Simulation Interoperability in NATO
Progress, Trends and Future Opportunities

Otto Hoogesteijn (NL), chairman
Tony Scott (UK), secretary

Independent Specialists Working Group 4 (ISWG.4)
NATO Army Armaments Group (NAAG)

ABSTRACT

Being responsible for agreeing NATO wide the standards on simulation interoperability, the way, the Independent Specialists Working Group 4 (ISWG.4) works and the achievements already obtained, are explained. Also, current and future activities of ISWG.4 are mentioned.

The paper offers insights into NATO policy concerning interoperability for Simulation Training and gives a view in the importance of networked training systems for Commanders and their Staffs of a multinational coalition force.

One of the first Partnership for Peace (PfP) workshops was organised by ISWG.4. Experiences with PfP and lessons learned are within this paper.

ABOUT THE AUTHORS

Being graduated as an electrotechnical engineer at Delft University and after working for more than 11 years at the Delft University, Otto Hoogesteijn joined the Netherlands Army as a civilian in 1982. After eight years of experience with proofing all kinds of systems for the Army, e.g. main battle tanks, and after three years of experience with the procurement of simulator systems he is now working for the Technology and Scientific Research Division and responsible for the policy of simulation for the Royal Netherlands Army.
Since 1991 Otto Hoogesteijn is also chairman of the Independant Specialists Working Group 4 (ISWG.4) "on Simulation Interoperability".

After his career as officer in the British Army, Tony Scott left the Army as Lt. Colonel.
In 1991 he started to work for NATO and is now working for the International Staff of the Defence Support Division of NATO. He is the official Secretary for several NATO Groups, including the NATO Army Armament Group (NAAG) and the Independant Specialists Working Group 4 (ISWG.4) "on Simulation Interoperability".

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INTRODUCTION

Starting in 1991 as an adhoc group with 10 Nations (Belgium, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Spain, United Kingdom, United States) and representatives of Supreme Headquarters Allied Powers Europe (SHAPE), NATO Defense Research Groups and International Military Staff, the Independent Specialists Working Group 4 was officially established in April 1992. Since its start, two further Nations (CANADA and NORWAY) have joined the ISWG 4.

The first task was to agree on a series of definitions, including training levels, and the second step (still in progress) was to secure interoperability by agreeing to international standards.

The area of responsibility of the ISWG.4 is the interoperability of higher level military simulators and in particular the emplacement of standards to permit such interoperability between differing Nations and between various simulation systems. In practise, interoperability at the very highest level (Corps or Armies) has been left to SHAPE.

INTERNATIONAL AGREEMENTS

The first agreement made by ISWG.4 was to divide all simulation into three categories:

a. Level-1: Individual and Crew Training;

b. Level-2: Tactical Training, including networked simulators and including field exercises with simulators;

c. Level-3: Command and Staff Training and Wargaming.

All simulators belonging to level-1 were considered to be stand-alone systems (as for instance are pilot/crew trainers for civilian airlines). Because it is the mission of ISWG.4 to promote interoperability between Allied military simulation systems, ISWG.4 is not officially responsible for level-1 simulators, which remain the responsibility of other Groups/Panels. From the moment a level-1 simulator becomes part of a higher level system (for instance where two or more tanks are linked together to operate as a pair or platoon), the responsibility for interoperability is again the area of ISWG.4.

In practice, it can be assumed that agreement upon interoperability of all simulation systems is the responsibility of ISWG.4.

Figure 1 lets see the relationship between the US division of the world of simulation and the by NATO/ISWG.4 accepted division.

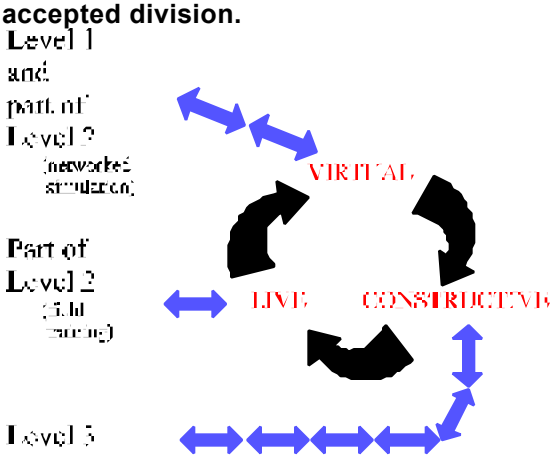

Figure 1. Relation between NATO and US terminology.

Perhaps this is the moment to describe in a little more detail just how NATO standardises. Because NATO is an alliance of equal nations, all our work is done by committees and nothing goes forward unless consensus can be reached. In other words, if even one nation vetoes a proposal, that proposal fails. So, the first thing to do is to agree that a standard is necessary. Once that is accepted at the appropriate Panel or Committee level, it is usual to form a group of experts, called a Working Group (WG), to draft the necessary agreement. Depending on the complexity of the standard, this can take up to two or even more years, since WGs generally meet only twice a year. Once the WG agrees to the standard it is circulated for approval at higher levels and then finally sent to each nation for Ratification. Once sufficient nations have ratified, the standard, now called a STANdardisation AGreement (STANAG) is promulgated, at which time it becomes a formal NATO document. However, the STANAG is not binding on any nation, even one that has ratified, until that nation Implements the STANAG, that is to say, formally and officially puts it into practise. There are towards 2,000 current STANAGs and the successful cooperation between France, the United Kingdom and the United States in the Gulf War shows that they really do work.

The standard for interoperability concerning level-2 simulation (and relevant level-1 simulators) is STANAG 4482 "on Standardised Information Technology Protocols for Distributed Interactive Simulation (DIS)". The ratification procedure for Edition 1 of STANAG 4482 is almost completed. Nearly all members of ISWG.4 have ratified the STANAG, which in consequence has been promulgated.

The draft Edition 2 of STANAG 4482, which contains, besides "the Standard for Information Technology Protocols for DIS", also "the Communication Architecture Requirement for DIS" and "the Exercise Control and Feedback Requirements for DIS", has been approved at the April 1995 plenary meeting of ISWG.4. The existence of an Edition 2 when Edition 1 is only just being promulgated neatly illustrates a significant difference between the dynamics of military and civilian standardisation. Many civilian standards are updated annually, because there is an ever-changing market. Military standards change every three or four years at best, because there is only one market and, once something has been purchased, we must wait for it to wear out before buying something new. As taxpayers, I am sure that you will approve of this frugality but as civilian manufacturers, trying to offer the military the latest

technology, I expect that you find this a serious constraint.
Now that Edition 1 has been formally promulgated, draft Edition 2 of STANAG 4482 will be submitted for ratification, a process which can take up to 2 years.

At level-3 (Command and Staff trainers and wargaming), Guidelines based upon Aggregated Level Simulation Protocol (ALSP) are still considered to be the best way forward. This is because the ALSP standard is still evolving (and indeed to some extent depends upon who is participating in the network coalition). In consequence, ISWG.4 has not developed a STANAG for ALSP but will continue, for the moment, to publish guidelines and update these. Meanwhile, experimental testbeds, using ALSP, are operational, both in the US and under supervision of SHAPE Technical Centre in Europe.

AREAS OF CONCERN

For level-2 field training with simulated weapons, the future for interoperability is unsatisfactory. There are major differences between European Direct Fire Weapon Effect Systems (DFWES) and equivalent US DFWES systems. Firstly, the laser intensity is different. Because stricter European safety regulations forbid the use of lasers other than class 1 in the open, European sensors systems have been made more sensitive to achieve greater distances. US systems have more powerful lasers but less sensitive receivers. The second problem is that different laser codes are being used by different manufacturers. Whilst the problem of the different laser code could probably be solved (with some cost), the problem of the different laser beam strength can not be so easily addressed. Finally, European systems are generally two-way (taking into account the ballistics of the weapon, recording hits, near-misses and the direction of attack) whereas the great bulk of US systems are one-way and so only record hits. This incompatibility could also be bridged but at the expense of performance.

Since most European nations and the United States are already committed to a new buy of DFWES (and AWES), interoperability, for at least the next decade, is unfortunately very unlikely.

But do we need interoperability for level-2 field training systems? There are three reasons to pursue interoperability. The first of these is to get common standards that are in the public domain and so independent of manufacturers. This will improve competition and I believe that this will be good for everyone. Indeed, I think this was the main reason to start the DIS workshops.
From NATO perspective, apart from ensuring realistic competition, there is also the possibility of making use of facilities belonging to another nation and this is important for several reasons. Especially for smaller nations, the costs of establishing and maintaining a full battalion sized Combat Manoeuvre Training Centre (CMTC) are very high: common standards will allow sharing.
The third reason for pursuing interoperability is the possibility for different nations to train together, multinational coalition force training. I believe that this

will be a primary goal for NATO.

Because the whole field of simulation is relatively new and very dynamic indeed, military planning has yet to catch up with what is on offer. We in ISWG.4 have been struck by the general lack of formal military guidance on the role of simulation in future military training and we are pressing for this to be remedied as soon as possible. There is an urgent need for a NATO doctrine on the place of simulation in military training. I am guardedly optimistic that this will be achieved before very long.

However, at the moment NATO has not identified a military requirement to train in multinational coalition at battalion level and/or below at a CMTC. We have asked the International Military Staff (IMS) of NATO to reconsider this point of view. If it were to change, a close look will have to be taken at the possibility of NATO common funding a CMTC. Meanwhile, I stress that there is no currently identified military need for interoperability on level-2 field training over the next decade.

Future operations will be characterised by the need to strike quickly and decisively with smaller forces, operating on a lower budget. In every peacekeeping or peace-enforcing operation a different mix of nations will have to operate together, usually without the possibility of training in advance as a multinational force. Without training in advance, nations have to improvise in the crisis area itself. Since coordinating joint operations is always the most difficult element, I personally believe that NATO will be pursuing multinational joint training at Command and Staff level as a high priority. This would mean that the real future will lie in networked training. From the moment that nations are earmarked to operate together in a (new) crisis area, the preparations for working together and the training will have to start. The best way to train staffs is to set up an exercise in a virtual world, in which the real C^4I systems can be used. Commanders and their Staffs could then train together without leaving their headquarters.
This would mean that, even if the soldiers had little experience of working together, their staffs would have harmonised procedures. This was where the Coalition Forces scored in the Gulf, since France, the United Kingdom and the United States all used common NATO procedures. Of course, if a NATO CMTC were to be set up and if future DFWES and AWES are interoperable, then it will be possible for the soldiers of a multinational force to train together beforehand as well.

PARTNERSHIP FOR PEACE

With the prospect of the enlargement of NATO by allowing more Nations to join the NATO, two principles are particularly important and these have already been stressed many times by the NATO Secretary-General. The first is that decisions on enlargement will be taken only by NATO Nations. No non-NATO countries will have the right to veto enlargement. A second principle is that enlargement must not in any way undermine the strength and cohesion of the NATO integrated military command. The process of enlargement should strengthen, not weaken our collective defence. New cooperation Partners have

to be not only consumers of, but also contributors to security. However, I do not want to become involved in NATO policy, because it is not in the power of ISWG.4 to do so.

The Partnership for Peace (PfP) process is the first step towards a possible future enlargement of NATO. The first PfP workshop within the NATO Army Armaments Group was guided by ISWG.4. Of the 23 Partners who were approached, 7 nations (BU, CzR, ES, FIN, RO, SLOK and SW [a]) actually attended the meeting.

Between Partners the interest in the three topics for interoperability on level two and three differed very markedly, depending on the technical complexity of the subject and money available in that nation. The fluctuating interest is best characterised by the questions being asked. The range of questions varied between how and where to buy the cheapest DFWES to requests for cooperation in developing a wargaming (level 3) capability, especially in the context of crisis management for peace keeping and peace enforcement operations.
Partners were also very interested in the standards accepted by ISWG.4 and were eager to learn more about STANAG 4482 (DIS) and the Guidelines for level 3 simulation interoperability (ALSP). They seemed willing to accept these standards, although in general they do not have the systems to interoperate.

The interest of the Partners lay not only with technological matters but also in obtaining assistance for problems such as establishing the military and operational need for simulators, guidance during the procurement process, etc.
In particular, Partners would appreciate international contacts to gain knowledge of technological and procedural matters.

CONCLUSIONS

With this presentation I have tried to show how ISWG.4 of the NATO Army Armament Group thinks and operates, using this to offer insights into NATO policy concerning interoperability for Simulation Training. In ISWG.4 itself, we have concentrated on achieving NATO-wide acceptance for the DIS protocols, through STANAG 4482: we are close to success. We have also tracked the ALSP standard for level 3 simulation interoperability and will continue to do so. We believe that interoperability of networked training systems, whether at level 3 or level 2, will be essential for effective multinational operations in the future.

Because of the fast-moving nature of the whole field of simulation, NATO military policy has lagged behind the actual potential of what is on offer and we are in the process of remedying that. However, as a result of this lack of policy, interoperability of field training systems, DFWES and AWES, will not be possible in the next decade. For the moment this does not worry the Military but we need their policy for the future soon if the next generation of these systems is to be properly interoperable.

At this moment, the difference between NATO members and NATO Partners is too large to consider already combined exercises on level-2 simulation. Level-3 simulation offers more possibilities and Partners are very interested into cooperation in the level-3 wargaming, especially the wargaming in which crisis management for peace keeping and peace enforcement operations could be handled.

Finally, ISWG.4 is one of the pioneers of working for the PfP. We look forward to building on this relationship in the future, believing that it will be for the good of both NATO and Partners in the longer term.

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[a]) BU: BULGARIA, CzR: CZECH REPUBLIC,
ES: ESTONIA, FIN: FINLAND,
RO: ROMANIA, SLOK: SLOVAQUE,
SW: SWEDEN.