

**THE NEW FACE OF EMERGENCY PREPAREDNESS TRAINING:
USING SECOND LIFE TO SAVE FIRST LIVES**

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ABSTRACT

A team from the University of Illinois at Chicago, School of Public Health CADE (Center for the Advancement of Distance Education) has created a training archipelago called Public Health Preparedness Island. The island chain offers a variety of urban and rural environments with customized buildings, objects, and scripting tailored to emergency scenarios ranging from pandemic influenza to bio-terrorism and dirty bombs. Training exercises began in late 2006. Current training is primarily in the form of facilitated exercises allowing federal, state, and local workers as well as emergency volunteers to conduct a wide variety of virtual operations in support of Planning, Training, and Evaluation. There are terrific advantages in using Second Life to conduct many exercises virtually instead of live or in other traditional training modes (like tabletops). We predict that within two years a large portion of Emergency Preparedness Training exercises will be conducted virtually.



-Bird's-eye of a Quarantine Exercise on PHP Island

PROJECT SUMMARY

The challenge was to develop training environments that could be used for a wide array of emergency preparedness training exercises and be rapidly altered to reflect real-time decision-making. At the same time, we developed curriculum and techniques for facilitating exercises that take advantage of the unique characteristics of virtual training. Lastly, we created a system for watching and recording virtual exercises that allows exercise participants to be active SL operators or passive webcast viewers. Custom scripting allows us to shoot cinema-quality movies of the exercises and save layouts of buildings and objects for instant recall. Assets created in this way become part of a jurisdiction's emergency inventory for both pre-event and just-in-time training.

We drew heavily on lessons learned from military applications, but built the core of the system on preparedness training – especially lessons learned from actual events (like Hurricane Katrina) and live exercises (like Topoff). The training system integrates NIMS (the National Incident Management System) and ICS (Incident Command System) structures and follows HSEEP (Homeland Security Exercise and Evaluation Program) protocols. The exercises themselves are designed around Homeland Security and CDC compliance objectives.

The primary island chain has expansion bridges for jurisdictions to own their own training islands and link with PHP Island. All islands are restricted access.

WHY SECOND LIFE?

In 2005, CADE brought together developers and facilitators with experience in modern learning technologies to create a new kind of preparedness training that could take advantage of “state-of-the-shelf” products. One area that held particular potential was virtual environments. A number of CADE’s 70+ employees had previous experience with virtual environments for military and industrial application. Experimentation began in earnest, using a variety of virtual engines and, while many had unique features or advanced fidelity, few offered cost and performance suitable to the Preparedness community.

When Second Life entered its 2006 deployment, its function and fidelity reached a benchmark that made it an excellent choice for live training exercises. Some of the advantages:

- Suitable function and fidelity for procedural, decision-making, and critical-thinking training (limited communications training – changing now with voice, not suitable for manual dexterity-based training),
- Potential for custom scripting to support training algorithms. (i.e. Res-boxes, Bots, Control Panels, and Smart Objects),
- Easy access, installation, technical support, and customer service,
- A broad population base of participants suitable for volunteering, role-playing, and even expert participation,
- Cost-effective compared to many Emergency Preparedness Alternatives.

One of the greatest hurdles was and remains overcoming bias for more traditional Emergency Preparedness Training practices. Let’s compare with two of the most common traditional alternatives.

Traditional Alternative: Live Exercises

Since 9/11 there has been a dramatic increase in the number of live exercises run for Emergency Preparedness Training. This is a wise and necessary practice but there are some drawbacks that virtual environment training can solve.

COST – The cost of live exercises can be very high. Topoff 2 (Top Officials Live Exercise) cost 16 million dollars for 4 days of training

involving 8500 participants from 25 federal agencies, 2 states, 2 major cities (Seattle and Chicago) and Canada. This was no small undertaking. The cost of travel, locations, developing and running exercises as well as the cost of staff days for training can be enormous. And even though the broader benefits of Topoff go well beyond the training goals, the exercise suffers from the same inherent cost-benefit problems as other live exercises in Emergency Preparedness.

NEGATIVE ECONOMY OF SCALE –

Because the nature of disaster is to affect a mass population, emergency response is aimed at stretching the work of a few trained responders to the benefit of the largest population. So live training requires a large number of volunteers to train a small cadre of responders. Most of the participants in live exercises are volunteers representing the mass public. In the virtual environment, volunteers do not need to be brought in by the busload in order to create an effective exercise.

CROSS TRAINING – Many emergency responders need to be trained in multiple roles for preparedness. It is likely that the scale of an event will draw the same pool of responders into different positions depending on need. Live exercises allow participants to immerse in one role. But to cross-train, repeating the live exercise so that participants can play musical chairs doesn’t make sense. A virtual exercise can be replayed ad infinitum with participants performing any role required.

LIVE MEASURES/VIRTUAL INJECTS – Live exercises are so costly and rare that they are usually tasked with too many objectives. The first is the balance between pre-event training and just-in-time training. Do participants show up already knowing procedure or are they learning as they go within the exercise (just-in-time)? The second is the use of the exercise as a measure of performance versus use as training for live injects. Injects are challenges artificially introduced into an exercise to prompt reactions.

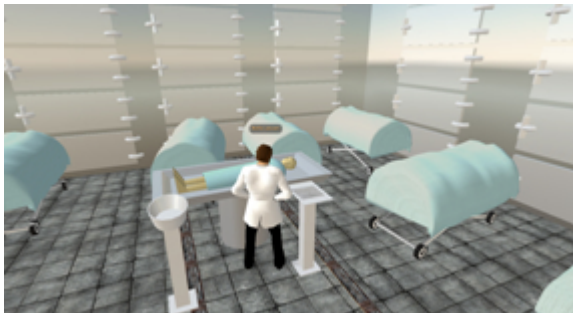
The cross purposes of these two goals is always a paradox. Exercises that fill a limited time frame with an unrealistically high number of artificial injects for training (and interest) do not yield a realistic performance measure. CADE has addressed this by recommending that live exercises focus on setting performance measures and identifying problems. Save injects for

virtual exercises. Live drills tend to have enough real challenges of their own and live injects usually present uncomfortable acting followed by an uncomfortable “I guess I’d better play along” treatment. In the virtual environment role-playing is much easier (almost automatic) since avatars are already separate incarnations.

ABSTRACTION – And picking up on this separation, one good rule for implementing any technology is to turn limitations into opportunities. Since avatars are at least one level abstracted from you, they can never actually be you. And while this sets an upper limit on immersion, it opens a world of possibilities. It is this abstraction that allows safe training involving lethal objects, like toxic gas or dirty bombs. It is also this abstraction that allows role-playing to actually be easier in the virtual world than in a live exercise.

Abstraction also allows for a certain thoughtful perspective. The distractions of a live exercise can be eliminated in the virtual environment. Emotions, which can heat up rapidly, can be slowed in the virtual environment.

This is a psychological distinction we take advantage of in our violence prevention training. Conflict in live exercises has a certain edge to it, which can be a powerful training tool - but not always. Sometimes it is better to practice behaviors with a kind of psychological distance so that you can unpack the experience of the moment.



- Morgue facing surge capacity exercise on PHP Island

This same psychological distancing is also an advantage when practicing exercises like mass casualty processing. The dead or injured can be emotionally charged subjects. And while a live exercise tossing around body bags filled with potatoes or sand may give you a better sense of fatigue, virtual body bags can actually be easier to suspend disbelief.



- Airport Security exercise using mannequins on PHP Island

LOCATION – When was the last time you shut down a major airport for training? How about the financial center of a major city? Perhaps the Superbowl? Needless to say, anyplace can be modelled virtually. And the most obvious advantage of the virtual environment is that you have complete control over it. For many locations, virtual exercises are the only way the preparedness training will ever occur.

All of these comparisons are meant not only to distinguish advantages of each mode of training, but also to establish a relationship between live and virtual exercises that can benefit each. When used as preparation for live exercises, virtual training can be, to quote one recent participant, “invaluable.”

Traditional Alternative: Tabletop Exercises

Virtual Environments are to traditional paper tabletops as television is to crossword puzzles. To be fair once again, traditional tabletops have a lot to recommend them. They can be highly effective and, like radio, offer the advantages of theatre of the mind. But after that, they tend to be limited in graphic visualization (often resorting to matchbox cars and paper cut-outs). More innovative tabletops have included computers as visualization tools. But even electronic tabletops (desktop exercises) tend to function on the level of simple PowerPoint presentations and phone conferencing. Virtual environments offer a level of immersion and graphic visualization that leaves traditional tabletops far behind. When engagement is the measure, there is no contest – virtual environments can be an incredibly effective advantage. Comparisons between tabletops and virtual environments are most likely just points on a continuum. The future of tabletops is already here and this project represents that genesis.

As the genesis continues, during which tables and walls themselves will become interactive tools, the comparative advantages to watch are:

ADAPTABILITY – Virtual environments, because they have an appearance of fidelity, create an illusion of substance where there is only computer code. That code is easy to change on the fly. Virtual environments will increasingly be able to adapt in real-time to creative changes in concepts and ideas during training.

IMPROVISATION – The human element is an essential ingredient in training. As the virtual space itself improves, the means of inhabiting that space will improve as well. At the time of this paper, it is too early to know the full impact of voice to Second Life, but examples from other voice-enabled virtual environments indicate that the innovation is just beginning.

The human ability to improvise will blossom in new ways. Expect greater creativity and the development of tools and techniques for expression and learning. Virtual acting or role-playing may become a career choice. Likewise, virtual observation and consulting will develop as a market. Lookout for virtual anthropology (homo avatars?).

COLLABORATION – The power of virtual environments to bring people together for unique interactions has already been realized for a small sample. Wait until everyone incorporates virtual environment collaboration as tool. The same 16 million dollars used to train people in 2 states for 4 days will be able to fund simultaneous, real-time training in all 50 states as well as other countries at all levels of the National Incident Management System...

DOCUMENTATION – ...and record the entire experience for analysis and evaluation. In fact, we are already using the stills and movies captured from virtual training to enhance video training, papers such as this one, and even to better illustrate actual Emergency Situation Manuals.

FIDELITY – Fidelity, the measure of realism, deserves special discussion because it is the one area where more expensive and advanced virtual environments have already proven themselves. Fidelity has been the holy grail of virtual research since the beginning. And the goal of achieving visual fidelity to equal the resolving power of the human eye has been reached. And while that level of fidelity is not yet available in Second Life, one day it will be. But it begs the

question: How much fidelity is needed for effective training?

And the answer, according to military and academic sources, is not that much. In fact, too much fidelity can distract from training. So while the future will undoubtedly involve amazing advances in virtual experiences, we are already at a level where Second Life environments are super-tools for training.



- Gymnasium SuperPOD (Point of Dispensing) Exercise

IN CONCLUSION

Public Health Preparedness Island is thriving as a training space. CADE highly recommends using virtual environments as a key component in any emergency preparedness training system. In conjunction with traditional training methods, Preparedness Island has filled many gaps in existing training plans. We are currently deploying our SL Island and virtual training systems for several jurisdictions in the U.S. We have also demonstrated it for the CDC and feel strongly that virtual environment training is on the verge of becoming an essential tool in the preparedness arsenal. A quick reference to technology adoption and diffusion modelling shows that if the right stakeholders are reached, the next two years will see virtual training become standard practice.

ABOUT CADE

The Center for the Advancement of Distance Education (CADE) is a self-supporting unit within the School of Public Health at the University of Illinois at Chicago. CADE brings innovative technologies, such as games and simulations, to a wide audience both in the field of public health and beyond. CADE specializes in unique, integrated, user-centric solutions. For more about CADE's work in virtual worlds, see <http://www.advancedrealities.com>.