing this paper an acknowledgement of the key challenge lay in trying to position work about virtual spaces with visualisation work being undertaken to help provide analysis of large datasets of information, e.g. GIS systems. That is, the gap between games and virtual world technologies and simulation and computer modelling was perhaps more substantial in practice than it was in theory. At face value the link between the groups may be tenuous, but upon consideration I realised that there was clearly a need to provide a bridge between these technologies and applications, not only because of the educational benefits, but also because of the research benefits.

The first point of bridging between the areas perhaps centres upon two shared challenges, how to better understand and conceptualise information in relation to human processes and how to understand and conceptualise virtual spaces in relation to the physical environment. For the purposes of this short paper I am proposing that we consider these two challenges together and use the challenge to consider how bridges between technologies can be best supported conceptually at least.

In common between these groups representing computer modelling and simulation groups and games development and design is a need to meet a key human challenge, the challenge of information (how to filter it, how to store it and how to use it (and model it) to support varied human activities). The notion of information is one addressed in my doctoral thesis, which focused upon an epistemology – an approach to information including the SAPPO model which outlined the need for Storage, Acquisition, Provision, Preservation and Organisation of information (de Freitas, 2001). The thesis argued that all effective information systems needed to invoke the five stages of the model throughout its evolution and that all the stages were mapped against human processes, which the system in turn mediates.

The key challenge before us centres upon the 'problem of information', that is that information as a building block of all human activity is a kind of interface to human activity and therefore is in constant flux, can be unpredictable, but can also enrich greatly our understanding of ourselves - and the worlds in which we inhabit.

Virtual spaces offer a new twist on our understanding of our own information spaces, and allow a 'doubling' of reality, a replication of reality and a re-organisation of physical spaces. The relationship between abstract and physical space is also not a new one, but virtual spaces allow us to 'play' and consider aspects of what we do both in the lived physical world and within the more abstract (and imagined) spaces.

To help us to consider this I will first give an example from practice. The example is the Triage Sieve Trainer being developed as a games simulation – or 'serious game'. The game simulation mocks up a busy urban street, which has just staged a bomb explosion with high

levels of fidelity. The simulation is realistic of the physical environment the victims of the explosion lie around, and the trainee has the task of sorting through the virtual environment, sorting victims according to urgency of medical assistance. See Figure 1. The Triage Sieve is part of training regimes for medics, and will be used in a blended learning solution with face-to-face guidance. The application will become embedded into a training day that will include assessment of skills. The training simulation, indeed any simulation, is based upon analysing current human practices and then mapping these into a virtual environment. The trainee may move around freely in the space, and select the order of sieving the victims according to their own prioritisation. Timing of completing the exercise and correct sorting all produce a matrix of data that allows the trainee to hone their skills. Early indications from research supporting another demonstrator (on infection control in hospitals) and from the general literature are revealing the potential of simulation games to support shorter training times, greater motivation and engagement of the trainee and greater impact upon behavioural change (e.g. Hays, 2005).

The benefits of the Triage Sieve Trainer may be found in the development processes. The human processes as observed, captured and mapped onto virtual spaces can be explored in the context of the simulation, and the open-ended aspect of virtual spaces gives us potential for learner autonomy. Simulating aspects of behaviour in any environment allows for reflection, but simulating in a virtual space gives another dimension that is greater freedom for exploring related or incidental aspects of the environment.

As the Triage Sieve Trainer example shows greater fidelity of the virtual environment can provide a much more lifelike environment for training, and this can aid learning transfer from the virtual to the real environment, as well as accelerating learning, reducing costs for training particularly with large cohorts of learners and providing a more autonomous – or 'personalized' experience (de Freitas, 2006; Delange, 2001).

A key challenge arising for the group here today is to consider how we can from our different disciplinary perspectives come together to build more effective systems for learning with visualization and games tools and platforms, and importantly to consider how we can build bridges between the technologies and tools we have already developed to facilitate a way of working together. There are clear considerations with using visualisations as rich and diverse as those represented in the work being shown here today, such as making the outputs available to user communities, finding effective mechanisms for distributed and shared development, identifying how best to utilise new technologies to support educational activities and producing conceptual models for assisting those processes. Work at the Serious Games Institute is committed to addressing these considerations, and to providing ways to focus cross-disciplinary work and networks, through building partnerships and networks engaging the development and user communities. To achieve this we are developing participatory design methods, frameworks and undertaking studies to measure and validate efficacy of new techniques, interfaces and development tools.

The match between understanding human processes and our uses of physical, abstract and virtual space provides excellent scope for developing bridges between different technologies, but merits a more participatory approach to design based upon learner profiling and modelling (de Freitas & Oliver, 2006). Without fully understanding the processes at work it will be increasingly difficult to develop and adapt existing technologies to useful purpose. If we are to develop useful technologies it will also be important to integrate existing functionality. Development of information systems once again follows the patterns of evolving human

processes, the closer we can match the human processes and activities the more effective our systems will ultimately become.

Figure 1: Screen shot from Triage Trainer. Copyright: TruSim.

References

de Freitas, S. (2001) Towards the global library. Completed thesis. Falmer. University of Sussex.

de Freitas, S. (2006). Learning in Immersive Worlds. Bristol. JISC. Last accessed online at: www.jisc.ac.uk_eli_outcomes.html.

de Freitas, S., Oliver, M. (2006). How can exploratory learning with games and simulations within the curriculum be most effectively evaluated? Computers and Education, Special Issue. 46 (2006) 249-264.

Delange, F. (2001). Validating small arms simulation. Military training and simulation news 6:31-34.

Hays, R. T. (2005). The effectiveness of instructional games: A literature review and discussion. Technical Report. Naval Air Warfare Center Training Systems Division. Orlando, Florida.

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