Annual ACT Operational Analysis Workshop: Providing a Venue for NATO Operational Analysis

Han de Nijs
HQ Supreme Allied Command Transformation
Capability Engineering Division
Operational Analysis Branch
7857 Blandy Rd, Suite 100
Norfolk, VA 23551-2490
USA

denijs@act.nato.int

ABSTRACT

*The ACT Operational Analysis Workshop has been held yearly since 2007 and fulfils in a need to bring together the NATO Operational Analysis community to discuss the common threads on the application of scientific methods to support the decision making process in the various NATO commands and agencies and at the national level. While Operational Analysis (OA) is applied at various decision making levels, the commonality of the practice of OA makes it possible but also necessary to discuss challenges, exchange best practices, gain insights and think about potential improvements. One of its main objectives is to compare the use of OA within the NATO Allied Command Operations (ACO), the NATO Allied Command Transformation (ACT), and the national laboratories and technical centres, and to determine how to improve synergy, cohesion and coordination between Operational Analysts within the NATO command and force structure and the nations. Furthermore, the OA Workshop explores opportunities to cooperate between NATO and national entities. The themes of the three workshops so far have been very diverse, but all have been within the overall aim "*To coordinate and improve the contributions of Operational Analysis to NATO operations and capability development*".*

*This paper will discuss the contribution of the three workshops to the continuing challenges that the operational environment and the transformational agenda is being confronted with and touches upon the expectations of what the fourth workshop to be held in June 2010 will bring. Some of the greatest challenges include dealing with the complexity of the current operational environment with less emphasis on kinetic solutions. Non-military dimensions and out-of-area operations have made clear that more analytical resources need to be applied towards "*softer*" analytical methods making less use of mathematical optimization, statistical application and "*number crunching*". Equally challenging is the problem of using experimentation to better understand and evaluate military capabilities, and how to support concept development with analytical efforts. The workshops have been striving to find ways to improve the value that OA brings to decision-makers in operations and in capabilities development.*

Keywords: *Operational Analysis, Complexity, Experimentation, ACT*

1 INTRODUCTION

From the successes of applying scientific methods to decision making and military problems during World War II, the field of Operational Analysis (OA) rapidly grew into a successful profession that supported

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
APR 2010	**N/A**	**-**

4. TITLE AND SUBTITLE
Annual ACT Operational Analysis Workshop: Providing a Venue for NATO Operational Analysis

5a. CONTRACT NUMBER
5b. GRANT NUMBER
5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

5d. PROJECT NUMBER
5e. TASK NUMBER
5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
HQ Supreme Allied Command Transformation Capability Engineering Division Operational Analysis Branch 7857 Blandy Rd, Suite 100 Norfolk, VA 23551-2490 USA

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)
11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
See also ADA564688. Analytical Support to Defence Transformation (Le soutien analytique a la transformation de la Defense). RTO-MP-SAS-081

14. ABSTRACT
The ACT Operational Analysis Workshop has been held yearly since 2007 and fulfils in a need to bring together the NATO Operational Analysis community to discuss the common threads on the application of scientific methods to support the decision making process in the various NATO commands and agencies and at the national level. While Operational Analysis (OA) is applied at various decision making levels, the commonality of the practice of OA makes it possible but also necessary to discuss challenges, exchange best practices, gain insights and think about potential improvements. One of its main objectives is to compare the use of OA within the NATO Allied Command Operations (ACO), the NATO Allied Command Transformation (ACT), and the national laboratories and technical centres, and to determine how to improve synergy, cohesion and coordination between Operational Analysts within the NATO command and force structure and the nations. Furthermore, the OA Workshop explores opportunities to cooperate between NATO and national entities. The themes of the three workshops so far have been very diverse, but all have been within the overall aim To coordinate and improve the contributions of Operational Analysis to NATO operations and capability development.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**16**	

decision making in a variety of industries, organisations and governments. Within the military, OA remained a speciality discipline and many defence organisations in nations have created OA capabilities to support equipment procurement, capability development and military operations.

The OA community in NATO is diverse, with staff employed to: provide assessment of progress of operations; support concept development and experimentation; analyse lessons learned, and optimise and evaluate training, to name a few. Given this diversity in application of structured and scientific decision making support, many staff felt that a regular meeting was required to establish a sense of community and professional identity.

Following the expression of this requirement, on 13 – 16 March, 2007, at the Little Creek Conference Centre, Norfolk, the OA Branch at Headquarters Supreme Allied Commander Transformation (HQ SACT) hosted the first NATO-wide OA Workshop that brought together many analysts from throughout the NATO structure. The focus was on establishing an analysis community and attendees were called to give briefs on their current work and responsibilities. A good understanding of the wide variety of NATO analysis ongoing and current practices was received, and a realisation that many of those current practices needed improvement.

On 17 November, 2008, the HQ SACT OA Branch hosted the second NATO OA Workshop, as a pre-event to the Concept Development and Experimentation conference in Oslo, Norway. This time, the focus was primarily on campaign assessment. It was realised that there was a serious problem with the way in which NATO assesses progress as a result of the lack of both standardised processes and connections between staffs at strategic, operational and more tactical/in-theatre levels.

NATO HQ SACT hosted the 3rd Annual NATO Operational Analysis Workshop on 9 – 11 June, 2009, at the Norfolk Naval Base. The core theme of this event was utilisation of analysis: how to ensure that analytical products from defence experimentation, analysis activities supporting operations, and lessons learned are fully used by customers and stakeholders in these respective communities. A critical question that is intimately tied with the issue of utilisation was also raised: the existence, definition and membership of the analysis community.

In 2010, HQ SACT will host the 4th OA Workshop from 15 – 17 June 2010. The theme of this event is to examine the problems that Concept Developers face and the role of analysis in supporting Concept Development. Within NATO, Concepts are a primary mechanism for initiating and debating change, yet in comparison to Experiments, it has been challenging to apply a wide variety of analytical techniques. It is our intention to determine analysis requirements and fit analytical methods to problems. The outputs will be used to inform best practice for Concepts Development within NATO.

The purpose of this paper is to give an overview of the aim of the OA workshops and to discuss how an event as the OA workshop can influence the discussion of problems within NATO, how the OA workshop functions as a gathering of likeminded people and what the fall-out of the meetings are for the OA community and for NATO as a whole.

2 CONDUCT OF THE WORKSHOPS

2.1 Aim

All four workshops have been constructed with a similar aim and set of objectives that have remained reasonably robust over the years. While there are some differences in the exact formulation of the aim of the workshops, the general genesis of the aim has been:

- To coordinate and improve the contributions of Operational Analysis to NATO operations and capability development.

Within that context the contributions from the OA practitioners within the Allied Command Operations (ACO) concentrated on how OA supported the NATO operations in Afghanistan, Balkans, off-the-coast of Sudan, the Pakistan earthquake relief efforts, and Operation Active Endeavour. The OA contributions in capability development have been concentrated in Allied Command Transformation mainly to support Defence Planning, Concept Development and Experimentation, and Research and Technology. Analytical efforts in NATO Agencies have been in support of ACO and ACT in these areas.

2.2 Objectives

The Operational Analysis efforts faced various challenges in conducting this support, and the OA Workshop's objectives were to understand these challenges from the various entities and see how coordination between the Operational Analysts could assist in finding solutions for them. The objectives for the workshops therefore have also been very constant from 2007 onwards:

- Review the various ways that Operational Analysis is currently contributing to NATO (commands and nations) operations and capability (looking at ACO, ACT and the nations);
- Discuss challenges, best practices, external insights and potential improvements;
- Determine how to improve synergy, cohesion and coordination between the Operational Analysts within NATO command and force structure and the nations;
- Identify additional challenges and opportunities for the OA Community to address together for the good of the Alliance.

However, the actual conduct of the workshops has been quite different. While the 2007 workshop served as an introduction to all NATO command and agencies of what kind of activities the Operational Analysts were involved in and sought to define what kind of mechanisms could improve the coordination between the various entities, the 2008 workshop focused on the single topic of Assessment. In 2009, the emphasis was on how analysis supported three different strands of work in NATO, and in 2010, the focus will be on how operational analysis interacts with the single activity of Concept Development and attempts to build understanding with non-analysts on what OA brings. The following sections provide details on the topics and the outcome of each of the workshops.

3 OA WORKSHOP 2007

The 2007 OA workshop was an opportunity for all NATO entities to present on current work and methods, for individual OA analysts to present a topic or study result, and for the forming of syndicates to discuss the future of OA. At that time, Operational Analysts were situated in all the ACO Joint Force Commands (JFC), their Air, Land and Maritime Component Commands (CC), at HQ SACT, at Joint Warfighting Centre (JWC), at Joint Analysis Lessons Learned Centre (JALLC), at the NATO Consultation Command & Control Agency (NC3A) and at the NATO Undersea Research Centre (NURC). Additionally, in the NATO Force Structure, the Corps HQs had OA experts.

3.1 Current Work

A full day of the workshop was devoted to these HQs and Agencies to brief on their OA experiences, what they were working on, and how their advice and expertise was used by their superiors. The focus of the ACO JFCs and CCs naturally was on supporting the operational planning for the NATO Operations in Afghanistan (ISAF), Kosovo (KFOR), Pakistan (Earthquake Relief) and in the Mediterranean (Operation Active Endeavour), and on assistance to the NATO Training Mission in Iraq, Hurricane Katrina relief and monitoring Dafur. Emphasis was placed on supporting the then developing Effects Based Thinking, and on campaign and operational assessment through the measuring of effectiveness and progress of missions. Their work was further broadened to support the same functions in the NATO Response Force exercises where substantial efforts were spent in supporting the course of actions by wargaming with NC3A developed tools. On the ACT side, analysts in various HQ SACT branches supported the development of requirements – hand in hand with NC3A – for the Defence Requirements Review (DRR) and Long Term Capability Requirements (LTCR), provided strategic analysis for ACT's and Bi-SC Seminars and Conferences, conducted the analysis for Concept Development and in Experiments, while the JWC analysis concentrated on CD&E projects, the JALLC produced various reports on burning issues in NATO's operations and exercises, and NURC reported on OA support to projects in port protection, autonomous underwater vehicles and maritime situational awareness.

3.2 Future of OA in NATO

Keynote addresses from Dr. George Rose (UK) and Mr. Michael Bauman (US) provided a welcome introduction into how two major NATO nations undertook transformation of their analysis focus to the future. Dr. Rose spoke about the need to go back to the roots of OA by collecting data and forward deploy analysts together with the troops to learn of the operational problems and to support them with science and technology (S&T), either directly, or by reach-back to the UK Defence Science and Technology Lab (DSTL). Mr. Bauman spoke about the need for OA to team up with the Subject Matter Experts and to engage major stakeholders, while maintaining OA integrity and professionalism, to support the development of concepts.

Four syndicates were formed to discuss the future of Operational Analysis in NATO. It has been perceived that the role of the operational analyst is to work in support of the projects and staff work in the HQs, and therefore is mainly invisible or in the background. The lack of procedures, vision, or a recognized program of work may undercut the ability of maintaining analytical expertise specifically in times when the old paradigms of cold-war analysis have become obsolete and new methods and tools have to be developed to be able to support the current type of missions of NATO. A need to explain the analytical method, to gather requirements for analytical work, to learn new methodology and to share locally developed models, was discussed in each of the four syndicates:

- NATO Operational Analysis Handbook
- Analysis Requirements List
- Operational Analysis Education and Training
- Sharing Analytical Models

The four syndicates briefed back on the last day of the workshop on their contribution to the formulation of a common analytical approach on:

- Principles on division of responsibilities and rules of cooperation in analytical work in NATO;

- An agreement to consolidate the combined NATO requirements for Operational Analysis into a single Analysis Requirements List (ARL) and initiate the formulation of business rules for the use and implementation of the ARL;
- Draft an outline of a NATO Operational Analysis Handbook and an agreement on sharing methods, models, database formats, dictionaries and contents;
- Principles on conducting peer review of OA work, on creating training opportunities and on building a NATO OA/OR network.

3.3 Special Topics

During the 2007 workshop there was also the opportunity to present analytical work done on special topics. These special topics were grouped under four headings:

- OA in Concept Development and Experimentation
- OA to support Operational Plans
- OA Case Studies
- OA in Campaign Assessment

Two presentations on CD&E discussed how analysis supports Concept Development through problem structuring, formulation, brainstorming, simple modelling and risk and feasibility analysis, and how vital it is to insert the analyst into the design of the experiment from the beginning to ensure that the aims and objectives of the experiment can be met by a well-designed data capturing and analysis plan. Examples were given for the concepts of Joint Urban Operations (JUO) and Joint Intelligence Surveillance and Reconnaissance (JISR) and the Multinational Experiments (MNE) on the Effects Based Approach to Operations (EBAO). A third presentation detailed the needs for proper survey and questionnaire design.

The second group contained a briefing on the NC3A model GAMMA (Global Aggregated Model for Military Assessment) and how it was used in a reach-back mode to support the JFCs in planning. NC3A further briefed on the models that are used in the DRR project to determine the Minimum Military Requirement for forces over the medium term informing the Defence Planning Process on force structures required from the nations. The Air CC Izmir briefing was on a network optimization model used to plan for humanitarian relief in a NATO consequence management mission.

The case study on social network analysis having potential uses in analyzing Command and Control vulnerabilities, situational awareness, lessons learned, concept development etc highlighted the capabilities of a new method to be used in NATO analysis. A presentation on logistics regression provided a way to cope with binary data analysis resulting from data collection through surveys. A analysis of the tasks that need to be conducted in countering piracy of the Horn of Africa used a mind mapping method to brainstorm and structure the problem.

Campaign assessment in exercises and operations faces a number of challenges, current practices and methods to tackle the problem were discussed in three separate briefs on the topic.

3.4 Conclusion

The 2007 OA workshop concluded with promises to develop an OA handbook, to build a NATO OA community, to develop a consolidated ARL and to look for opportunities to develop an introductory course for

military staffers that are placed in an OA billet or aspire to conduct analysis to appreciate and understand principles of analysis.

4 OA WORKSHOP 2008

While the 2007 OA workshop was conducted over three days, the choice to conduct in 2008 a one-day OA workshop on the role of analysis in supporting Campaign Assessment at both the Strategic and Operational levels, was given by the urgent need by the ACO commands to change their approach to assessment in light of developments in ISAF. The one-day workshop was an add-on to the CD&E conference, but only for organizational purposes and to maximize participation. The workshop allowed for participation by national representatives from NATO nations, who were either invited through the mechanisms of the RTO or had professional links with the topic assessment. The workshop covered in two sessions the role of analysis in supporting assessments at the operational level and at the strategic level. Each session was introduced by two presentations after which a plenary debate under the direction of a panel discussed the following topics:

- What is the state-of-the-art with respect to tools and techniques for conducting campaign assessments?
- What are the challenges facing analysts conducting analysis at Operational and Strategic levels?
- What are the relationships between Operational and Strategic level assessments: are there hierarchical links or are they independent?

4.1 Urgent Need

The urgent need to discuss assessment was given by operational considerations that were the topic of discussions in which SACEUR himself was involved. Finally, in December 2007 SACEUR's Strategic Commanders' Conference identified a need for a continuing Strategic Assessment process to inform SACEUR of the progress of the ISAF mission[1]. As a result an Urgent Operational Requirement for an ISAF Strategic Assessment Capability (ISAC) was drafted by SHAPE and was approved by the Military Committee in August 2008[2]. The final solution for the ISAC includes programmatic support for the Campaign Assessment Tool developed by NC3A and calls for a dedicated analyst support in situ in ISAF.

4.2 Presentations

The first session contained a Netherlands presentation on how Influence Diagrams were used to assess the operation of the Dutch ISAF contingent in Uruzgan. The tool used provided useful information and in concert with the data collection done by the embedded Operational Analysts, allowed for a comprehensive national assessment of the operation in Uruzgan. The presentation of the developments on the NATO Assessment Handbook produced by a sub group that is part of the Bi-SC EBAO Working Group, gave the participants an appreciation of work progress on assessment since the introduction of the EBAO concept. The handbook outlines how the measures of effectiveness and measures of performance are constructed and derived from the formulation of effects and actions, and gives guidance on how to construct them. The second session on strategic level assessment provided a brief on the ISAF Strategic Assessment Capability itself, and showed that the method used was very much tailored to the ISAF situation. A subsequent presentation warned for the oversimplification of aggregation of assessment results, the implicit cause and effect relations that some of the

[1] ISAF Strategic Assessment – Briefing to the Bi-SC Staff Talks, December 2007

[2] MCM-0104-2008 – Minimum Military Requirement for ISAC Initial Operational Capability, 27 August 2008

operational plans contain, and the difficulty to design and construct measures of effectiveness and performance, especially when the operational plan already had been constructed without consideration of these measures.

4.3 Plenary Discussion and Conclusion

The workshop concluded that the overall the implementation of assessment is inconsistent across NATO: where there are dedicated resources and expertise then there are areas of good practice. There is a continuing need for Campaign Assessment within NATO, in line with Comprehensive Political Guidance[3], but an overall concept to ensure robust delivery of NATO's campaign assessment requirements is lacking. It was recommended to develop an Assessment Concept that should be based on an integrated process that delivers products at the Tactical, Operational, Theatre Strategic, and Grand Strategic levels, focusing on Operational and Theatre Strategic products while identifying key interfaces between all products. Products would be prepared and delivered by Assessment staff, and supported by Analysis staff that can undertake deeper analysis where necessary. The products should be flexible to meet the appropriate commander's needs, but best practice should be identified for the content and format. The Assessment Concept should be cognisant of the complexity of the operating environment. This has implications for the measures selected, the assumptions pertaining to the relationship between measures, and the tools and techniques. The Assessment Concept needs to be coherent across DOTMLPFI to maximise the benefits of its implementation. The Assessment Concept should be a Bi-SC deliverable.

5 OA WORKSHOP 2009

As in 2008, the OA workshop extended invitations to the nations through the R&T Agency (RTA) Systems Analysis and Studies (SAS) Panel representatives. A number of nations attended and provided briefings. The 2009 OA workshop was constructed around three broad strands of OA work, each having their own sub-objectives:

- Analysis in Experimentation, with the objective to explore and seek improvements to the OA contribution to operational experimentation in NATO, to expose the entire OA community to approaches to operational experimentation as described in the GUIDEx[4], the Code of Best Practices (COBP) for Experimentation[5], and the developing NATO CD&E Guide, and to discuss among a limited group of experiment-focused participants the successes, challenges and potential improvements to OA's contribution to NATO operational experimentation;
- Systems Analysis in Operations, Planning and Assessment, with the objective to explore and seek improvements to the OA contribution to systemic analysis in support of planning and assessment in NATO operations in a complex operational environment, to expose the entire OA community to the NATO approaches to systems analysis (known by a variety of systems names) as it is applied to supporting operational planners and decision-makers in NATO operations, and to discuss among a limited group of systems-analysis participants the successes, challenges and potential improvements to OA's contribution to operational planning, assessing and decision-making;

[3] Comprehensive Political Guidance, 7 December 2007, Para 16b

[4] GUIDEx – Guide for Using and Implementing Defense Experimentation, The Technical Cooperation Program (TTCP), March 2006

[5] David Alberts and Richard Hayes, Command and Control Research Program (CCRP) – Code of Best Practices for Experimentation, Washington, 2002

- Operational Analysis for Capability Improvement (Lessons Learned), with the objective to explore and seek improvements to the analytical contributions to NATO's lessons learned processes, primarily as conducted by the Joint Centre for Operational Analysis (JCOA) and the Joint Analysis and Lessons Learned Centre (JALLC), to expose the entire OA community to the NATO approaches to analytical support to lessons learned and the way results are incorporated into capability improvements, and to discuss among a limited group of lessons learned-focused participants the successes, challenges and potential ways to improve analytical contributions to operational capabilities and capability development.

5.1 Keynote Addresses and Plenary Presentations

Major General Skare, Assistant Chief of Staff for Implementation at HQ SACT opened the meeting in a plenary session, reminding the audience that he understands "the value that [the analytical community] adds and the need for ensuring that [it] is relevant today". However, he challenged the audience to define themselves as problem solvers not as people that have a tendency to "fall in love with the problem."

Brigadier-General Crutchfield, Director of the United States Joint Centre for Operational Analysis (JCOA), provided the first keynote address in which he explained how his organisation has been more successful lately ensuring the utilisation of their analytical products. Consequently, the JCOA is now tasked to maximum capacity to analyse a number of critical operational problems in Iraq and Afghanistan. He pointed out that a team effort between the staff from his 'Engagement' division and the 'Studies and Analysis' division, has made all the difference: whilst the latter produces and delivers the analysis reports, the former visits all relevant stakeholders and interested customers with a focused brief on what the results and recommendations mean for their particular areas.

The second keynote address was given by Mr. Paul Labbé, Head of Science and Technology Capability Management at Defence Research and Development Canada, and chair of the international study group which drafted the GUIDEx. The GUIDEx provides the foundation for experimentation campaigns at ACT and in many nations. Mr. Labbé explained that experimentation itself must be seen as a campaign in which the problem statement is investigated through concept development, analytical games, modeling and simulation, studies and analysis, and event-like experiments, in which equal time is spent between understanding the problem and solving it. He showed that experimentation is a team effort between analysts, scientists and operators.

The morning plenary sessions of the second and third day were filled with a challenging and diverse set of briefings: the role of operational analysis in a campaign of chemical, biological, radiological and nuclear detection capability concept development and experimentation; the ability of and modelling and simulation to support each other; the nature of today's defence problems which tend to be "wicked" and complex and the challenges this brings; a novel technique of disruptive technology games to develop concepts; the NATO ACT Multiple Futures project; the exploitation of work from the NATO Research and Technology Organisation; and the new NATO Defence Planning Process.

5.2 Analysis in Experimentation

The purpose of subdividing the workshop into three strands was to allow analysts to present their work to a peer group, and to discuss the critical issues of how to improve utilisation of analysis results and how to maintain an analytical community.

5.2.1 Analysis Community in Experimentation

Given that NATO and many nations are involved in experimentation and commit significant resources, money and intellectual development, the need for a professional forum was discussed. Often the analytical problems faced by analysts and experimenters are very similar, even across diverse fields. For example, the issue of how to measure situational awareness has arisen in many past experiments, and is now an issue for upcoming experiments. Performing a basic literature review in the defence experimentation field is difficult, as a good body of published knowledge is not available. It is quite typical for projects to start from scratch and reinvent the wheel with regard to commonly measured defence parameters such a situational awareness, network robustness, plan effectiveness and information timeliness—a significant waste of resources and time. Developing a strong, professional analysis community is the primary way in which to resolve this situation. This requires several activities of the defence experimentation community:

- **Knowledge Sharing in Published Literature**: Most professional fields have a publication in which new methods, results and news can be shared. The experimentation community should be encouraged to publish the methods and results of concept development and experimentation campaigns in a professional journal. NATO HQ SACT is currently investigating the possibility of creating an annual, peer-reviewed, online journal with the NATO Research and Technology Organisation or the US Command and Control Research Program.
- **Regular Conferences and Workshops**: Most professions have regular conferences where members can network, share work, educate, discuss common problems, and most importantly, maintain a professional identity. The need for a regular, annual conference for the defence experimentation community was reaffirmed.
- **Training and Continuous Education**: The previous two points will address the need for continuous education to some extent, however, there is little in the way of suitable training for the field of concept development and experimentation. For example, the use of modelling and simulation in support of concept development and experimentation is not well established. The purposes of a professional community are to set standards, develop best techniques and promote learning – the overall result is better quality for the customer. The community should strive to seek and develop appropriate training materials and guides. Although the HQ SACT teaches an introductory course at the NATO School Oberammergau, several nations are interested in more advanced courses focusing on methods.

5.2.2 Experimentation Issues

The issues of rigour and validity in experimentation were discussed. A set of scientific principles, encapsulated within the GUIDEx, guide experimenters and analysts in the correct and scientific method of experimentation; however, these are difficult to maintain with the many organisational, resource and time constraints usually present.

Much of the activity in experimentation campaigns does not fall under the strict scientific definition of ‘experiment’, however, care must be taken to distinguish between an ‘experiment’ – which is the formal, hypothesis test to establish a causal relationship by showing covariance between variables in a controlled environment – and ‘experimentation’ which is now understood in a broader sense as the wide variety of activities that contribute to the overall development of a capability. This can include an iterative cycle of paper studies, modelling and simulation, observational studies, limited discovery experiments, which then may, or may not culminate in a ‘full-blown’ scientific experiment. Although organisational limitations, budgets and politics are often major constraints, the idea of experimentation campaigns need to be emphasised.

5.2.3 Utilisation of Experimentation Results

Primarily, the way in which results from experimentation are used depends on a complex combination of organisational structural issues, leadership and management and budgetary processes; factors that are difficult to change by one single group of people. However, there are several actions that analysts, in concert with concept developers and experimenters, can do to improve utilisation.

- **Focus on Conclusions and Recommendations**: Reports should be 'utilisation-focused' from their outset. This involves carefully structuring, presenting and emphasising the recommendations, and directing them towards appropriate customers and stakeholders.
- **Focus on Gaining Leadership Support**: The success of any effort ultimately depends on critical support of key leadership. Flag and General Officers will have to underscore the need for experimentation by confirming the objectives, re-assessing the concept or conceptual framework, and their stake in the experiment. Without this, the utilisation of results will fail.
- **Focus on Marketing Successes and Results**: Although such activities are not typically the purview of analysts and scientists, the power of good marketing must be accepted. For each experiment, concept development or analysis study, analysts must ensure that accompanying 'glossy' brochures, websites, weekly updates, posters, and tri-fold leaflets are produced in order to spread awareness and gain leadership acceptance. It was suggested that leadership should require that all ongoing and completed work is published in command quarterlies or magazines.

5.3 Systems Analysis and Assessment in Support of Operations

As more nations commit significant resources in Afghanistan and other operational theatres, there is increased recognition of the need to demonstrate progress. SACEUR himself testified to the US Senate Armed Services Committee recently, acknowledging that there was no reliable way to measure progress in Afghanistan. Given the large changes implemented at the operational level in the NATO command structure, which involves the creation of 'Assessment' branches, the time is right for a significant improvement in the way in which NATO measures operational progress. In common with Assessment, the new field of systems analysis and knowledge development is requiring changing NATO operational structures and processes.

5.3.1 Customer Support and Understanding

Given that both Assessment and Systems Analysis are relatively new subject areas in NATO and many nations, there is a significant need for basic training in these areas for customers of analysis products and key leadership. The analytical community should maintain involvement with the relevant training authorities to ensure the quality of training courses.

5.3.2 Ongoing Projects in ACT and ACO to Develop the NATO Assessment Process

The current NATO assessment processes are is in the process of being developed. The 2007 and 2008 workshops, in which almost all the NATO commands were represented, confirmed the need for urgent action on creating an improved assessment process. Currently, the processes used by analysts in operations are ad-hoc and not formalised and there is no NATO doctrine on which to base practice. The publication of a new NATO operations planning process should go some way towards rectifying this situation, although much work remains. Supporting software tools are also in development by NC3A, although they of course depend on the development of the doctrine and processes. The Workshop was an opportunity to demonstrate the various work projects ongoing in the area of Assessment, which are outlined below.

- **Bi-Strategic Command Effects-Based Approach to Operations Working Group** (Bi-SC EBAO WG): This working group has a sub-working group which is refining the NATO Assessment Handbook, and recently began work on the Assessment components of the NATO Operations Planning Process document.
- **ISAF Strategic Assessment Capability**: The ISAF Strategic Assessment Capability (ISAC) project was created at SACEUR's request to rectify the deficiency of assessment at the strategic level. Although there are many beneficial aspects and novel aspects to this project, it was felt that this work was a temporary fix, and that the analysis community needs to work towards ensuring that the project is generalised into a strategic level assessment.
- **Multi-National Experiment 6**: During the conference, the way in which civilian institutions and organisations such as the United Nations perform assessment ("evaluation") was discussed. The Bi-SC EBAO WG is considering these methods in the development of the NATO Assessment Handbook. A brief was given on Multinational Experiment 6 (MNE 6), a campaign of concept development and experimentation which is examining civilian methods and looking for areas where the military can use well developed techniques and practices. All Assessment staffs in the Allied Command Operations structure are encouraged to be involved in this program.
- **NATO Research and Technology Organisation**: A study on Assessment (HFM-185) has been initiated by a request from several nations (USA, CAN, GBR, NLD, DEU). The aim of the study is to share current practices and best practices on Assessment, and determine where these can be applied to NATO practices.
- **United States Measuring Progress in Conflict Environments** (MPICE): Dr. Barbara Sotirin presented the work of her team at the US Army Corps of Engineers. Although a national project, the work is well developed and operationally tested, and should be investigated by NATO to extract beneficial and applicable aspects.

5.3.3 Training

Although NATO civilian analyst posts are filled by pre-qualified experts, there is no such guarantee for the many military posts in the new Assessment and Knowledge Development branches in the Joint Force Commands. The necessity for development of training courses in Assessment was discussed, as there is currently no formal training (outside of limited instruction for exercises).

5.4 Analysis in Support of Lessons Learned and Capability Improvement

This strand featured both the NATO and US national lessons learned process and a wide range of issues were discussed.

5.4.1 Use of Analysis Products in Lessons Learned

Analysis in support of both the NATO and US lessons learned process generally has a well-defined customer from which initial requirements are generated. It was considered that analysis products are used effectively to bring about change across the DOTMLPFI[6] lines of capability development. The importance of keeping the leadership engaged was emphasised, and stakeholder analysis makes an important contribution. Although both NATO and national organisations focus on operational issues, frequently strategic and tactical issues are

[6] Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities and Interoperability

addressed. When tactical issues are observed by the analysis teams in-theatre, they need to be brought to the attention of the local Commander as soon as possible, and certainly in the out-brief as the team departs from theatre. Discussions on training needs analysis resulted in the view that training is a consumer of analysis products that demonstrate the gaps in training (i.e. the T in DOTMLPF recommendations). The JALLC Lessons Learned Database was viewed as a useful tool to be able to communicate information and analysis products in the NATO environment, but an effective search engine is essential for information management.

5.4.2 Organisational Complexity and Political Considerations

Organisational complexity adds difficulty to the handling of recommendations made in analysis reports and often results in time delays. It was noted that the findings and recommendations in JALLC analysis reports, once signed-off by the JALLC Commander, are sent to the two NATO strategic commands for endorsement. Although not ideal, seeking endorsement by HQ SACT and then by SHAPE results in additional delays in the release of reports. It is perceived that developing relationships between the different entities involved in Lessons Learned implementation processes is key: as stated in the NATO bi-strategic command lessons learned directive, the key principles are: cooperation, coordination, communication.

Discussion centred on the fine balance between making findings and recommendations "palatable" and being able to "tell it how it is". An essential skill for report writers is being able to write in a politically acceptable way, yet ensuring that the context is not lost.

5.4.3 Stakeholder Customer Involvement with the Analysis Task

As generally the NATO and national Lessons Learned processes have a well-defined customer, this was not viewed to be a significant issue; however, it is recognised that the rotation of military staff may change the requirement for the analysis study. Within the NATO process the first step in the procedure is to engage with the customer to clarify the analysis requirement.

The key issue with customer involvement is seen to be building trust between the customer, identified stakeholders and the analysis team. Stakeholder analysis at project initiation is seen to be essential part of this trust building. The JALLC uses a 'Coordinating Draft' report distributed to all identified stakeholders to elicit customer review and comment before publication of the final report. The analysis team must not be viewed by the command staff as being evaluators: the aim of the analysis is to identify those factors that lead to lead to systematic errors, not to evaluate the performance of the staff.

5.4.4 Presentation of Results

The presentation of analysis results in a way that assists the user of these results is an essential aspect to consider when considering the output of an analysis study – the final user of the study must be considered from the outset. Writing a well structured report with an executive summary is fundamental. For example, JCOA presents results in a matrix of recommendations against DOTMLPF (+P) lines of capability development, and JALLC adopts the same approach in its analysis reports where appropriate. It was noted that the US system can accept unformatted entries (e.g. reports can simply be embedded) whereas the current NATO Lessons Learned database is constrained to the "observation, discussion, conclusion and recommendation format". It was felt that a "finding, discussion and recommendation" format may be a more natural way of presenting Lessons Learned analysis results and it was agreed that this is an approach that should be investigated by HQ SACT and the JALLC when reviewing the user requirements for the new NATO Lessons Learned database software.

The participants noted the function of the JCOA Engagement Division in providing contact and the push of analysis results to customers and stakeholders. It was recognised that this not being well done in the NATO Lessons Learned process and could be improved. JCOA analysis reports are finally signed off by the report's customer whereas JALLC reports are signed off by the Commander JALLC and then are sent to the Bi-SCs for endorsement.

5.5 The NATO Analysis Community

The proposed changes in NATO structure have brought a difficult challenge to the Operational Analysis community, which traditionally (and informally) has been defined in NATO as those expert civilian staff who employ structured and scientific methods to support decision-making in operations in all fields. Now, operational analysis staff are being distributed in various places in ACO including within new Assessment branches and in new Knowledge Development branches. Additionally, within ACT, Operational Analysis manpower has been cut. Some questions now arise, how do we define "Operational Analysis" and who should be considered as an operational analyst?

This dispersion of OA will not guarantee the professional standing and development of the OA practices. Additionally, including generic military analysts without a professional education or background in OA will further affect the quality of headquarters' OA capability, to the extent that questions arise whether or not OA is present in the HQ.

5.5.1 Professional Communities

Military planners, military logisticians, doctors, teachers, lawyers and engineers have professional communities. There is a large and established body of people whose profession is the application of scientific and structured analysis to support decision-making in various fields in defence and the need has been expressed by many to have an established professional community that can allow the following:

- Establish a professional identity with an external component – recognition by customers – and an internal component – self-identification;
- Education, training and professional development;
- Networking;
- Collaboration on projects;
- Technical development, to include Identification and definition of shared theories and concepts; Best Practices and setting technical, ethical standards and values; and mechanism to share (and validate) work of common interest to members of the community;
- Identification of issues of future importance;
- Community support to include representation, moral & social support, and rewarding and recognising achievement.

5.5.2 An Analysis Community?

We propose that the field of 'Operational Analysis' be considered as those professionally trained analysis staff that are experts in applying rigorous, structured, scientific methods to understand complex problems to assist decision-makers within the military domain with independent advice.

There are significant changes in the OA staffs in NATO: in ACO, OA branches are being disbanded and dispersed amongst Assessment, Knowledge Development, Plans and Command Group branches; in NC3A, there is a project focus in which the OR Division has been replaced by a loosely defined 'OR Community'; and in ACT the OA branch has been reduced to 50% manning in the new PE structure.

There is sufficient evidence to suggest that OA posts in Knowledge Development, Plans and Assessment are still necessary and that additional analysis functions can be justified, such as political, social, and economic analyses. The question is here, whether these other analysis functions should be included into the OA community to form a wider "Analysis Community".

OA functionality within in NATO Commands is needed, whether this is for support to operations, derivation of lessons, transformational activities in CD&E, requirement derivation or events analysis. The need to form an OA community is enhanced as OA becomes more dispersed within the new PE structure.

6 2010 OA WORKSHOP

On 15-17 June 2010, HQ SACT will be hosting the 2010 Operational Analysis (OA) Workshop. This three day workshop will focus on methods of analysis to develop concepts, and aims to bring together Analysts and Concept Development practitioners in order to examine the problems that Concept Developers face and the role of analysis in supporting Concept Development. Within NATO, Concepts are a primary mechanism for initiating and debating change, yet in comparison to Experiments, it has been challenging to apply a wide variety of analytical techniques. It is the workshop's intention to determine analysis requirements and fit analytical methods to problems. The outputs will be used to inform best practice for Concepts Development within NATO. Again nations have been invited to attend the workshop and to present their ideas on Concept Development. The workshop will be a mix of plenary and breakout sessions. Issues to be discussed will include:

- Case studies from NATO and national Concept Development centres;
- The types of issues and problems facing Concept Developers;
- The state-of-the-art with respect to tools and techniques for analysing a Concept;
- Opportunities for Operational Analysis in supporting Concept Development;
- The challenges facing analysts conducting Concepts analysis at various conceptual levels – Capstone, Operating, and Functional.

7 CONCLUSIONS

The OA Workshops fulfil a need in the NATO analysis community to gather on an annual basis the practitioners of analysis within the NATO commands, centres and agencies, augmented by many OA analysts from the national laboratories, centres and organizations. The OA workshop started out to allow for a general display of what the participants were engaged in and worked on in their parent organizations, but quickly devoted itself to discuss specific topics, reaching out to the military staffs to allow their participation to grow understanding and awareness of analytical issues.

The promises of the first OA workshop in 2007 to develop an OA handbook were shelved when it became clear that the first priority of the NATO OA community was to survive the restructuring of the NATO Peace

Establishment Review, and that attempts to build processes and procedures on OA could only disenchant the leadership as they were asking questions on the value that OA brings to their staff work. It must be assessed whether subsequent re-arrangement and re-assignment of analysts to branches not solely oriented on OA may have done the OA cause good or has been detrimental to it. Attempts to build a consolidated Analysis Requirements List were diverted when it became clear that the list was only meant to build a program of work for the JALLC. Several steps have been set to build a NATO OA community and to conduct analysis training. Firstly, the OA workshop is now in an annual rhythm and it is the intention of the OA in HQ SACT to continue to provide this forum. Additionally, a full-week analysis course exists for JALLC staffers introducing them to analysis tasks they need to perform when tasked to investigate operational issues within the NATO operational theatres or during exercises. The NATO CD&E course at NATO School Oberammergau contains three modules on analysis: introduction, concepts analysis and experimentation analysis. The NC3A has build an Operations Research Peer Network, that functions as an internal entity for discussion, training, education and invites guest speakers to talk about special topics in Operations Research. Plans to extend the NATO School curriculum with an introductory course on appreciation of Operational Analysis have been voiced but are still in the embryonic phase.

The 2008 and 2009 OA Workshops have been well-attended and highly appreciated, particularly by the military staffers that either sought a forum to discuss a topic on its analytical merits, or had a desire to broaden their knowledge on analysis and gain exposure to the wider NATO OA community. Fall-out and follow-on actions from the 2008 workshop on assessment allowed for clearer formulation of what assessment in operations planning needed to be. The 2009 OA workshop raised the awareness of some decision makers on what OA stood for. The session on systems analysis and operations planning during this workshop was very well attended and allowed for discussion between analysts and military staff on the current issues, but also gave the opportunity to display national viewpoints and opinions. The discussion on experimentation allowed for the management of expectations from experimentation projects in ACT, and has given rise to possibilities for experimentation looking less like exercises, and more like seminars and war games. The prime example of that is the Concept Development Assessment Game (CDAG) on Maritime Situational Awareness that will be held in May with assistance from the SAS-086 Specialist Team.

A lesson that was learned from the JCOA specialists was that engagement of the stakeholder in the analysis task is vital for the acceptance of the recommendations that fall out of the analysis, whether it is in experimentation, in exercises or in operations. Efforts to engage our leadership to understand what Operational Analysis brings, is vital for our profession. Equally important is the engagement of the analyst in the project, topic or issue for which analysis is provided. Close proximity to the military staff that needs to be supported is needed, so the question arises whether the restructuring of the OA in ACO and re-assignment into other branches will turn out well for the cause of analysis.

A continuing engagement with and support to the military staff by the OA analyst has been identified as the prime reason for a steady request for Operational Analysis in any form. While initially this support may not immediately be focused on solving problems with analytical methods and tools, the inclusion of the OA analyst in projects will guarantee the infusion of logic and subsequently analytical methods and scientific reasoning will make their way into the project's work allowing it to be based on sound principles and common rules. It may be that in operations and exercises, the analytical support will have to be immediate and to the point to be effective, however, in longer term projects such as experiments or concept development, there is ample time to inject analysis.