The Role of the NATO Code of Best Practice for Provision of Analysis Advice in New Operational Scenarios

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ABSTRACT

The new strategic environment and NATO's wider roles and missions have led to new challenges throughout the Alliance forces. The NATO Defence Doctrine identifies processes for the planning and direction of operations, which has resulted in an increasing reliance on decision support tools. At the November 2000 Studies Analysis and Simulation Panel meeting, the US suggested that this topic would be an appropriate one for a collaborative study. Recent advances in information technology have opened new opportunities for the application of decision support tools and techniques in the defence environment.

Examples are to be found in training, exercising and mission rehearsal, and increasingly for direct support of operational planning and decision making. For example, HQ ARRC with its integrated Operational Analysis Branch has supported both IFOR and KFOR 1. NC3A have given support to SFOR and KFOR deployments. In addition analysts from other nations have augmented these in theatre OA teams. The UK subsequently agreed to lead an Exploratory Team. The general title of the initiative was 'Decision Support for Joint Task Forces and Component Commanders' and the final deliverable was to be a Code of Best Practice.

EXPLORATORY TEAM PHASE

During this Phase two meetings were held where a consolidated work programme was developed. National representatives came from United Kingdom, United States, France, Netherlands Germany, and Norway. In addition NATO organisations sent representatives from SHAPE, RHQ AFNORTH, RHQ AFSOUTH, HQ ARRC and NC3A. The work programme was divided into four tasks, namely.

> *Task 1: Carry out a User Requirement Definition Study to identify the decision making processes that are to be supported.*

It is essential that any analysis support has a clear understanding of the decision making processes in the appropriate organisations (HQs). Whilst it was difficult to precisely identify all higher HQs in the NATO structure which could benefit from OA, surrogate HQs in the form of, for example, RHQ AFSOUTH, RHQ AFNORTH and HQ ARRC were considered representative. It was also fortuitous that these HQs had, or soon will have, small, embedded analysis cells, which can give authoritative assessment of the HQ decision making process. It was intended that these cells were the main source of such information, but none of the new teams were set up during the timescale of this current work. General information was included from operational HQs such as SFOR and KFOR. This task also had utility for other RTO groups. In addition it was necessary to have a common set of definition of terms used in the different scientific and analysis communities.

> *Task 2: Carry out a census on Decision Support Tools and Techniques to identify the range of tools and techniques that are currently being used within Nations and others that have potential applicability.*

This task generated interest by other NATO initiatives and a number of such initiatives has been corresponding members of the Team. Although the census concentrated mainly on current capabilities it was recognised that techniques that are emerging from the research community were included.

> *Task 3: Catalogue Recent Decision Support Experiences and Lessons Learned from Nations and NATO HQs.*

There have been a number of recent examples where decision support has had an impact on the planning and conduct of recent operations. This task sought to capture their experiences and further demonstrate to the customer community the range of techniques that are available. In particular, recent Balkans operations have generated considerable interest and the respective deployed operational headquarters were invited to share their experiences. This task started to build up the fundamental lessons that have been learned and was be a precursor to collation of these lessons into a 'Code of Best Practice'.

> *Task 4: Develop a Guide to 'Best Practice' for successful decision support to commanders. This will cover analysts, capabilities, tools and training.*

This was seen as the major output from this Technical Team which would greatly benefit the nations analytical communities. It was linked directly to the lessons learned from recent experiences of operational support and identified those capabilities of fundamental

importance to analysts. In particular it considered the training requirements for analysts and the characteristics which best suit analysts to this type of direct support to military commanders. The Guide is essentially in two parts. The first part is seen as being a set of principles that have been seen to be of longstanding and proven utility. The second part will contain practical examples of analysis support and will be continually updated as the experience base grows. In addition a 'Two Pager' document giving a very brief overview of operational analysis for the 'senior decision makers' was produced.

RESULTS OF THE EXPLORATORY TEAM PHASE

The findings of the Exploratory Team were that there was sufficient interest to establish a Technical Team to implement the devised work programme. Other Nations were encouraged to participate and Turkey and Sweden joined the group. Australia also became a corresponding member.

TECHNICAL TEAM MEETINGS

The process of developing the Code of Best Practice was through a series of team meetings and mini-workshop sessions (6) over 18 months. In addition an Open Meeting was held in Winchester, UK in October 2002. At this meeting the Team Task leaders reported on progress of the Programme of work. Also 12 Papers were presented from: UK, US, CA, SW, NC3A, and AUS. The topics covered practical experiences; new techniques and lessons learned from analysis in support of commanders. The meeting resulted in a number of new ideas being incorporated into the work programme. A CD was issued containing all the Papers.

During the discussions at the meetings there was support for an additional output from the Team. This was termed a 'Marketing Document' or 'Two Pager,' which was aimed at senior Commanders. It was a summary of the main advantages of using analysis in their decision making. It had a simple layout and structure and Frames operational analysis by answering the: Why, What, When, Where, Who, & How of analysis. The '2 Pager' is at Annex A to this Paper.

- WHY should I include operational analysis in my processes/staffs?
- WHAT are the types of activities and products operational analysts provide?
- WHEN do I use operational analysis?
- WHERE is operational analysis conducted?
- WHO are operational analysts?
- HOW do I use operational analysts?

CURRENT STATUS OF THE CODE (JULY 2004)

The Code has contributions from participating all Nations and Headquarters and the final draft has incorporated a wide range of views. After the meeting of the team in February 2004 in Istanbul, Tu, a final draft was completed. The NATO Research and Technology Organisation toward the end of 2004 will publish this. In total the Code is ~60 Pages, including 30 pages of Annexes of useful checklists and examples of recent operational analysis.

STRUCTURE OF THE CODE

A summary of the major sections of the Code is included in this Paper.

EXECUTIVE SUMMARY

The following is an extract from the Executive Summary:

> 'The aim of NATO Technical Team SAS 044 'Decision Support to Combined Joint Task Force and Component Commanders' has been to promote an alliance approach to decision support to Commanders. It has sought to establish the current status of analysis in direct support of Commanders within NATO, and Nations, has concentrated on the general principles for successful analytical support, rather than identification of specific tools and models.
>
> NATO operational Headquarters have become involved in running operations and have drawn on Operational Analysis (OA) in support. Experience has shown that OA is an integral part of the HQ decision-making process – bringing quantitative analysis with a clear audit trail to inform the decision. OA does not just answer the question posed but seeks to identify 'hidden' concerns, branches and sequels.
>
> In the Balkans (Bosnia and Kosovo) analysts have been deployed through HQ Allied Command Europe Rapid Reaction Corps (ARRC), NATO Consultation, Command and Control Agency (NC3A), RHQ AFSOUTH, and through nationally deployed OA teams. Recently, 2004, NATO analysts have deployed to support ISAF in Afghanistan. These experiences offers the ideal opportunity to create a Code of Best Practice (COBP), which incorporates these NATO and National experiences and place on record the lessons identified and learnt.
>
> The guidance in this Code is intended to assist analysts and military staff in understanding the principles of providing decision support to Commanders. It is not intended to be prescriptive, nor exhaustive, and is based upon knowledge from experience gained on recent operations. This Code contains pertinent information aimed at helping prepare, deploy, integrate and support

OA teams in the field. In addition to the COBP, the team has developed a short summary document (two pages in length), explaining the role of operational analysis in a form more accessible to those working under short time scales, such as senior military commanders. This summary document may be found in the annexes of this code.'

CHAPTER 1: INTRODUCTION

This defines the characteristics of front line operational analysis. It also explains why it is timely to produce a NATO COBP for decision support. For the purposes of this Code of Best Practice (COBP) the following definitions have been assumed:

- Operational Analysis (OA) is the *'application of scientific methods to assist executive decision makers.'*

- Decision Support is the *'application of the best available analytical tools and/or techniques to support the decision process.'*

OA may be used in both "deliberate planning" and "crisis action planning." Deliberate planning occurs during peacetime, and takes place over a period of months. Deliberative planning is collaborative, based substantially on assumptions, and allows long lead-time analytical work to influence key decisions. Crisis action planning is done during crises, and deals with the real situation, enemy and available forces, and is heavily time constrained. The OA support provided in both of these situations will have the following characteristics:

- Independent: Refers to the unbiased nature of the Operational Analyst's support—the Operational Analyst typically does not have a vested interest in any one of the unique functional-area perspectives of the members of the Joint staff.

- Credible: Refers to the support being defendable. The Operational Analysts role is to bring logic and structure to the often otherwise highly subjective nature to the decision-making process.

- Understandable: Refers to the Operational Analyst's ability to communicate with the operators and decision-makers. The Operational Analyst reduces the dizzying array of information into the essential nuggets that inform the decision process and provides that knowledge in a format meaningful to the commander and staff.

There are specific characteristics and constraints to the analysis provided in direct support of commanders. For example:

- Timeliness: The time scales available for answering problems are usually short with a primary response window of 2 to 72 hours.

- Data Set: The data used is usually current/near term, often directly using data derived directly from operations, trials, and exercises.

- Problem owner: Normally an 'individual' rather than a 'committee/ community.'

- Deployability: OA capabilities are distributed at various sites and there are likely to be only small numbers of analysts deployed in the field.

- Wide scope of questions: Reliance on the wider analytical and scientific community.

- Resource constraints: These tend to be what the commander has available in theatre, rather than financial.

CHAPTER 2: HOW OA SEEKS TO HELP DECISION-MAKING

This chapter relates operational analysis and the decision-making processes within a headquarters, and where an operational analysis cell should be placed in the command chain. It also summarises the position of decision support within the new NATO command structure.

OA can be used to address a wide range of problems and assist in finding a solution through the structuring, collating, and organisation of data. Figure 1 shows a generic decision process, for a military organisation. OA can provide advice throughout the decision-making process, but makes substantial contributions to the areas shown below.

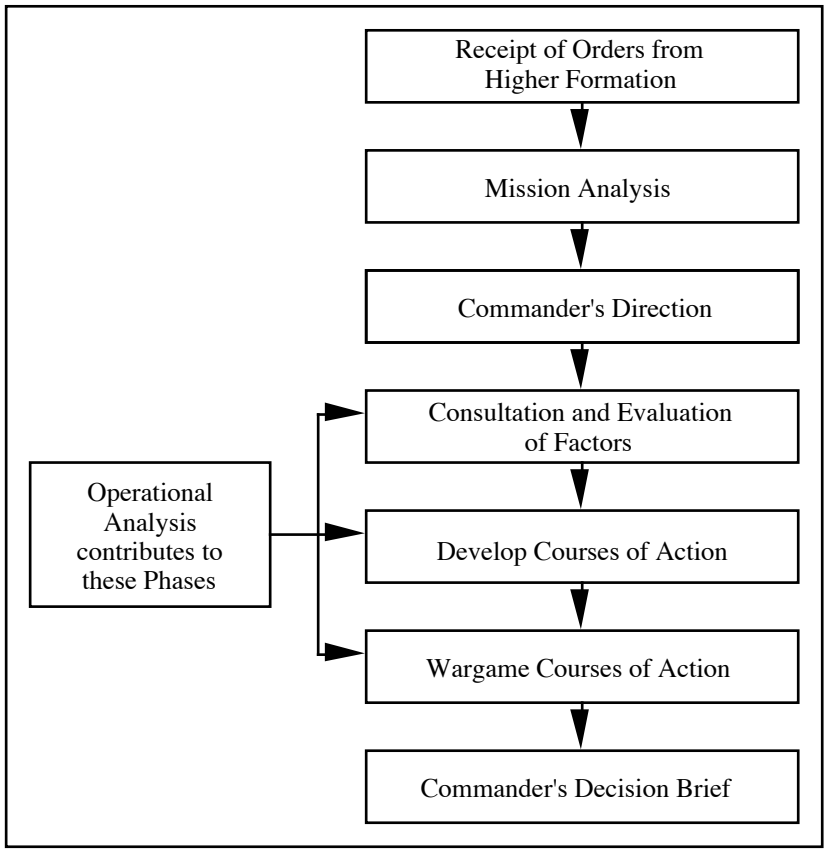

Figure 1: Contributions of Operational Analysis to the decision-making process.

OA IN THE COMMAND CHAIN

It is important that analysts make commanders aware of the range of their capabilities, as not all officers will have had prior exposure to direct analysis support. Analysts need to be proactive, have the ability to produce timely analysis and 'sell' the analysis product. Wherever possible, the tasking process should be explicitly defined and there should be a clear understanding throughout the command chain of how the OA cell carries out its function.

There are a number of different templates as to the location of the OA cell within an HQ. OA can contribute to the planning and decision processes in all parts of the HQ and hence analysts need a degree of freedom to work across the HQ. In general the OA should be responsible to a single senior individual as high up the command chain as possible. There are good examples of OA cells formally reporting to the Chief of Staff (COS) of an HQ, even if the specific tasks may have originated within branches (logistics, planning, engineers, etc). OA cells have also successfully functioned from within an individual branch but the key is that the OA capability is seen as an HQ-wide asset.

It is important that analysts are seen as an integral part of the HQ (even though in many instances they may be civilian); they should be involved with all the activities with the HQ. In the event of the HQ deploying on an operation, the analysts would also deploy. Thus they must be seen as a normal staff branch and should take part in all relevant training and exercises. OA to support HQ decision-making requires as much training and exercising as any other HQ branch function. It is through this day to day interaction with HQ staff that the value of OA can be routinely demonstrated and trust built up between the analysts and HQ staff.

CHAPTER 3: OPERATIONAL ANALYSTS

This chapter discusses the operational analysts themselves, from the selection of personnel and team leaders to the provision of reachback analysis.

SELECTION OF PERSONNEL

The importance of the deployable scientist's personality and overall training becomes apparent when considering team issues. The team need the professional skills to be effective and the personality to make a positive contribution to team cohesion, effectiveness, and safety. Team members need to meet the analysts' values listed below. Ideally, all these criteria should be considered when recruiting staff.

Analysts' values

- Be loyal
- Be frank yet tactful
- Be proactive
- Be 100% honest
- Be an expert
- Be helpful
- Be a team player
- Be a smart worker
- Be timely

TEAM LEADER

It is essential to have a single team leader, as the military dislike a confused chain of command. The team leader may be civilian or military, for example the UK experience has been with a civilian team leader, whilst the US normally has a military officer as team leader. The team leader should be technically competent and know the primary reachback organisation.

The team leader must have the confidence and competence to be able to make decisions both about the work and the team's safety even when unable to contact the home establishment. They must know the limits of their authority, and must be given the confidence that they will be supported after the event provided decisions are taken within that authority. Finally, the leader must have the confidence of the commanders and staffs.

TEAM COMPOSITION

To make best use of the warning time staff selection and as much staff training and exercises as practicable should be completed in peacetime as the flexibility for such activities reduces when an operation is about to be launched. Furthermore, conducting training and exercises during peacetime reinforces on the individual the commitment they have made.

Accommodation and working areas are usually very cramped, and a team should be as small as practicable for the expected workload. A template, which has shown to be successful, is a team is comprised of about 4 people capable of working in two elements of 2 and a staff officer. In a multinational HQ, such a team composition will inevitably lead to different Nations being represented within the OA cell. All members of the OA cell must be deployable and may be prepared to work in shifts whilst deployed.

However, it should be noted that mixed teams where the military members also have analysis experience could have a different composition to that proposed. The OA team will almost certainly require administrative support. As such the OA cell may contain up to eight members; that is between two to six analysts, a team leader, and a staff officer. The staff officer, should be staff trained and numerate, and hold an appropriate rank (approx. OF 3 / 4 or Capt/Major).

The staff officer should be able to offer advice on military issues and liase with all involved military organisations and elements when required. The officer may wish to create a permanent network of named Points Of Contact (POC) within the various branched of the HQ. Again, should the military members of the team have analysis experience, a different approach to that proposed could be used.

One member of the team should have a secondary duty as IT lead, responsible for the team's equipment and any IT interface with host HQs. It is worthwhile considering the appointment of one of the analysts as the team's information manager. This manager should be responsible for the staff routines for handling and storing data within the OA cell, and for implementing proper data information management.

ANALYSIS REACHBACK

Reachback is a process whereby a question or request for data is sent by a deployed analyst to a separate organisation for action that is beyond the means of the deployed analyst. The responding organisation may be in the operational theatre, or more likely home based. In many instances the role of reachback is to carry out detailed analysis, input of specialist knowledge, or the application of detailed models. Factors that should be taken into consideration when using reachback are:

- Communication between the deployed analyst and "reachback" analysts.
- Situational awareness of reachback analysts.
- Time difference between theatre and the home-base.
- Operational security.
- Realisation of time scales to achieve an answer.

Reachback is an important feature, which extends the capability of the deployed analysts. The commander's and their staff must be aware of this capability, but it must be used via the deployed team of analysts. The use of reachback requires a specific point of contact, who may have to be locatable at the home base for twenty-four hours a day. Depending upon the operational tempo/urgency of the operation, a call out system of subject matter experts may be necessary. The use of reachback is also dependent upon a reliable, and if required, secure, line of communication between the deployed analyst and the specified reachback organisation.

During a high tempo operation, analysts working at the home base in a reachback role are unlikely to be able to maintain a high level of the most up-to-date situational awareness. This will limit the types of analytical tasks which can be usefully carried out at the homebase.

CHAPTER 4: OPERATIONAL ANALYSTS ON DEPLOYMENT

This chapter discusses a number of the issues to be considered prior to, and during, a deployment of operational analysts, for example: medical fitness, training requirements, and clothing and equipment.

READINESS

A deploying HQ must have confidence that its OA cell will be available if required. To this end there should be an agreed readiness state from which the OA team plans are developed, the team is assembled and resources are apportioned. Readiness time is the time within which a unit can be made ready to perform the tasks, for which it has been organised, equipped and trained. It does not include transit time. During this period the scientific staff deploying should be assisting the planning at the deploying HQ, handing over existing tasks

to alternative staff, and preparing themselves professionally and personally. Readiness requirements for OA teams will be dependent upon the operational status and mission of the HQ. For example OA staffs within HQ ARRC are generally at 15 days notice to move.

MEDICAL FITNESS OF PERSONNEL

Individuals need to be fit and sufficiently healthy to cope with the rigours of an operational environment. The Code suggests levels of personal fitness, inoculations and medications required by deploying analysts.

TRAINING OF PERSONNEL

Operational Analysts provide support to many aspects of the NATO armed forces and consequently civilian staff may be required to deploy to operational HQs in theatre or on exercises. The legal requirements and appropriate duty of care for individuals depends upon their nationality and employment status; this is an issue of which the team leader will have to be aware. To fulfil this requirement, only suitable and appropriately trained staff should deploy to an operational theatre. The needs of an analyst at a high state of readiness must be recognised by the individual's parent organisation, who must provide the necessary resources to meet the obligations.

It is highly recommended that any organisation deploying civilian staff to an operational theatre should assign a deployments officer who is responsible for advising on and ensuring compliance with the necessary preparations. All preparation and training should be realistic and be based on the worst case scenario rather than the most likely or optimistic situation.

The practices outlined in this section are generic guidelines for all operations and all departments. However, common sense should be applied. The preparation may be different for short deployments, particularly those to rear or benign areas. An appropriate medical should always be mandatory, as should the arrangements for welfare support and the keeping of proper records. The Code suggests a series of training requirements.

CLOTHING AND EQUIPMENT

The decision to wear military (combat) or civilian clothing is dependent upon a number of factors including the military or civilian status of the analyst, NATO and national policies, the work of the scientific team, and where in the field they will be operating. If a nation or body requires military clothing or equipment for civilian analysts, then that nation or body must provide it.

The arguments for and against civilians wearing military clothing are:

- Civilians wearing military clothing could be at greater risk because they look like the military.

- Civilians wearing civilian clothing in a predominately military environment will stand out and may be confused with VIPs or interpreters, and as such may be the target of choice for snipers and terrorists. This risk was seen as sufficient for SFOR interpreters to be issued UK uniforms in Bosnia.

In practice, analytical staffs have found it much easier to be accepted into a HQ, gain access to sensitive information, and to administer themselves if they are wearing military clothing. However, if military clothing is worn then it must be worn according to national dress codes. Kit lists for military clothing and equipment are included in an Annex. Irrespective of whether the analyst wears uniform or civilian clothes, it is essential that they carry appropriate identification, both national (Member of Ministry/Department of Defence/Defense) and international (NATO, Geneva Convention card stating the right to be treated as a prisoner of war).

The ultimate decision on the choice of dress must remain with the commander of the headquarters, who must balance the operational risks with the responsibility for providing a secure environment for all personnel.

One possible additional reason for the use of military clothing is that analysts may be required to wear NBC protective gear. NBC suits are designed to be worn over military clothing, should the suit be worn over civilian clothes, they are likely to be ruined. When considering NBC protective gear it should be remembered that respirators need to be fitted to a specific individual and may require corrective lenses. The lead time for lenses, and the requirement for training, mean that it is necessary to issue and fit respirators in peacetime.

Field equipment includes all of the non-clothing items that will allow an individual to operate with reasonable comfort in austere conditions. As a minimum this must include a sleeping bag and a rucksack. However some deployments require the full paraphernalia of living in the field, e.g. webbing, mess tins, water bottles, etc. If the individual deploys in military clothing, then the field kit should all be military issue from the analyst's home nation or deploying body.

The OA cell may, depending upon the deployment and their own National legislation, require their own form of transport, e.g. hire car. Any analyst being deployed should also consult their own Nation's legislation on the carrying of weapons for self defence.

COMPUTER EQUIPMENT

The HQ will have its own IT, however in addition to this, it is preferable for the OA cell to have its own IT assets. This is essential to allow the OA team to run tools and models that are not accredited for use on the HQ command systems. Determination of the IT requirements should be the responsibility of an IT manager appointed by the OA team leader. This could be a set of laptops, operated either stand-alone or with the equipment to configure a small LAN, plus printing facilities.

The OA team needs to communicate its results to the military staff. To this end, it is essential that the OA team IT and communication requirements (e.g. secure, insecure, voice, fax, e-mail(including reachback requirements)) are made known, particularly to the Computer

Information System (CIS) staff within the HQ well in advance of deployment. It should also be confirmed that the IT assets taken are compatible with those of the HQ. When using both HQ and the OA cell IT assets, the experience of analysts working at AFNORTH and HQ ARRC suggests that the best combination is the use of HQ CIS to communicate and promulgate OA advice, and the OA teams own IT assets to carry out the analysis and run any OA tools or models.

The means of deployment of the equipment is an issue that the IT manager will need to address. The aim should be for a deployed analyst to arrive at their place of work with sufficient capabilities to enable them to offer immediate, at least partial support to the military customer. A sensible option is the preparation of laptops loaded with all likely tools, models and data to support the envisaged operations.

Implicit is the assumption that the OA "suitcase" includes a laptop computer of sufficient capability to execute the necessary software. Consideration should also be given to different means of transferring and backing up data (USB pen drive, floppy disks, CD writer, PC link cables, and network capability) and whether or not print capability will be required. All equipment - personal, IT or team - should be clearly marked and double wrapped for protection from damp and dust. There is also a training implication. The operational analyst must be expert in at least the critical tools, and ideally would have a working knowledge of any additional tools identified.

CHAPTER 5: DECISION SUPPORT: TOOLS, TECHNIQUES, AND DATA

Decision support tools, techniques and data used by the analyst are presented in this chapter. There are recommendations relating to a software suite for the provision of operation analysis support to a military operation. Issues relating to data requirements, information management and data collection within the context of decision support are also included.

DEFINITIONS AND EXAMPLES

For the present context, a *technique* is defined as a general description of the analyst's approach to solving a problem–the way he/she works to carry out the tasks at hand. Examples of common OA techniques are simulation, statistical analysis and spreadsheet modelling.

To apply a specific technique, the analyst may need to use a variety of *tools*—devices used to carry out particular functions—to collect and analyse available data, and to present the necessary information to the decision-makers. Some examples are spreadsheets, statistics package and simulation software.

These broad definitions should not be taken too literally. It is often difficult to draw sharp borders between the two terms. Embedded in the analyst's efforts is the need to collect, synthesize and analyse data. Proper handling of data (retrieved and produced) is critical. This

information management includes cataloguing for future reference and correlating related information.

GENERAL COMMENTS ON TOOLS AND TECHNIQUES

OA can be used to support the military in a wide variety of areas including in barracks, whilst on exercise, and on operations (as shown in chapter two of the COBP). The types of OA tasks required to support a military operation change over the life of the mission, and will vary with the operational environment and customer demands. Different tools/techniques will be used depending on the: command level involved, phase of the operation, and the intensity of the conflict. The important thing for the analyst is to be problem centric at all times, not tool centric. The problem is the issue, and it is more important to provide timely answers than to perform detailed analysis with academically preferred tools.

Analysis support at strategic, operational and tactical level will differ in appearance and detail. Tools and techniques used at the strategic level will often be less specific than those used at the tactical level. At the tactical level tools must be able to cope with specific details of systems commanded and controlled at this level, e.g. weapons, communications. At the strategic level the aggregation of data of different types and from different sources becomes important, and this creates its own challenges. Tools and techniques at this level should be able to deal with different types of data, collected in varying ways, and be flexible.

The changing nature of the operation also influences the type of tools and techniques that will be of use. There are several phases within an operation; planning/preparation, deployment, execution, recovery and post operation work. A wide range of tools and techniques are useful in the planning phase and much of the decision-making is done here. During execution, available time for analysis will often decrease, and time-consuming tools and techniques become more difficult for use in a timely manner. The control of the operation may still require decision support, but data collection and analysis will grow in importance.

At the end of the operation the analyst may be asked to support the evaluation of the mission. Tools and techniques used during the planning phase may be used again to determine the extent to which the operation arrived at the predefined objectives. Data collected during the operation can, or even should be, used to support procurement and policy studies and doctrine improvements in post operation analysis.

In operations with a high operational tempo, time is limited. The demand is for tools and techniques that give results quickly. The operational tempo in warfighting operations will remain high. Operations with lower tempo (e.g. longer periods in Peace Support Operations) give the analyst additional time to use tools and techniques that are more detailed.

A SOFTWARE SUITE FOR IN-THEATRE SUPPORT

This section suggests a suite of software for deployed analysts based on experiences gathered during a range of recent operations. To specify a helpful suite of software, special consideration is given to the early phases of in-theatre support, where OA tasks are often

similar across different types of operations. While the complexity of tasks may vary, the urgency is most likely high (quick response). Therefore, the application of tools should focus on the ”quick” as opposed to the “perfect”; flexibility over customisation. Thus, the analysts will need a selection of simple, fast running tools/techniques that are flexible for a wide range of question, scenarios, situations and conditions.

This COBP will not suggest a fixed suite that should be used in all situations. Rather, it is a set of core tools that should be tailored according to the analyst’s capabilities and the operational environment. These tools may not be available in theatre, so the analyst should be prepared to bring his own.

The suggested tools for inclusion in the software suite are the following.

Critical Tools

- Word processor, spreadsheet analysis, visual aids. For example Microsoft Office™, Lotus Notes™.
- Data base. For example, Microsoft™ Access.
- Project management package.
- A statistical package.
- Information portability software. For example WinZip™, Adobe Acrobat™.

Suggested Additional Tools

- An all-purpose compiler.
- A simulation package.
- A mathematical package.
- A geographic information system.
- A decision support program.
- Optimisation software.
- Multi criteria analysis software.
- System dynamic software.
- An image processing program.

- A screen capture program.

Readers may be surprised at the absence of simulation techniques in the software suite. Simulation modelling has a strong position in military OA environments, and customised simulation models are often used in the preparatory phases before an operation or by a reach-back element outside the theatre of operations. Simulation models may be of particular use when confronting a known enemy and scenario. In this situation a model may be prepared in advance and use to provide 'quick' analysis when in theatre. However, this process is often complex and time-consuming. As a result, customised simulation models will be of marginal value in theatre, and are therefore not considered in this section.

OPERATIONAL DATA

Operational Analysis needs data as input, and will produce new data as a result. The data are used for analysis, recording lessons learned/noted, archive/research, version management, and sources references. This can occur at any phase of an operation from planning, preparation, deployment, execution, recovery, and post-operations.

Metadata is defined by the Oxford English Dictionary as *"a set of data that describes and gives information about other data."* Essentially metadata comprises the sources and nature of the data collected for analysis. This includes (in the OA case) the following aspects of the data: the time, data and location of collection or origin of the data; the collection method including the sensor(s), platforms and operators; the storage and transmission method and the range of dissemination. It may also include the categorisation and processing methods of the data collected.

Most data considerations should be handled as early as possible in the planning and preparation phases. The data collection plan should be based on the anticipated analysis tasks both during and after the mission. This is often overlooked. Wherever possible the requirements of the data collection plan should be seen as an essential part of the planning for the operation.

During deployment and execution, it may be difficult to make significant adjustments and it may be possible that all the analysts efforts are focused on implementing the collection plan. At the end of operations every effort should be made to finish up the collection plan and catalogue and archive the data for timely exploitation. The data collected should be summarised as quickly as possible into salient facts, which can be used by leadership to respond quickly and effectively to key questions. If an operation continues, it is imperative to facilitate an effective data collection hand-over.

The need for post-conflict data collection should be acknowledged early and approved at as high a level as possible (especially if the requirement originates from areas outside the military command structure). Any experts required should be identified and trained as soon as the specific data collection requirements are known, and the resources that will be demanded in theatre to support the team need to be allocated during initial planning for the operation.

Recent experiences have demonstrated that information management within the operational environment is not well understood and this means that the OA cell may have to provide a local solution. It is not the scope of this text to provide an exhaustive manual on the proper handling and collection of data. Rather, the next paragraph will discuss some important information management issues for operational analysts in theatre.

PLANNING AND PREPARATION

The collections of data during an operation are of crucial importance to analysis conducted both during and after operations. As such, the data requirements should be thought out before the operation starts. Some effort may have already been considered with a strategy to task decomposition of the operation: this should be capitalised on. It will not be possible to identify all data needs before deployment, but some preparatory work on the following questions could prove beneficial:

- What are the key things the commander will want to know?
- What measures of success will be used?
- Which data should be collected from the start?
- Where can data be found?
- What data are needed to use the tools brought into the theatre?

If analysts do not deploy to theatre, data collection may become impossible, or at the least very hard. It is therefore even more important to ensure that data collection during the operation is seen as an essential part of the operation.

CHAPTER 6: RECENT EXAMPLES AND LESSONS IDENTIFIED

This chapter comprises recent decision support experiences and lessons learnt from National and NATO HQs. It includes specific examples of operational analysis used in decision support in operational situations.

EXAMPLES OF OA ANALYSIS AND DECISION SUPPORT

This section contains details of generic and specific examples of OA applications offering decision support to Component and Combined/Joint HQs. They cover the range of operations from peace support operations (PSO) (i.e. non warfighting) to medium scale warfighting. Tables 6.1 and 6.2 list the examples. Table 6.1 shows generic examples. The examples in table 6.2 focus on a specific situation. For each example, the following characteristics are given:

- Background: circumstances of the operation and the issue requiring decision support.
- OA Action: task required of the OA team.
- Timescale: time available for analysis.
- Data requirements: type and detail of data required to analyse the subject issue.
- Decision supported: the commander's decision(s) as supported/advised by the OA advice.
- Report format.
- Significant lessons: any significant lessons identified as a result of the OA study.

Table 6.1: Generic examples of OA applications offering decision support to Component and Combined/Joint HQs.

Generic Examples for OA in Support of Military Operations		
Class/Title	Phase	Keywords
Peace Support Operations	Execution	Cessation of hostilities. Measures of Normality. Crime rate. Commodities and utilities availability.
Warfighting	Planning	Force comparison. Weapon performance. Accuracy of weapons. Measures of Effectiveness; Success Indicators.

Table 6.2: Specific examples of OA applications in offering decision support to Component and Combined/Joint HQs.

Specific Examples of OA in Support of Military Operations		
Class/Title	Location/Phase	Keywords
Measures of Normality		
Overall measures of normality	Balkans/Planning and Execution	Crime. Commodities availability. Utilities. Violations of ceasefire.
Crime rate measure	Balkans/Execution	Serious crime. Attacker/victim ethnicity.
Measures of Campaign Success/Progress		
Campaign success	Afghanistan/Execution	ISAF I. Crime statistics. Patrol reports.
Risk Assessment		
Security measures	Afghanistan/Planning and Execution	Control and processing of delegates. Security.
Risk from rebel force attack	Sierra Leone/Planning, Preparing	Friendly and enemy order of battle. Fire support.

Contingency Planning		
Force withdrawal from PSO (war starts)	Bosnia/Planning and Recovery	Withdrawal from PSO during actual change to warfighting, escalation.
Air Support	Kosovo/Planning, Preparing	Land, limited Air support.
Prisoner of war handling	Gulf War 2003/Planning and Preparing	Surrender rate. Guarding requirement. Law of Armed Conflict.
Course of Action Assessment		
Air attack effectiveness	Balkans air war/Execution	Weapon usage, precision weapon scarcity implications.
Urban close air support	Gulf War 2003/ Execution	Weapon accuracy, destructive power. Collateral damage.
Measuring Enemy Capability		
Force ratio for attack planning	Desert Storm 1991/ Planning and Preparing	Casualties. Friendly and enemy order of battle (orbat). Weapon performance.
Integrated air defence system (IADS)	Desert Storm 1991. Kosovo 1999. Gulf War 2003/ Planning and Preparing	Suppression of enemy air defences (SEAD).
Mission Evaluation		
Mission evaluation	Afghanistan/Execute and Post operations	ISAF III, Mission Evaluation
Technical Issues		
Ship visibility/camouflage	Gulf War 2003/Planning and Preparing	Visual detection. Climatology. Counter shading.
Ship vulnerability	Adriatic 93-95 / Planning and Preparing	Sea mine threat. Airborne sensor performance.

The Code then gives brief details of the analysis. A few examples are included in this Paper.

Measures of Normality

Title.	D2.1 Assessment of the Measures of Normality.
Background.	Peace keeping operations Bosnia. An OA team deployed with ACE Rapid Reaction Corps: Dec 95 to Sep 96.
OA Action.	Assess progress towards normality.
Timescale.	Ongoing monitoring/analysis throughout operation.
Data Requirements .	Price and availability of basic commodities (fuel, power, potable water, foodstuffs), crime rate. Violations of the Dayton Accords/ co-operation with Kosovo Force (KFOR). Balance of power between warring factions. Co-operation with the Civil Administration (smuggling, impersonation of government officials, collection of unofficial taxes, civil demonstration). Schools: number (percentage) open: total, by location. Access to healthcare. Traffic flow. Demilitarisation rate. Minefield clearance (locations cleared, area cleared). Current Population by Ethnicity and Status (and location). Location/ identity of displaced persons/ refugees.
Decision Supported.	Assessment of progress towards normality. Assessment of effectiveness of Peace Support Operations (PSO) force. Targeting aid and reconstruction effort (i.e. to co-operative communities). Monitoring violations of the Accords demonstrated, contrary to general perceptions, that it was the Bosnians not the Serbs who were responsible for most of the violations once the

	Accords were in place. This information was fed to the commander to ensure that pressure was brought to bear correctly and fairly, so avoiding false accusations and unjust responses. Deconfliction of troops and displaced persons/refugees.
Report Format.	Regular briefings and written reports (daily, weekly, monthly).
Significant Lessons.	This task is highly data intensive requiring substantial effort from troops on the ground. Considerable information operations (IO) benefits from regular contact between troops and the local population. This work demonstrated the worth of having analysts "on the ground".

Risk Assessment

Title.	D4.1 Security Measures.
Background.	Peacekeeping ISAF had security concerns about the admission process for delegates to the 2002 Loya Jirga in Kabul. In particular, the task of processing the large number of delegates expected was significant, and there was concern that insufficient attention was being paid to the problem.
OA Action.	A model of the admission process was generated to illustrate delays in getting delegates in.
Timescale.	Short term, one off action.
Data Requirements .	Likely attendance, rate of arrival, search procedures.
Decision Supported.	Analysis proved that the proposed search/ security resources were insufficient for efficient processing of delegates in timely manner. Resources allocated to LJ security were substantially increased (with successful results).
Report Format.	Results were briefed to ISAF Commanders in time to influence the LJ planning process.
Significant Lessons.	OA is applicable to short term, unique problems, and can provide insight and quantification that purely subjective analysis would not produce. Value of a quick simulation tool for visualisation and briefing.

Title	D5.2 Warfighting. Kosovo.
Background.	Permanent Joint HQ (PJHQ) J5 OA reports were generated for Chief of Joint Operations (CJO) and the Assistant Chief of Staff(ACOS) J3 to support the UK planning for possible Land operations in Kosovo. This was war-fighting at Joint, medium scale. MNB(C) contingency planning for possible Land operations in northern Kosovo (Podujevo). This was a multinational (NATO) war-fighting scenario at Brigade level. The scenario was centred on the Podujevo bowl, a large flat expanse of land at high altitude surrounded by mountainous terrain. The CONPLAN assumed that adverse weather conditions would prevent any air support for up to five days.
OA Action.	OA was used to assess the risks of a forced entry into Kosovo. Military staff from the HQ (G3, G2, and Artillery) conducted the wargame and a team of two OA analysts adjudicated, analysed and then presented the results. Alternative courses of action (COA) were examined and compared in terms of force ratios, probability of success, duration, personnel and equipment casualties caused and identified risks. Another particular question asked concerned the amount of artillery ammunition required. This was required by the UK Chiefs of Staff (COS) who were debating an order for a buy of artillery ammunition.
Timescale.	The gaming was conducted in theatre over a period of two weeks. One week was required to set up the model and collate the required data and one week to game the concept of plans (CONPLAN) and its subsequent iterations.
Data Requirements.	Enemy and friendly orders of battle, weapon and equipment performance data for the wargame and other analysis tools.
Decision Supported.	The wargame identified fundamental flaws in the existing concept of plans highlighting friendly forces susceptibility to enemy artillery fire. The wargaming predicted an unacceptably high level of friendly casualties prompting the Commander to request that the concept of plans was completely reworked. A number of new COAs were then developed and subsequently wargamed in order to optimise a revised CONPLAN.

Report Format.	A PowerPoint presentation report.
Significant Lessons.	Need for a faster wargame. This process was initially completed for 19 Mechanised Brigade, but was subsequently repeated with 7 Armoured Brigade when they took over command. The concept of plans was once again wargamed and refined to take into account the differing force structure and tactics employed by an Armoured Brigade in comparison to a Mechanised Brigade.

THE FUTURE OF THE CODE

It is important that the Code is widely disseminated both within NATO and in Nations. It will be produced both in paper and on a CD, and be placed on the NATO website. Team members will be responsible for bringing the Code to the attention of analysts and military officers in their Nation. A NATO Lecture Series is being proposed to advertise its existence within NATO commands. It is to be advertised to a number of courses at the NATO school. If a reader wishes a copy of the Code of Best Practice please get in touch with the author of this Paper (grose@dstl.gov.uk) or visit the NATO RTO website (http://www.rta.nato.int)

CONCLUSIONS

The Code of Best Practice brings together a wealth of experiences from NATO nations. This is an important step forward in the provision of analysis support to Commanders.

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Annex A: COMMANDER'S SUMMARY DOCUMENT

INTRODUCTION: The purpose of this document is to provide CJTF (Combined Joint Task Force) and Component commanders and their staffs with an overview of operational analysis (OA). Two important definitions from the NATO Code of Best Practice (COBP) on Decision Support for CJTF and Component Commanders are:

- *Operational Analysis: "application of scientific methods to assist executive decision makers"*
- *Decision Support: "application of the best available analytical tools/techniques to support the decision process"*

This document will frame operational analysis by answering the 5 "W's" & "H": **Why, What, When, Where, Who, & How.** A more thorough description can be found in the COBP on Decision Support for CJTF and Component Commanders.

Figure 1: NATO Operational Planning Process Overview

WHY have analysts been successfully used in recent operations?
Historically, commanders' (and their staffs') decision processes – and ultimately the decisions themselves, were improved when operational analysis was applied. Previous examples of OA support to operations include:

- **DESERT STORM** - Warfighting Operations —OA support was used to develop the 1 (UK) Armd Division plan.
- **PSO-Balkans** ––Peace Enforcement/Keeping — OA defined/measured indicators of "compliance and normality"
- **ALLIED FORCE** – Warfighting Operations -- OA collected/synthesized/analysed allied combat munitions effectiveness and Battle Damage Assessment
- **ISAF** – Peace Support Operations —OA included compliance and stability monitoring and Info Ops assessment

In more generic terms, OA can improve decision making throughout the commander's decision cycle (Figure 1).

WHAT problems can OA address?
OA can address a wide range of problems and assist in finding a solution through the structuring, collating, and organisation of data. Examples where OA can make substantial contributions include:

- **In Barracks**
  - Contingency Planning/COA Analysis
  - Support with Exercise Planning
  - Liaison with wider analysis communities
- **On Exercises**
  - Ensure realism/coherence of the Exercise
  - Part of HQ; testing OA decision support
  - Assess the performance of the HQ
- **On Operations**
  - Operational/Contingency Planning
  - Measurement of Campaign Success
  - Data Collection and Analysis
  - Lessons Learned

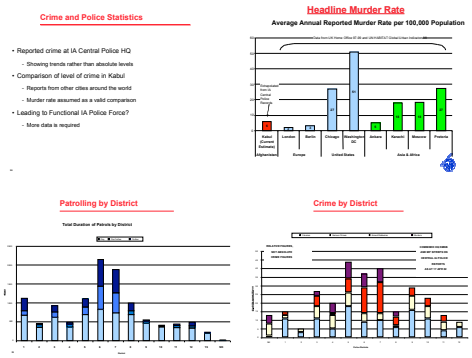

Figure 2: Example Analyses from ISAF

Figure 2 displays actual analyses performed to help monitor & improve peacekeeping operations at ISAF.

WHEN do I use operational analysis?
Operational Analysis can contribute during all phases of an operation. Naturally, the type of support and activities will vary depending on the operational phase. Historically, operational analysis has been most effective during actual operations when it was included early in the planning phases of that operation. Typically, OA contributes during peacetime in the policy/procurement arenas, but OA in direct support to commanders varies in several aspects:

- **Timeliness** – typically answers within 2- 72 hours
- **Data** – current/near-term; usually incomplete
- **Problem Owner** – individual vs. community
- **Quantity** – small numbers of deployed analysts
- **Scope** – Wide range of problems to solve
- **Constraints** – time and what's available in theatre
- **Completeness** – 80% solution usually sufficient

As a general rule, it's best to use OA early and often!

WHERE are operational analysts located?

Given that OA ideally occurs in peacetime and crisis, OA can and should occur both "in barracks" and "out of barracks". Optimally, OA should be included in forward

deployed opportunities whenever possible (exercises, operations, post-operations). Figure 3 depicts a deployed JTF (which includes OA personnel and facilities). Operational Analysis can be conducted at multiple locations simultaneously:

- **Forward Deployed** – small team of analysts embedded into the commander's staff (Figure 4)
- **Reachback** – the larger analytical/scientific community may provide specific expertise not easily deployed

In the COBP on Decision Support for CJTF and Component Commanders, various options for the placement of the OA team within the commander's organisation are described – from working directly for the chief of staff, to being embedded in the planning cell. Ultimately, the location of the OA team will depend on the specific operation and needs of the commander.

Figure 3: Deployed JFLCC Compound (HQ ARRC)

WHO are operational analysts?
Operational analysts are a mixture of civilians and military officers. Team members can be both male and female, and include not only multiple services but multiple nations as well. As a goal, OA teams will include at least one military officer. However, the team leader will often be civilian. It is essential that the team leader not only be technically competent but also is credible with military commanders, and has good access to the reachback OA team/organisation. The importance of the deployable scientist's personality & overall training becomes apparent when considering team issues:

- Cramped accommodations/work areas
- Successful team templates of 2, 4 or 6 (mission dependent) people working in pairs.
- Need for 24-hour manning
- Individuals must be suitably fit for deployed operations (inoculations, some physical endurance, etc)

Figure 4: Deployed Operational Analysis Team

HOW do I use operational analysts?
Both commanders/staffs **AND** the operational analysts themselves are responsible for ensuring successful use of operational analysis. A short version of the analysts' values is depicted in figure 5. Additionally, commanders and their staffs need to know ways **THEY** can help the analysts succeed. Three "How's" for their consideration:

- **Best Way to Use Analysis**
  - Ensure analysts have access to data and staff
  - Endorse/Advocate OA activities
  - Be aware forward team does have access to rear party and reachback analysts/organisations
- **Poor Use of Analysts**
  - Manpower pool for "Action Officers" (i.e. using them as PowerPoint Rangers)
  - Full-time data collectors & administrators
  - Lessons-Learnt administrators (although they can help analyse/synthesize the lessons)
- **Limitations/Risks You Should Know**
  - Force protection (many analysts are NOT military personnel)
  - Predictive analysis is VERY limited
  - Science vs. Art (not all problems will be analysts strong-suit, e.g. quantitative)
  - Task Saturation (very small OA team forward)

Analysts' values

- Be loyal
- Be frank yet tactful
- Be proactive
- Be 100% honest
- Be an expert
- Be helpful
- Be a team player
- Be a smart worker
- Be timely

Figure 5: A short version of the analysts' values.

SUMMARY: This document only provides a cursory overview of Operational Analysis. All operational analysts **MUST** read the NATO COBP on Decision Support for CJTF and Component Commanders; CJTF and Component commanders and their staffs seeking a deeper understanding **SHOULD** also do .