The Application of Live, Virtual and Constructive Simulation to Training for Operations Other Than War

Lieutenant Colonel Michael Kelly, AM: Operations and International Law – Defence Legal Office
Major Mark Phillips: Education & Training Technology Branch, Headquarters Training Command – Australian Army

Summary: There has been much recent media attention on the failings of the Canadian, Belgian and Italian contingents in Somalia. These incidents, combined with the coverage of the conduct of operations against the warlord Aideed in Mogadishu in 1994, have highlighted the consequences of not properly preparing troops and commanders to deal with complex operations. These complexities can include dealing with civilians, applying graduated levels of force, handling detainees and being forced to carefully discriminate in targeting when applying lethal force in populated areas.

To date the Australian Defence Force (ADF) has managed this problem by outdoor, scenario based practical training given to the troops that deployed to Somalia and Rwanda. “There was no doubt as to the benefit to the soldiers of this training, confirmed in Post Operation Reports.” (17) The training falls into the category of live simulation. It continues to be given to troops of the RDF but only very sporadically or not at all to other Army formations and units. It is difficult to achieve the desired level of training Army wide given the logistic, financial and coordination factors involved. It is also impractical to give such training to individuals who are deploying to join or supplement overseas operations.

There is also a need to add greater realism to the operations law and rules of engagement/orders for opening fire (ROE/OFOF) training currently being given to commanders in the sense of directly applying this to the planning and conduct of operations. It is therefore proposed that an alternative form of training be developed utilising computer generated options, specifically the virtual and constructive simulation mediums. At the soldier level this would include a virtual reality style construct that could be used regardless of the numbers involved in any location and with no hindrance by logistic or weather considerations. This is intended to add another dimension through greater realism to the training environment and reveal incidental factors that could relate not only to legal aspects but possibly psychological and medical.

The virtual reality concept would include testing soldiers in the understanding and application of ROE/OFOF; the graduated level of force regime on complex operations; and the employment of non-lethal weapons and discrimination of targets (ie between combatants and civilians, and protected objects under international law). Also addressed would be problems of conventional operations in populated areas under normal law of armed conflict conditions. Such training would be an efficient and cost effective way of ensuring that all soldiers and commanders are mentally equipped with the cognitive framework necessary to deal with complex operations. Such a framework will result in a reduction in the hesitation or errors that could be generated on such operations.

INTRODUCTION

Experiences of recent operations have demonstrated that conventional war training provides soldiers with a solid base from which to build for any operational contingency. It has also been well illustrated, however, that this training alone is not enough for many of the more complicated scenarios. An example is provided by the court martial conviction of a US soldier for negligent homicide of a Somali where the court stated:

‘Furthermore, this (court-martial) strongly recommends to the convening authority... that the rules of engagement, in general, were not clearly stated to the soldiers, and specifically, that the use of warning shots by the Platoon Leader and Squad Leader, to halt fleeing civilians who were suspect only because they were running away, was contrary to standards of due care and shows negligence on the part of the chain of command’ (9)

The problem is that individual errors of judgement in the application of force in operations other than war (OOTW) can have far reaching deleterious effects. As COL Allard of the US Army has put it:

"A single unwise tactical move by a soldier on patrol can instantly change the character of an entire operation and, when broadcast by the ever-present media pool, can also affect strategic considerations." (2)

The obverse failure in applying ROE or Laws of Armed Conflict (LOAC) is that the soldier will hesitate unnecessarily with fatal consequences to himself or someone it his duty to protect. In a recent detailed US study it was made apparent that the main fault that was emerging in the preparation of the troops for such operations lay in an emphasis on briefings to deal with ROE and LOAC issues. (10) The study emphatically asserted that this was simply not good enough and that some form of practical training was essential. These findings were similar to those made by the Canadian...
Board of Inquiry into their operations in Somalia, which commented:

“It was stated time and time before us that when it comes to training on the ROE, briefings and lectures are insufficient. The training has to be ingrained and instinctive, so that the soldier is able to react instantly under stress with the appropriate amount of force. Several witnesses testified that the best way to achieve this implicit understanding of the ROE is through scenario-based training, where soldiers learn to make quick decisions in practical situations.” (7)

They drew heavily on the Australian experience in making this finding. The need for practical scenario based training at the soldier level has been recognised in the ADF for the last seven years and a package designed to achieve this has been in use over that period. This type of training falls into the category of live simulation.

The difficulty with what has been done in the ADF to date is that it has been ad hoc and personality driven. It has neither been systematically applied, evaluated, adjusted nor formally incorporated into training requirements. It ought also to be updated in the light of recent ADF and NATO experience. The problem with the practical scenario based training is also that it can be difficult to organise and is generally only available for rifle units. By the nature of conducting the activity it has limitations in relation to what can be simulated.

Beyond what has been experienced in the field the ADF is in the process of being equipped and trained to deal with crowd control in offshore Services Protected Evacuations and restoration of order operations. Such operations pose a unique range of restraint, force application options, systems and personnel management.

TRAINING OBJECTIVES

The individual soldier requires a thorough and unambiguous understanding of how to deal with a tense and often complex situation when on active duty. Failure to rapidly identify solutions to complex problems before escalation, whilst applying LOAC and ROE places a great deal of stress on the individual combatant as it does the commander, who must be able to anticipate the responses of the soldiers under his command.

The overall objectives for using any simulation as part of a training system to train soldiers should provide (18):

- a means of assessing soldier performance;
- a means of providing feedback to the soldier to reinforce and improve correct performance;
- a means of record keeping to allow the management of individual and collective training and identify deficiencies requiring additional training.

ENABLING TECHNOLOGIES

The eighties and nineties have seen a tremendous leap forward in computing power. So much so that the average home PC user has the equivalent of a 1970s mainframe at their disposal as well as the ability to display rendered lifelike graphics. There was a great deal of speculation in the late eighties that the 486 CPU would produce a bottleneck for computing bandwidth due to limitations in the number of transistors on a single silicon substrate.

In 1998 we are still seeing a sharp increase in computing power with limitations being present in the seek times of magnetic media (hard disks) rather than CPU and semiconductor memory speeds.

What does this mean to the simulationist and the trainer? In short it means that projections forward regarding user needs verses the estimated computing power and cost can be calculated with a high degree of certainty. More importantly, by the time:

- a thorough understanding of the training need has been acquired,
- the necessary analysis conducted to define the training system, and
- the necessary procedures required to achieve identified learning outcomes have been developed;

the technology required has matured well past the benchmark taken when the analysis started.

This was evident in November 1996 when the committee assigned to the TECHSIM Project at the Australian Army - Headquarters Training Command attempted to benchmark the technologies required to meeting the training needs of the Australian Army out to 2005. By the end of 1997 many of the technologies had reduced dramatically in cost, many new technologies were on the market and performance had increased dramatically in the short term. This implies that technology should not be applied as a limiting factor when designing a training system. Cost will tend to be the overriding limitation on the development of the system.

Live

The use of scenario based live simulations is common place and presently the preferred method of training soldiers for operations. This type of simulation is manpower intensive, however it does require the soldier to exercise most aspects of his training through interaction with his environment.

Live simulation has a place and should not be totally subsumed by efforts to replace it with technology. There are environmental, psychological and physical factors that just cannot be simulated effectively with modern simulation systems (yet).
The soldier will get limited exposure to this type of training and will usually receive it just prior to deployment (Just In Time – JIT). It will sometimes be difficult to simulate effectively certain aspects of a situation and the relevant ROE for a particular mission, or even for generic training.

Virtual

There are a variety of definitions concerning the term virtual reality (VR), however Sestito (7) when referring to a definition proposed by Burdea describes VR as being composed of the three I’s; interaction, immersion and imagination. By using this description of VR we can extend the definition, being:

“a simulation in which computer graphics is used to create a realistic looking world. In addition, the synthesised world is not static but responds to user inputs (gestures, verbal commands, etc.”(17) to include simulations that do not involve the typical stereoscopic head mounted display (HMD). Rather we can refer to a simulation by the degrees in which the three I’s are involved, this now includes the desktop animated displays as seen in products such as the MAK Stealth and DI Guy products. These simulations are rare at present in the Australian Army.

A simulation system comprised of a synthetic entity such as DI Guy, and an instrumented weapon may if:

• used in the correct context,
• applied within defined boundary conditions, and
• measured against clearly enunciated training outcomes (derived from METL).

would be a low cost and effective use of technology.

Taking for example the case of riot control scenarios, the training doctrine currently involves making determinations as to the employment of personnel and systems based on assessments of the threat level of the crowd. The threat level is broken up into four categories to which an appropriate response regime is linked. It would be possible to design a computer generated urban environment and crowd objective, factoring in meteorological conditions, simulating varying crowd threat levels (visual and audio cues) and building on this variation to test both soldiers and commanders in the appropriate decision making regime.

Constructive

This type of simulation attempts to represent the world (or at least a portion of it) through means such as a GIS\(^2\) interface on a computer screen or screens. This type of simulation medium is in common use in the Australian Army through applications such as Janus and CombatSim and at ADF level through the application of the Joint Theatre Level Simulation (JTLS). The simulations are not presently well understood by the Army training audiences due to the infrequent access that users have to the simulation and the lack of in-depth knowledge held by the trainers in applying introductory training to interactors. Hence there is usually a gap between the user’s perception of events and the reality as defined by the mathematical models in the simulation. Training is usually restricted to “menu milking” and an understanding of the procedures necessary to make events occur at a desired time.

This understanding will improve as constructive simulations become more common in training establishments and training in the fundamentals of simulation are given at the various officer and soldier training establishments.

Constructive simulations are however excellent tools when applied correctly against training outcomes, and due care given to understanding fidelity and reality (as defined by the simulation) as a function of VV&A\(^3\).

The issue of embedded training is very relevant here. Clearly defined training outcomes and assessment criteria must be weighed carefully against the ability of the simulation to meet those requirements. For example the sensitivities required to exercise appropriate responses to an unstable political environment would be difficult to replicate consistently with a manoeuvre warfighting model such as Janus. However Janus could be used to exercise some of the command and control requirements of a particular operation.

The present focus of the Australian Army is the provision of a manoeuvre warfighting model. Clearly Janus or any of its derivatives are not capable of effectively exercising commanders and staffs in all facets of OOTW. This is also the case with conventional warfighting in relation to the realities of operating in populated areas under LOAC conditions, at least without the design of a dedicated training system and environment with a degree of offline adjudication. Systems such as SPECTRUM may hold the answer to training of both commanders and staffs in an OOTW environment.

SPECTRUM

SPECTRUM is a simulation that is second generation in terms of development. The first generation was the Variable Intensity Computerised Training System (VICTORS) which was developed in 1993 to model low to high intensity conflict. The terrain used for VICTORS was battle board based and as such was limited to its application to real world situations (lacked geo-specific

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1 Mission Essential Task List
2 Geographic Information system
3 Verification, Validation & Accreditation
Technology, by its very nature, is expensive. There are also arguments that the concept of providing a seamless continuum of simulation, from the live through to the virtual, will never fit with the training regimes for individual and collective training at the various sub-unit, unit and formation level training programs (as presently defined within the Australian Army Training System). This is in part due to the financial limitations on the acquisition of simulation and simulator systems.

Until such time as an analysis of the training requirement as it exists presently and is perceived to develop is conducted the answers to questions regarding cost effectiveness; timing for training activities and fidelity will simply be a subject for conjecture. It is not enough to acquire simulation and apply it in a template fashion to existing training regimes. The use of simulation may allow for more to be done than would have been previously possible (what if) or less, due to issues regarding fidelity or reality. However as long as quantifiable training outcomes (conditions and performance) have been defined in the statement of user requirement the distractions associated with the ‘bells and whistles’ that are frequently provided by simulation manufacturers will not adversely affect the perceived training requirements and hence outcomes.

Audio cues, visual cues and the integration of both will aid in the suspension of disbelief necessary for synthetic environments to fully immerse the trainee into realistic interactive situations.

THE TRAINING TECHNOLOGY /GAP

The perception that COTS products will arrive to solve training dilemmas is at best naïve. In fact the requirement to design and develop systems specifically aimed at meeting well-defined, quantifiable and assessable training objectives is greater than ever. The provision of embedded training into weapons systems (18) is an objective of the US Army and is still considered as a new concept with many lessons to be learned.

Embedded training as defined by Witmer & Knerr as:

“training that is provided by capabilities designed to be built into or added into operational systems to enhance and maintain the skill proficiency necessary to operate and maintain that equipment end item.” (18)

The problem with the above definition in terms of training for OOTW or factoring in LOAC is that the aforementioned materiel based approach does not adequately cater for a training system that is not materiel based. For example, we can train soldiers either individually or collectively in the use of their primary weapon system (rifle); however, this training would not ordinarily include the decision making processes required for complex operations. In this instance the system that we are training is the individual soldier or the soldier as
part of a team (weapon and communication systems inclusive). This is not to say that a weapon system trainer (simulation) could not incorporate the competencies required to operate the weapon in an operational scenario, in fact, the Weapon Training Simulation System (WTSS) could potentially to do just that. The WTSS project may provide a solution that incorporates scenario-based options for more realistic engagements. The system will however be provided without the presumption that this type of training should be conducted. It can be stated that nearly all simulations of this type are attrition based, rather than allowing for graduated levels of response. The soldier under training needs to rely on the cognitive selection process and therefore will be required to exercise restraint when under stress. The simulation must be immersive enough to permit this to happen and provide appropriate visual and audio feedback.

There is in general a very real difference between the intended design for a simulation and the application that it may be used for. We tend to find that an application is found for or adapted to a simulation rather than a top down design from the level of the training system through to the requirement for a simulation to achieve a desired learning outcome. Pongracic, Marlow and Triggs (15) stated that it was the available technology and resources that have largely determined the form and level of training that is implemented rather than behavioural learning and training models. It is clear that there is a very real need to increase the fundamental understanding of the processes associated with simulation.

RESOLUTION (GRANULARITY OF REAL WORLD SIMULATIONS)

Whilst it is recognised that simulation offers a great deal in terms of safe and cost effective training. This must be weighed against the training objectives as defined by the training authority. In theory the training objectives must come before the system used for training is conceived, otherwise the simulated training outcome may not be satisfactory when compared to other methods of conducting the same training. In practice the simulation is acquired and the converse is true. Using simulation for simulation sake is something that must be avoided. An example of this is the use of a simulation system to conduct mission rehearsal using digitised terrain that has a low resolution where high resolution and current detail is essential (ie counter-terrorist operations) or the use of a stochastic model (simulation) in order to achieve deterministic results.

In terms of the application of synthetic (not necessarily virtual) environments to the training of individual combatants it was noted by Cosby when referring to research conducted by Richbourg and Olsen (6) that a 6 percent accuracy improvement in terrain fidelity resulting from decreasing horizontal spacing from 3 metres to 1 metre would require an 88 percent cost (time, space and dollars) increase. This implies that the cost of providing geo-specific terrain at resolutions required for individual combatants would be cost prohibitive when produced on an exercise by exercise basis. In fact it is for the training analyst and the training authority to decide if geo-specific terrain is warranted in terms of the required training outcomes.

Perhaps the provision of a small number of high fidelity terrain models which clearly display ground truth are a far better alternative to a large number of low resolution geo-specific models. This in itself is worthy of an in-depth study.

Where OOTW is concerned it should not be an imperative to recreate the exact environment to operate in, however the resolution of the model should as accurately as possible depict all features natural and cultural that could impinge on the decision making process. Geo-specific terrain is rather a luxury than a necessity. Creation of the environment will be most affected by time and money rather than technological limitations.

Verification, Validation and Accreditation (VV&A)

The issue of VV&A is relevant to any discussion concerning training or analysis when referring to simulations and simulators. The difference in perceived functionality of models by the training audience compared with the actual physics and accuracy of the model can be quite substantial. The training authority is responsible for the determination of whether or not the training system or any of its components are suitable for accreditation. With a training system the importance of accreditation is squarely with the ability to achieve desired learning outcomes under known conditions and to predefined standards. These requirements may be at odds with a similar system that will be applied for analytical outcomes.

IS THERE A REQUIREMENT FOR A DEDICATED TRAINING SYSTEM FOR OOTW TRAINING?

Embedded Verses Ad hoc Training

Training in LOAC and ROE has to be thoroughly embedded into every aspect of training for conventional or OOTW operations for it to have any chance of success. Success in this training is critical and closely coupled to mission objectives. We are not currently training either our soldiers or our officers for the realities of the battlefield or peace operations as instruction, exercises and war gaming tends to focus on technical issues in a sanitised operational environment. Real life is not a fire and movement exercise at an open range. It is much more common that our troops and commanders will encounter people and property. All instruction that aims for realism should therefore factor these matters in.
The Canadian Inquiry referred to earlier stated that:

“Training in the law of armed conflict is of critical importance to effective peacekeeping: it cannot continue to be provided in an ad hoc manner. A clear responsibility centre must ensure that sufficient and effective training is conducted throughout the Canadian Forces”. (14)

Training must be systematic with respect to both LOAC and ROE. There are certain general principles that can be taught in relation to ROE that will not vary and these can be supplemented by specific-to-mission training. The key conceptual breakthrough that must be made is that LOAC and ROE are not separate factors for training in the profession of arms. They are what the profession of arms are about and are inherently embedded in the conduct of operations. Training must reflect this.

This means that ROE and LOAC training must not be founded exclusively on an intellectually based model but on an experiential one. Reference to law or printed rules is a small and largely irrelevant aspect of what must be imbied by operators. The key is for the principles to be translated into practical focus as part of the physical experience we seek to give our commanders and soldiers to prepare them for the cognitive demands of operations. The best way to achieve this is through embedding.

Ad hoc training may be necessary to supplement embedded training for specific operations and to reinforce particularly difficult concepts or play out the problems of particular scenarios.

Manoeuvre Warfare

It is important to provide commanders with a medium for training in the complexities of the management of an area of operations. Such an area of operations can include factors such as cities, towns and villages, NGOs, refugees/displaced persons, protected objects, dangerous forces, political constraints, and non-conventional enemies.

Training must not only provide commanders with the means of efficiently acquiring and dealing with targets but with target selection and determining the appropriate weapons systems to employ against particular targets. Factors that will impinge on this decision include weighing the anticipated collateral damage against the expected military advantage. Training, while seeking to ensure this process is inculcated and individuals are evaluated in its application, should also ensure that commanders are not unnecessarily fettered by misconceptions about the restrictions of LOAC. Training should also bring home the importance of the intelligence gathering and evaluation aspects to this decision making process as well as the logistical dimensions of catering for operations in a populated area against a live enemy.

OOTW

OOTW or low intensity conflict operations pose particular problems for soldiers and commanders and they must be carefully prepared for. They have in fact constituted the majority of the operational experience of the ADF since the end of World War II. The sort of problems that can be encountered are illustrated by COL Hurley the Australian battalion commander in Somalia who stated:

“Initially (the soldiers) tended to overreact because in a lot of the early training we had concentrated on crowd control a bit more than we should have and that has a fairly aggressive tone to it. After a while, though, they began to understand how their actions could trigger reactions amongst the local population and that if they kept themselves under control and took measured steps, they could control any confrontation that was developing.”(4)

The Canadian Inquiry endorsed the comment that:

“The success or failure of peacekeeping missions rests to a great degree on the local population’s perceptions of the peacekeepers, so the tactical and strategic consequences of violating the laws of war in peacekeeping missions could be greater than during combat.”(13)

In such operations our forces may face opponents that are organised factional formations, guerrilla outfits or heavily armed entrepreneurial bandit gangs. At the same time they may need to control crowds at food distribution points, to protect designated property and persons or to secure points of entry for evacuation purposes. To do these things they now have a greater array of systems and equipment. It is imperative that we devise a system of training that best simulates the confusion and parameters that will be faced in reality so that the margins for error can be reduced.

MAJ Mark Martins, author of a major study on ROE in the US Army, has written:

“Soldiers can learn to defend themselves and their units with initiative and to apply deadly force only when necessary. Clear and simple rules on the use of force can complement the learning process. Once assimilated into a soldier’s judgement, these rules can provide a base of understanding on which a larger system of contingent ROE may rest. Ground force trainers... can anticipate scenarios, design rehearsals, promote role-playing, and demand brief-backs. Consequently, trainers can condition soldiers to respond better and use force more appropriately across the entire spectrum of potential armed conflict.”(10)

It was the recommendation of the Canadian Inquiry that:

“The Chief of the Defence Force ensure that training standards and programs provide that training in (LOAC and ROE) ... be scenario-based and integrated into
training exercises, in addition to classroom instruction or briefings, to permit the practice of skills and to provide a mechanism for confirming that instructions have been fully understood.” (7)

Our own experience has demonstrated both these points clearly. “Operations in Somalia, however, highlighted what additional training should be incorporated into this model. These included urban patrolling, building search techniques and close quarter fighting, both day and night.” (19) This also suggests other fundamental conventional skills that must be refined, as a US Army paper on OOTW stated:

“Refinement of marksmanship procedures to present different sets of targets to soldiers and to force selective engagements will better prepare soldiers...Soldiers will face difficult choices in the event they must use their personnel weapons. They must be trained to think before they shoot.” (3)

The issue therefore is not whether it should be done but how best to do it. There is a cost benefit analysis that needs to be applied to any training system implementation but in this area the threshold ought to be high as the real question is, can we afford not to develop such training systems?

A PROPOSAL FOR FOR THE DESIGN OF A TRAINING SYSTEM.

The training system that is designed to address this simulation need must be aimed at two levels, the experiential/sensory level for the soldier and the multi-factoried command and control environment for the commander. With this in mind and the experiential base acquired by a number of countries including Australia it should be possible to generate a matrix that matches level of training (for each competency or skill) with the most appropriate training medium or mediums. The matrix can then be applied to available tools (simulations and simulators) and validated.

In some cases a determination will be made as to the inappropriate use of a simulated training environment, however it is perceived that in the majority of cases simulation will provide cost effective, accessible, repeatable and quantifiable training.

Live

Role-play is effective and presently the only way to accurately apply OFOF/ROE in a realistic and safe environment. This training will continue to be a relevant and necessary, however it must be integral (embedded) to the training system rather than additional to sanitised warfare. As stated previously it is expensive and difficult to coordinate. It is essential that scenarios be designed to assess competency and ability. This must start at basic officer and soldier training establishments (it is an all corps requirement). Use should be made of video cameras to record examine and play back points of interest to guide trainees to a better understanding of cause and effect. A quick debrief on the spot is not sufficient to maximise the learning experience.

Constructive

It is highly unlikely that the Australian army will design and develop its own constructive simulation for OOTW training. It can therefore be assumed that either a COTS simulation such as the Raphael ABS2000, Hughes Link BCT will be purchased, or SPECTRUM will be acquired under ABCA arrangements. This medium for training is essential and can provide a window into situational awareness. The versatility of training both the Commander and his staff can not be understated.

The provision of canned exercises will aid in repeatability and analysis of training effectiveness as well as feeding back into the doctrine development process. In addition the application of the after action review (AAR) will allow for lessons to be passed on with the exercise repeated and an improvement gauged. The first iteration can be essentially considered as discovery learning where a Commander uncovers weak areas in training and can then focus on improvement.

Effective use of the AAR requires the involvement of trained observers to ensure that teaching points (and the reason) are recorded as they happen. This prevents the AAR from being reduced to a video playback with ad hoc commentary.

Virtual

This medium promises much in the way of experiential and sensory feedback whilst being both accessible and cost effective.

By developing a matrix as described earlier the boundary conditions for effective training can be established. This will require a degree of experimentation. This is a dilemma that places a degree of risk with the system designer. What if it doesn’t work? The question should really be ‘What if it does?’ We need to ask ourselves; What is at stake?

There are a number of simulation toolkits available as COTS products that require very little in the way of actual programming. These products are robust, readily available and operate on most standard computer platforms. In particular SGI-IRIX and to a lesser extent NT.

It is proposed that a low cost (and low risk) virtual concept demonstrator be developed using products such as Boston Dynamics DI Guy to immerse a soldier into a synthetic environment under controlled conditions. This type of simulation could be deployed to an area of operations for ongoing training (refresher, awareness etc) if required.
The system would comprise the following characteristics:

- Record and playback of training scenario;
- Ability to employ standard equipment (radio, weapon);
- Allow personal interaction (visual and audio cues);
- Provide environmental interaction and immersion.

To achieve this, the following components are considered as necessary:

- Viewing device (Reverse Projection, HMD);
- Instrumented equipment (Weapon, radio);
- Recording device (video and stealth – Gen-locked);
- Sensory input device (to facilitate environmental interaction);
- Coach/Instructor Console (To allow for action/reaction under control of the instructor);
- Virtual software (Multigen, DI Guy etc);
- Simulation server.

The concept for operation is that the instructor provides the human interaction via the console allowing the trainee to respond to cues. The trainee interacts through voice commands and actions. The instructor interprets these and a response determined. The scenario is recorded and later played back on a split-viewing screen to bring out teaching points. The objective is to allow the trainee to respond to a situation using graduated levels of response and providing the opportunity to de-escalate a situation rather than applying deadly force.

It is interesting to note that every component can be purchased readily and requires little if any in-depth engineering knowledge to assemble the system. Design is squarely with the training system designer. This concept demonstrator could be built for under $50,000 and is re-configurable.

It is proposed that a concept demonstrator for OOTW training in a virtual setting be set up and experimented with in an environment such as RMC, or the upcoming RTMC in Enogerra. Validation of the concept by subject matter experts will require a period of discovery learning followed by trials. There are possible benefits to psychologists in the development of experiments and the observations made through viewing recorded footage of practiced scenarios.

CONCLUSION

The question we must ask is, do we truly want to train our personnel for operations? To achieve this, training must be as close to the real thing as possible. The real thing is about dealing with impact on the sensory faculties, often to the point of overload. While we may not always be able to recreate the level of discomfort, stench and noise we may be able to simulate degrees of stress, confusion and the decision-making processes. Computer generated simulation may offer the most cost-effective option in this respect. The only way to be sure of this is to experiment with advanced concepts such as virtual simulations and apply them in a learning context. We run the risk that the consequences of failing to adequately systematise our LOAC and ROE cognitive training will emerge on our next operational test. Let us train as we mean to fight and fight like we mean it.

REFERENCES


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