Verification and Validation of the Public Order Management Serious Game

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ABSTRACT

In urban operations, military commanders have to take into account the civilians present in the operation area. This is why Public Order Management (POM) is an important subject of their training. The organization of POM field training is challenging. It requires lots of humans to act as crowds. It is hard to make the training sufficiently effective and efficient for the own units.

Therefore the Royal Netherlands Military Police and TNO initiated the development of a dedicated POM training system for commander staff. This system includes simulations of own POM units (formations, stances and dress) and crowds (movements, formations and aggression). Virtual Battlespace (VBS2) provides the system's simulation engine. As VBS2 is not meant primarily for staff training or for crowd control, a fair amount of functionality had to be added.

During development, multiple trials were organized with students from the NL school for Public Order Management. The final trials were meant to evaluate the utility and validity of the new training system. These Validation & Verification (V&V) sessions revealed that the new training system creates a valuable learning experience for the staff of a full POM platoon. It provided a challenging urban setting, where the trained staff could focus on the four key POM competences (tactics violence management, command and control, situational decision making, and communication), without the logistic burden of having the full platoon and several crowds on site.

1.0 INTRODUCTION

1.1 Public Order Management Training

"A capital city in tumult. The United Nations convenes an international conference. Ethnic minorities are protesting on the streets, tensions are rising and civilians are in danger…" Military commanders increasingly have to take account of the civilians present during operations. Public Order Management (POM) is, therefore, an ever more important subject of their training.

The overall objective of the training for POM commanders is to train tactics and command and control in the field of POM. They need to learn how to act in advance of a POM operation, and during the actual operation. Prior to the operation they need to analyze the situation, the (urban) terrain, the civilians (e.g. their objectives, leadership, cohesion, aggressiveness), and the likelihood of incidents (e.g. riots) to occur. Subsequently, they need to plan the operation. During the operation, they need to:

[1] This paper is based on [13] with an expanded chapter on V&V.

- Build a shared situational awareness, which involves recognition of environmental and human behavioral cues, e.g. recognition of cues predicting the (un)willingness of civilians to show aggression;
- Make situational decisions, i.e. deciding upon possible interventions (e.g. changing route, formations, gear, non-lethal weapons, etc.);
- Coordinate the activities of their units;
- Coordinate within the chain of command;
- Communicate with the public.

POM commanders need to obtain the required "peaceful" attitude by means of training. This means they need to reduce the number of violent interventions to a minimum. Otherwise the hearts and minds of the civilians will be lost.

1.2 Training Issues

In the Netherlands, the National Training and Knowledge Centre of the Royal Netherlands Marechaussee (military police) is responsible for POM commander training. Until 2011, this training mainly consisted of classroom-based planning exercises and field training. Field research showed that it was hard to make the training sufficiently effective and efficient [1]. This was because of three reasons. Firstly, POM field training is both logistically challenging and it is hard to create a good setting with adequate tactical cueing. In field exercises, generally groups of students will act as the public or demonstrators. It is not always easy to acquire a group sufficiently large to provide counter play and, although the students initially enjoy their role, there is a great deal of waiting involved and they soon get bored. Also, students generally are not very good role players, as they love to riot and are likely to behave more aggressive than the general public would under normal circumstances. A first demand, therefore, was to be able to train staff and to provide them with a tactically valid role play from the public without having large groups of human role players available. A second issue is that staff training yields very little training value for the so called 'riot police men', the people actually doing the work on the street. In dedicated staff exercises, the sub-ordinate police men only every now and then perform an action and will be waiting most of the training time. Hence, a second demand was to be able to train staff without the necessary presence of their sub-ordinate police men. A third issue is that the number of training sites in the Netherlands is very limited and all very similar in layout. In classroom-based planning exercises only paper-based, two-dimensional maps are used. Hence, a third demand was that simulation exercises should allow the exploration of various settings in a variety of urbanizations within all sorts of critical infrastructure such as airfields, industrial sites, ports, civilians and vehicles.

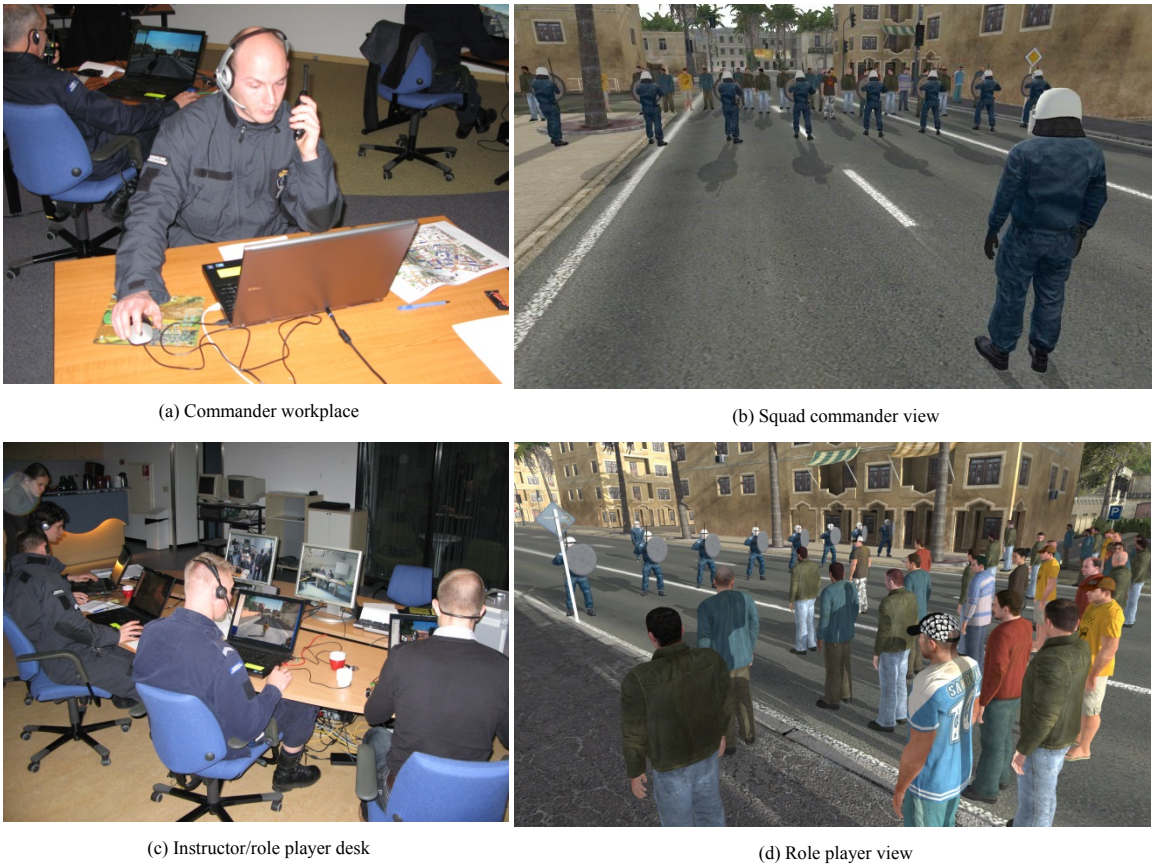
1.3 The Public Order Management Game

Together with the National Training and Knowledge Centre of the Royal Netherlands Military Police TNO constructed a staff training system where military commanders can train for POM by means of serious gaming. This *Public Order Management game* had to provide a solution to the three above-mentioned issues in their POM commander training. This paper describes the game (§2.0). It also presents the results of a Verification and Validation (V&V) study. This study was meant to verify whether the POM game truly comes up to the three above-mentioned issues, and provides a proper and feasible training solution to the Royal Netherlands Military Police (§3.0 and §4.0).

2.0 THE GAME

2.1 System Description

Virtual Battlespace [2] provides the simulation engine of the Public Order Management game. VBS2 is a networked, multi-player simulation game. As part of the POM game, VBS2 enables a group of 5 to 10 POM commanders to practice POM scenarios in a virtual urban environment in real-time. Figure 1 shows a typical setting with one platoon commander and several squad commanders. Each commander has his own VBS2 workstation where he can move through the virtual environment, either on foot or in vehicle (Figure 1a). Squad commanders each can take control of a group of eight simulated riot police men (Figure 1b). Two up to four instructor/role players (Figure 1c) control the activities of simulated civilian crowds (Figure 1d), and observe the commander' actions in a bird's eye view of the virtual environment. One chief instructor keeps an eye on the commander workplaces, observes the progresses made, and regulates the introduction and timing of subsequent scenario events.



(a) Commander workplace

(b) Squad commander view

(c) Instructor/role player desk

(d) Role player view

Figure 1: Public Order Management Game.

As VBS2 is not meant primarily for staff training or for crowd control, a fair amount of functionality had to be added in order to enable the POM staff training. The newly added functionality enables squad commanders to position and control their simulated riot police men as one group, and to manipulate their formations, stances and dress. It also enables the instructor/role players to easily take control of the activities of the simulated crowd. They can position the crowd either as a large group, or in subgroups. They can move groups to a specific location and command groups to keep at a fixed distance from a simulated entity, e.g. a POM squad. Also they can control groups to be less or more aggressive, e.g. by throwing stones or Molotov cocktails at a squad vehicle.

The commanders in training use their regular professional radios for mutual communication. Also, they can virtually speak to crowd members by means of a second communication system. Then an instructor/role player plays the role of the specific crowd member (e.g. to facilitate negotiation with the leader of a civilian crowd).

2.2 Scenarios

The training scenarios cover all sorts of (un)expected issues which might arise as part of public order management. The instructor/role-players stage events which reveal the consequences of erroneous assumptions or wrong choices. The trainees must respond in time and adequately to all events.

All scenario events yield cues that provide information about the willingness of a civilian crowd to show aggression [3]. During the scenario execution, this willingness moves between three levels:

1) The crowd is peaceful; there is no willingness to show aggression. For example, the people of the crowd have neutral or happy facial expressions and move casually.
2) (Part of) the crowd might become aggressive; there is a willingness to show aggression. For example, people within the crowd are elated, people are shouting, they might e.g. carry of flags of known potentially violent associations or they wear clothing geared towards fighting.
3) (Part of) the crowd is behaving aggressive; there is aggression, people are throwing objects, shouting aggressively, running fast, or commit acts of vandalism.

Cues are not only provided in the execution phase of the gaming session. They are also provided in the preceding planning phase by means of a mission order containing a situational description. Cues can be setting-related cues (e.g., background info on the underlying reasons for a demonstration), environment-related cues (e.g., street pattern, exits from buildings and squares) and civilian (crowd) behavior-related (e.g. male/female composition of the crowd). The hard part is developing relevant scenario storylines and creating challenging forms of training in which the commanders in training can stimulate one another to the maximum to encourage their alertness and creativity. Therefore, the storylines of the POM game are created by, assessed and discussed with experienced trainers. The aim of this is to better prepare the instructor/role-players for the potentially unusual and unexpected solutions possible in the area of maintaining public order.

2.3 Educational Setting

Computer simulation provides participants with a safe learning environment to practice and experiment. The success of computer simulations depends on how they are used. A lesson learned, for instance, is never to start in the simulation directly. In infantry scenarios, for instance, when starting right away in the simulation, trainees start shooting randomly and (even worse) at each other. In contrast, when trainees are provided with a professional briefing and with ample time to do a proper analysis and come up with plans for the most likely courses of actions, their actions in the simulator are far more controlled and more goal-oriented than without a proper planning phase. Also, scenarios need to be challenging. Our experience within the POM trials and trials with other branches of military services has shown that participants learn a great deal when they are given a challenging task that demands substantial focus and complex decision making.

Figure 2: Three Phases of the Training Session.

Finally, each simulation session needs to be followed by a dedicated reflection phase. In this phase the operation is recapitulated, subsequently a self assessment is made whether the planned courses of actions turned out appropriate and conclusions are drawn concerning the aspects of the operation that were considered adequate and the aspects that needed improvement. Only once the task has been completed and after the mutual reflection between participants, the instructor is to give his expert insight into the approach selected by the participants. TNO supervised instructors initially in this coaching role, which is new to them.

3.0 VERIFICATION AND VALIDATION

3.1 Introduction

Verification and Validation (V&V) are a set of activities that seek to find answers to the following questions: "Is the right model, simulation or serious-game acquired or used (i.e. validity)?" and "Is the model, simulation or serious game build or used right?". Additionally an acquisition decision maker has to know whether the use risks of a model, simulation or serious-game is acceptable. As usual only limited resources are available to execute a V&V effort. Therefore the V&V activities must be performed such that they give clients the optimum balance between results, use risk, cost and time.

The Dutch Ministry of Defence Material Organization (DMO) sees V&V as an instrument to help improve the efficiency and professionalism of their simulation and training systems acquisition processes. The NL MoD has participated in the development of a widely accepted international standard for V&V since 2003. This standard is called: Generic Methodology for Verification and Validation (GM-VV) to support acceptance of Models, Simulations and Data [4] [5] [6]. The GM-VV is developed under the auspices of the Simulation Interoperability Standards Organization (SISO) [7] with significant scientific contributions provided through the NATO M&S Group (NMSG) [8]. The SISO is recognized by both IEEE and NATO as standards develop organization in the Modeling and Simulation (M&S) domain. To consolidate the significant R&D investments to develop the state-of-the-art V&V knowledge and technology, and to make the know-how available for application in the whole NL MoD organization and other M&S market segments, the NL MoD set the objective to realize a V&V expertise center: "Q-tility" [9]. In its current form Q-tility is a cooperation of National Aerospace Laboratory (NLR) [10] and TNO [11] specializing in verification and validation solutions for models, simulations and serious-games. Both partners are independent R&D organizations in the area of M&S. The combination of extensive V&V knowledge with application domain specific knowledge of both parent organizations allows independent and objective V&V in virtually all problem and application domains.

For V&V projects such as described in this paper, the Q-tility expertise center establishes, based on the GM-VV, the processes and lifecycle models to be used; initiates or defers V&V projects; provides resources required (e.g., financial, human, equipment); retains reusable knowledge and information from current V&V

projects; and leverages such knowledge and information from previous V&V projects. In short it provides the environment in which V&V projects are conducted.

3.2 The GM-VV

The GM-VV is a generic and comprehensive methodology for structuring, organizing and managing the verification and validation (V&V) of modeling and simulation (M&S) assets. The GM-VV defines a set of interrelated generic V&V building blocks (i.e., components): products, processes and organization. These may be used to develop a tailored V&V solution that fits the V&V needs of any particular M&S organization, project, application, and technology or problem domain. The GM-VV provides a framework to efficiently develop arguments for decision makers to justify why M&S assets are acceptable or unacceptable for a specific intended use. Since the GM-VV is a generic (i.e. abstract) methodology it must be tailored to fit the specific V&V needs of an M&S organization, project or application domain.

The basic premise of the GM-VV is that models and simulations are always employed to help fulfill the needs of their stakeholders (e.g. trainers, analysts and decision makers). The GM-VV uses a four-world view to structure this larger context (Figure 3). Within this context, stakeholders exist who are responsible for making acceptance decisions on the use of M&S systems, their results or any intermediate products. Acceptability criteria need to be derived from the overall needs of the stakeholders. Criteria found in this derivation may concern every stakeholder, role, process and product in the four worlds. For these criteria evidence needs to be obtained, and then arguments underlying an acceptance recommendation must be developed in a structured manner using a format where the reasoning is transparent, traceable and reproducible. The GM-VV supports this by means of a V&V argumentation approach. This approach can be implemented in various manners; one implementation is a V&V goal-claim network (Figure 4).

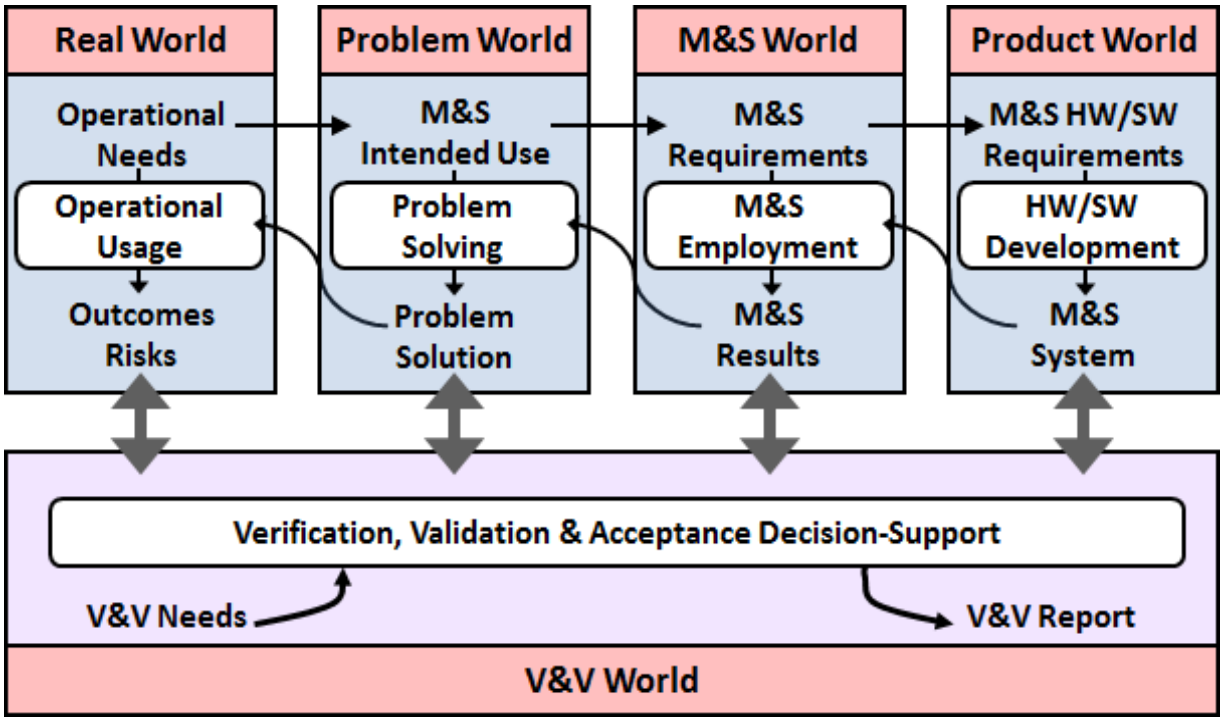


Figure 3: Four Worlds of M&S Based Problem Solving in combination with the V&V World.

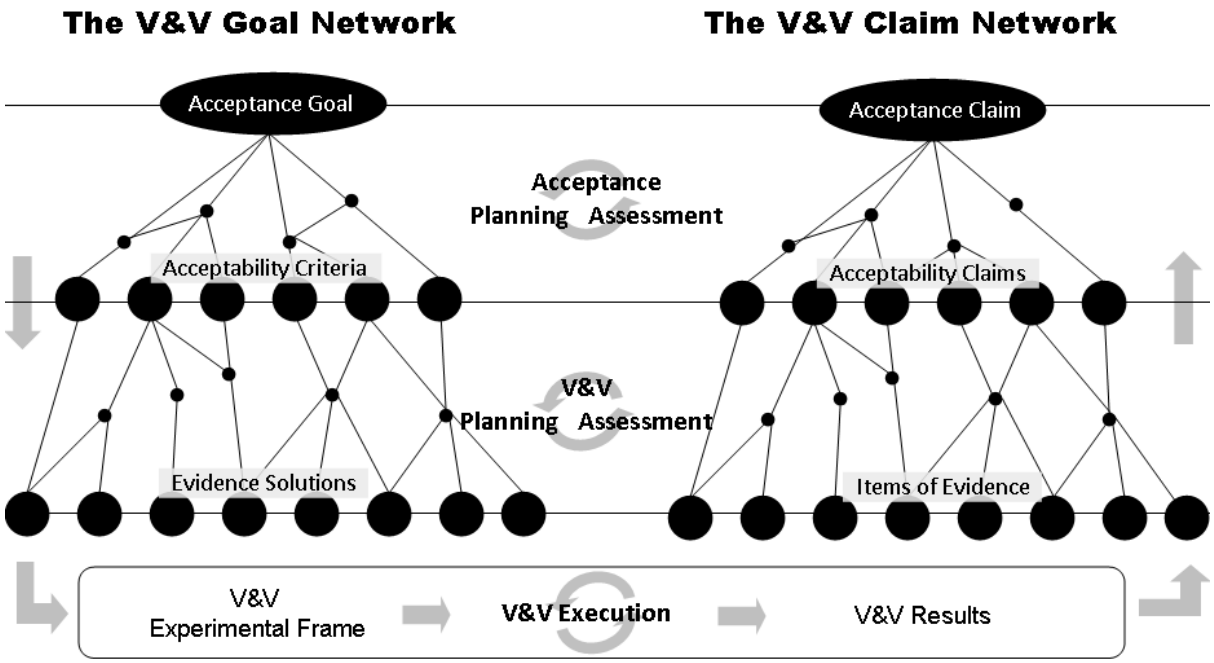


Figure 4: The V&V Goal-Claim Network.

The left-hand side of a V&V goal-claim network is used to derive the acceptability criteria from the acceptance goal, and to design evidence solutions (tests/experiments, referent data, methods for comparing and evaluating) for collecting evidence. The obtained items of evidence support the arguments that underpin the claims on whether or not a related acceptability criterion has been met. This eventually results in an acceptance claim for the M&S asset. The V&V goal-claim network encapsulates, manages and consolidates all underlying evidence and arguments necessary for developing an appropriate and justifiable acceptance recommendation. At the end of the V&V effort the resulting V&V goal-claim network can also be used to make an assessment on whether the overall V&V effort is of sufficient quality given the real-world risk. This assessment must accompany the acceptance recommendation, since, for example, insufficient resources (e.g. budget, time, skilled people, access to facilities, real-world referent data) for the V&V effort may have lead to weak acceptance recommendations for the V&V user/sponsor risk tolerances.

3.3 V&V Enterprise: Q-tility

One of the GM-VV concepts is the definition of a technical layer where the actual V&V activities are defined, a project layer, which helps in effectively and efficiently executing the V&V activities, and an enterprise layer. A V&V enterprise entity can be viewed as an organization that: establishes the processes and lifecycle models to be used by V&V projects; initiates or defers V&V projects; provides resources required (e.g., financial, human, equipment); retains reusable knowledge and information from current V&V projects; and leverages such knowledge and information from previous V&V projects. The V&V enterprise provides the environment in which V&V projects are conducted.

To consolidate the significant R&D investments to develop the state-of-the-art V&V knowledge and technology, and to make the know-how available for application in the whole NL MoD organization and other M&S market segments, the NL MoD set the objective to realize a V&V expertise center based on the GM-VV enterprise level definition. The result is this effort is named “Q-tility” [8].

Q-tility is a cooperation of NLR and TNO specializing in verification and validation solutions for models, simulations and serious-games. Both partners are well established independent R&D organizations in the

area of M&S. Q-tility's strength is the unique combination of this extensive V&V knowledge with deep application domain specific knowledge of both parent organizations. This allows Q-tility to perform independent and objective V&V in virtually all problem and application domains. Many M&S professionals and organizations have gained valuable and directly applicable V&V knowledge through Q-tility's real-life experience that allowed them to grow their M&S business professionally and successfully.

Q-tility provides complete verification and validation services for M&S projects, either for clients that acquire, develop, or use M&S products. These V&V services are based on a V&V life-cycle model which is based on the GM-VV and involves management, planning, design, implementation, execution, results analysis and reporting for any level of V&V in a client's M&S project. Since the V&V life-cycle model is scalable and tailorable, Q-tility is able to provide V&V services that always meets the clients budget, time-frame and business needs. Instead of doing the V&V work for clients, it is also possible to assist them to do V&V themselves by coordinating and setting-up V&V activities and teams, and transitioning these into the client organization. Moreover, Q-tility provides hands-on training courses that help clients to increase the V&V competence level of their M&S personnel, novice or expert alike. Q-tility also offers customized consultancy services that help solve V&V challenges and provide the advice, research and development tools to make a client's M&S business successful. Q-tility offers clients the possibility of quick-scans, in short engagements, to help introduce or decided on V&V inside their M&S project or organization, effectively and efficiently.

3.4 V&V Study of the POM Game

The Royal Netherlands Military Police organization (NL Military Police) wanted to know what needs to be done in order for the POM game to be useful to them. The scope of the V&V work was not just the game, but a broad range of topics including the support within the NL Military Police on both policy and technical level, the embedding of serious game based training in the overall education and program, and the instructors and role players involved in the execution of the game. For the V&V project, we had the full cooperation of the NL Military Police, the designers of the POM game, and a number of subject matter experts (SMEs).

The goal network consists of a hierarchical derivation of acceptability criteria which are further made measurable by defining appropriate tests for each acceptability criterion. The NL Military Police instructors and the SMEs set the acceptability criteria. For the POM game an argumentation structure (as exemplified in Figure 4) was constructed which in its final version contained almost a thousand nodes. The top goal in the network states that the POM serious game must be useful for the NL Military Police. This top goal is, on the basis of the 4 worlds model disaggregated into ever smaller goals. The first level of disaggregation is the following:

- **Effectiveness**: the whole game (software, hardware, human controllers, trainers, scenarios, location, etc.) must produce an effective training for students of the Training and Knowledge Centre of the NL Military Police. Goals derived from this effectiveness goal are typically found in the Problem World of Figure 3. For this V&V study the Problem World can be considered as the POM Training World which includes the M&S based training as well as class room and live training. An example of sub-goals of effectiveness are that the game is appropriate to attain the educational goals listed in §1.1.
- **Efficiency**: the whole game (software, hardware, role players, instructors, scenarios, classroom, etc.) must produce an efficient training for the Training and Knowledge Centre of the NL Military Police. The sub-goals derived from this efficiency goal are typically found in the M&S World of Figure 3. An example sub-goal of efficiency is that the game-based training must be used efficiently in the entire POM training program which also includes classroom and field training parts, meaning that each part of the training should use the training method that allows to most efficiently reach the specific training objective of that part of the training.

- **Low risk**: the use of the POM game, compared to other available training methods, must not result in a higher risk to the NL Military Police in operational situations. These risks are mainly found in the Real World of Figure 3, but the acceptability criteria concern the POM game and its use in POM training. An example sub-goal is that there should be no negative training effects. This sub-goal means that state that during the training the scenarios and gameplay should stay away from limitations of the game, and that the game should always be followed up by live practice.

For each of the lowest level goals in the argumentation network one or more tests were defined that should deliver convincing evidence. Various types of tests were needed to completely cover all required evidence: interviews, observations and 360° assessments during two game trial sessions, hardware/software inspections, and literature reviews. The major effort was in setting up and running the two game trials. Each trial consisted of two days. In each trail, the platoon and squad commanders of a different Military Police platoon played the POM game. During the trial the V&V team performed measurements, made observations and conducted interviews with SMEs, instructors and trainees, to collect evidence covering the full set of acceptance criteria.

The goals derived by considering effectiveness, efficiency and risk are, where needed, further System world goals are further disaggregated. Some of these reference details of the POM serious game software or hardware. These goals are typically found in the System World of Figure 3 but are usually derived in later stages in the goal network. Typical examples concern the look and feel of the virtual world and its inhabitants, the completeness of available commands students can give virtual characters and their equipment, and technical issues such as a correct implementation of collision avoidance of objects in the virtual word.

The lowest level of goals in the argumentation network were casted into acceptability criteria. For each of these criteria one or more tests were defined that should deliver convincing evidence based on which it can be decided whether a criterion is met or not.

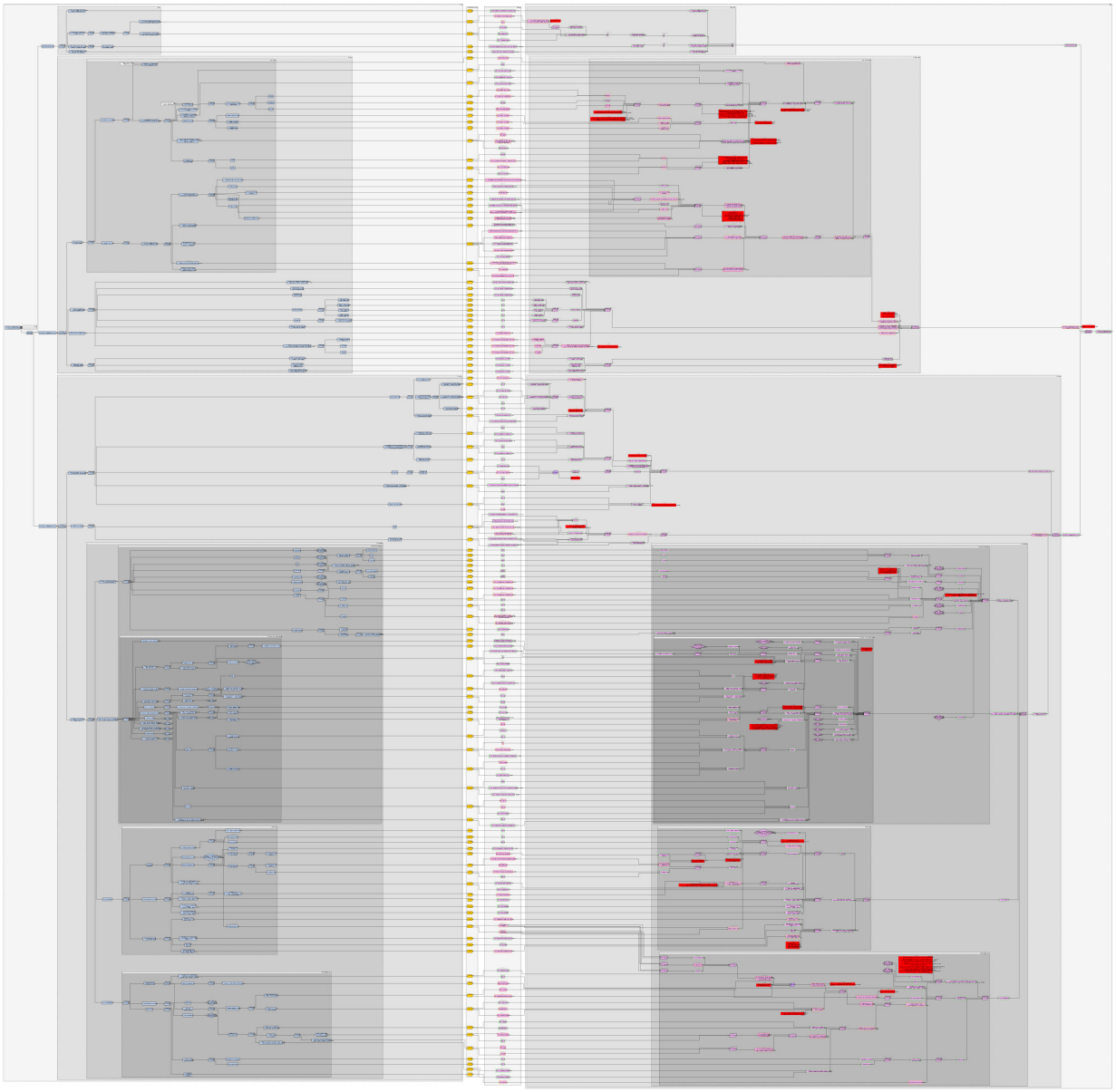


Figure 5: The argumentation structure consisting of (from left to right) the goal network, test definitions (the vertical line of yellow nodes), the results of the tests and the claim network.

3.4.1 Tests

Various types of tests were needed to completely cover all required evidence: interviews, observations and 360° assessment in a live trial, hardware/software inspections, and literature reviews.

The major effort was in setting up and running the trials. On the one hand a considerable number of trainees were needed as well as controllers and trainers from the NL school for POM. On the other hand the available software had to be ported to new hardware. The actual trail had to be run with personnel from the NL school for POM where previously it was run by the developers. So besides the V&V personnel also TNO personnel to help the people from the NL school of POM were continuously present.

The final set-up for the trials consisted of the M&S system, scenario's, controllers, 2 trials with different groups and the physical location for the trials.

The test itself consisted of 4 days (two full training sessions with 2 separate platoons) in which KMar personnel used the POM game as they intend to use. During the test period the V&V team performed measurements, made observations and conducted interviews with SMEs, trainers and trainees, to collect evidence covering the full set of acceptance criteria.

Based on the collected evidence we defined recommendation to the KMar. Its main part consisted of recommendations for changes in the near term, i.e. before they would actually use the game, the mid-term and which changes would be possible in the far future.

4.0 RESULTS

Based on the collected evidence we evaluated the educational effects of the POM game (§4.1), and defined recommendations to the NL Military Police (§4.2).

4.1 Educational Effects

4.1.1 Methods

In order to measure the educational effects we asked trainees and instructors to fill out a questionnaire. The questionnaire introduced nine competencies, representing the competencies that the NL Military Police wishes to train by means of the POM game:

1) Task order analysis;
2) Situation assessment;
3) Planning the operation;
4) Tactics violence management;
5) Command & control;
6) Situational decision making;
7) Problem solving;
8) Effect-based operation;
9) Stress management.

Each competence was supported by 4 – 8 behavioural indicators. For instance, ‘constantly keep oversight on a changing situation’ belongs to the competence ‘situation assessment’ and ‘stay calm under high stress and rapidly evolving events’ belongs to ‘stress management’. Instructors and trainees were asked ‘To which extend are the listed competencies developed in the POM game?’. They answered this overall question by rating the behavioural indicators of each competency on a scale ranging from 1 (i.e. ‘no learning’) to 5 (i.e. ‘in-depth learning’). They filled out the questionnaire twice: at the end of session day 1 and at the end of session day 2. This was done because different competences were trained on each day: day 1 focused on planning the operation (competences 1 through 3) while on day 2 the operation was actually executed (competences 4 through 9). The questionnaire resulted in a data set of self-assessments with N=12 for session 1 and N=15 for session 2 based on the two moments of filling out the questionnaire (a few data were missing). The data set containing the competence ratings from the instructors was smaller: N=5 for session 1 and N=6 for session 2.

We choose to use self-assessments as well as instructor-assessments because of two reasons. First, it appeared to be impossible for instructors to observe all individual trainees during the trials. This is why the data set for the instructors’ assessments was rather small. Second, it was impossible to obtain adequate pre-

trial assessments of the competencies of each of the trainees. Therefore, assessments made by instructors alone might not be sufficient to indicate the amount of learning as our instructors could not be fully aware of the pre-trial competence level of our trainees. The assumption here was that the trainees themselves could also assess how much they had learned, independent on their entrance level.

4.1.2 Results

First, we analysed the differences between the self-assessments and the instructors' assessments to get insight into the reliability of the self-assessment data. Figure 6 presents the mean scores on each competence, averaged for session 1 and 2, for the self-assessments and the instructors' assessments. The figure shows that the instructor scores and the self-assessment scores are much the same. For instance, 'situation assessment' is rated relatively low both in the self-assessment and by the instructors while 'situational decision making' is rated relatively high by both the instructors and the trainees. Despite of the small number of data, these results suggest that the self-assessment scores are usable for measuring learning effects.

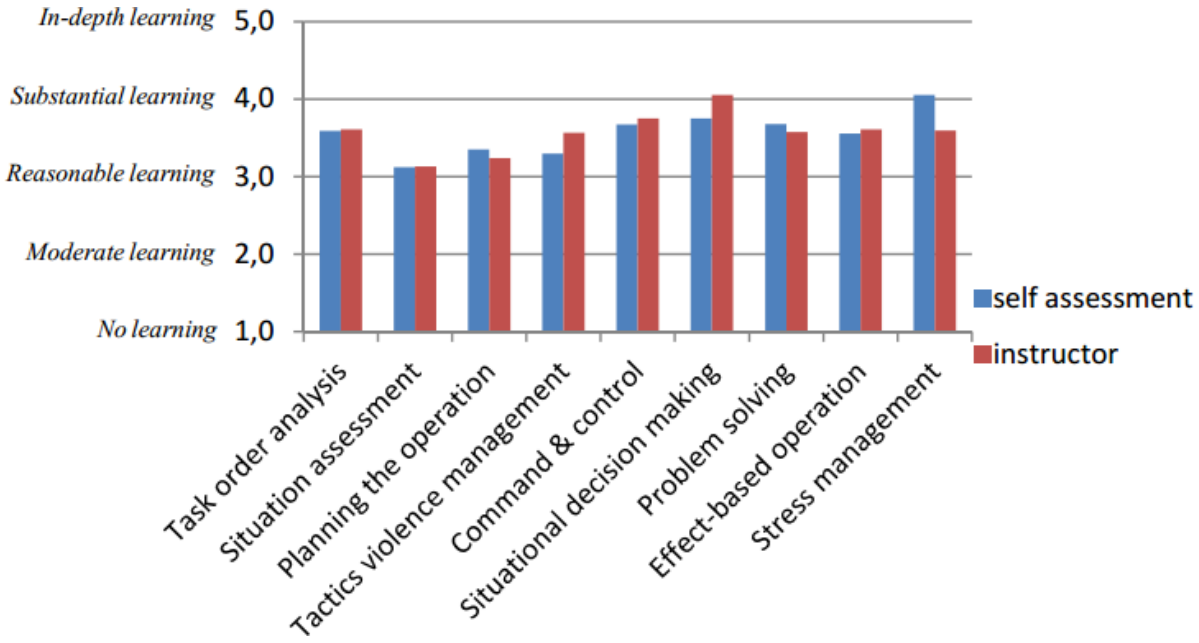


Figure 6: Mean scores self-assessments versus instructors' assessments.

Next, we measured the learning effects based on the self-assessment data only. We compared the mean scores, averaged for day 1 and day 2, in session 1 with the mean scores in session 2. Figure 6 shows the results. The figure shows that there are quite some differences between the outcomes of the sessions 1and 2. In general, the competences are rated higher in session 2 than in session 1. These differences can be explained by differences in experience of both trainees and role players. The platoon commander in session 2 delegated more tasks to his squad commanders than the platoon commander in session 1 did. As a consequence, in session 2 squad commanders could learn more. In session 1 and session 2, the role players were the same persons. In session 2, it turned out that they had learned substantially from the first session. As a consequence, they could introduce more events in the execution phase of session 2, such that the trained commanders could learn more.

The results presented in Figure 5 and Figure 6 show that all competencies listed can be trained with the game, with scores ranging from 'reasonable learning' to 'substantial learning'. Relatively high scores were found for 'command and control', 'situational decision making', and 'stress management'. Apparently, the game is particularly suitable to train these competences.

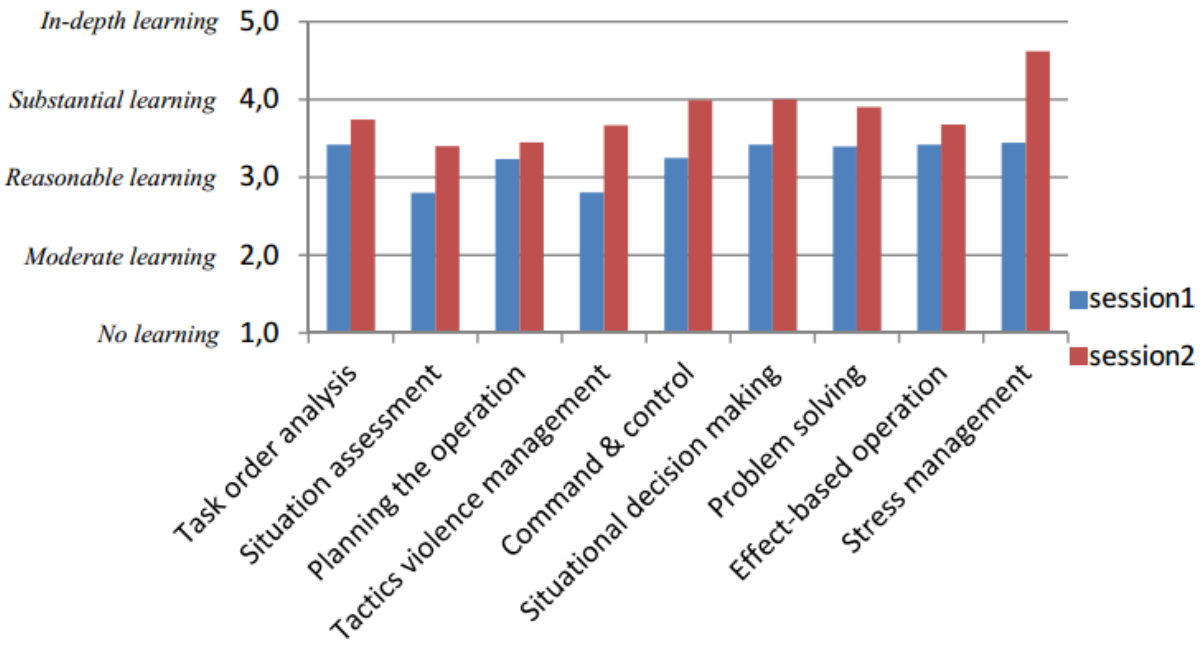


Figure 7: Results Self-Assessment.

4.2 Organization and Technical Aspects

Next to the educational effects of the POM game, the V&V study also evaluated technical and organization aspects of the game. From a technical perspective, a shortlist of desired new game functionalities was composed (not discussed in this paper). From an organization perspective, it was concluded that instructors and role players need to obtain new skills in order to effectively use the POM game. E.g. VBS2 operation skills are needed. But also new educational skills: the POM game provides the trained commanders a safe, authentic learning environment, where a Job-Oriented Training (JOT) philosophy [12] is most practicable. In JOT, the trained commanders are made fully responsible for their own task proficiency. The trained commanders are encouraged to find effective task-strategies by experimenting in the safe authentic learning environment, and by cooperating and reflecting with other trainees. Interaction between trainees is crucial to the success of JOT; the instructor must encourage trainees to discuss, experiment and reflect together, instead of telling them how to act like a traditional instructor frequently does.

The two game trial sessions showed that the instructors and role players of the NL Military Police made good progress in obtaining the required skills. However, it was obvious that more experience has to be gained, and that frequent game sessions are necessary in order to retain the new skills. Integration of the POM game in the education and training program of POM commanders is the first step that must be taken here.

5.0 CONCLUSIONS

The Public Order Management Game enables military commanders to obtain and retain the key competencies required in POM tasks: tactics violence management, command and control, situational decision making and communication. The results of the Verification and Validation of the POM game show the game's effectiveness from an educational perspective, as well as desired technical and organization changes in the short and medium term.

The added value of V&V is that now sufficient – and independently obtained – data is available to back up the above-mentioned claims. The POM game developers also appreciated the independent view on the

usefulness of the game to prevent tunnel vision in the development team. Immediately after the V&V tests the NL Military Police has started implementing changes to allow for efficient and effective use of the POM game.

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