Methods and Models Database for Analysis of Small Scale Contingencies

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ABSTRACT

Currently not too many methods and models exist for the relatively new field of analysing Small Scale Contingencies (SSCs) under Operations Other Than War (OOTWs). To facilitate exchange of knowledge on methods and models that do exist for this analysis of SSCs, the NATO SAS-027 Technical Team “Analysis of Small Scale Contingencies” has established a database for recording and cataloguing these items.

INTRODUCTION

Analysis of Small Scale Contingencies (SSCs) for Operations Other Than War (OOTW) is complex. As stated in other SAS-027 contributions to the Cornwallis VII conference, the problem scope is much wider than for traditional theatre wars and therefore requires new approaches to explore new fields of analysis.

Because of this wide problem scope and the complexity of the problems at stake, a need for good methods and tools for analysis arises. Existing tools developed for analysis of traditional theatre wars often do not suit the problem at stake well enough, so new methods and tools are required. At some locations relevant developments in this field can be distinguished, but because of their rarity it is hard to get a good insight in available methods and tools or in new developments.

The NATO SAS-027 Technical Team “Analysis of Small Scale Contingencies” decided to mend this problem by designing a database for multinational knowledge exchange on methods and tools. The database was designed in Microsoft Access 97 and populated by all
participating countries\footnote{UK, Australia, Canada, France, Georgia, Italy, NC3A, Netherlands, Norway, Sweden, Turkey, USA.} in SAS-027 with their methods and models specific for OOTW analysis or at least somehow usable for OOTW analysis. This database was then distributed among all participating countries.

A first impression of the database user interface is shown in Figure 1. It allows a user to report all available items, to search items having specific features and to edit the items in the database.

![SAS-027 Method and Model Database Interface](image)

\textit{Figure 1:} SAS-027 Method and model database interface.

\textbf{COVERED DATA}

The data covered by the database are divided into six main areas:

1. \textbf{General information}. This area includes the name and description as well as an indication whether it concerns a method, a model or both. A method is considered a general description of an approach that does not use significant, specially for that purpose developed, software tools. A method may, however, use standard tools like spreadsheets, word processors or standard LP solvers. A tool is considered a software item specifically developed for that purpose. Sometimes a tool is part of an extensively described method, in which case
the item is both a tool and a method. The general information also covers an imperative indication to what extent the item is OOTW specific (ranging from specifically developed for OOTW up to not specifically developed for OOTW and of little use for that purpose), the status (conceptual, under development, in operation for a specified number of years or obsolete) and a typification (like ‘(war)-game,’ ‘force structure balancing,’ or ‘probability theory’). An example of a model is given below.

Figure 2: General information interface.

2. Measures of Merit (MoMs). This area includes five separate lists of MoMs, each list at a different level at the MoM hierarchy as discussed in another NATO SAS-027 Technical Team contribution to Cornwallis VII. The levels discerned are Measure of Policy Effectiveness (MoPE), Measure of Force Effectiveness (MoFE), Measure of Effectiveness (MoE), Measure of Performance (MoP) and Dimensional Parameter (DP).

An example of several MoMs related to a model is given below. For each level at the MoM hierarchy multiple MoMs can be selected and so linked to the model. The user of the database can also easily add new MoMs to the database, if required.

3. Resources. This includes the manpower to maintain expertise, manpower for a typical application and special facilities required to practice the method or model.

4. Software application. This includes the programming language, operating system and hardware requirements of the software application. Obviously,
this is only relevant for a model or for a combined method and model, as a pure method has no specific software implementation related to it.

5. **Domain information.** This includes the operational phases and problem types for which the item is applicable. Examples of phases are ‘planning,’ ‘preparation,’ or ‘initial deployment.’ Examples of problem types are ‘operational planning’ or ‘mission rehearsal.’ The domain information also covers the levels of aggregation, tasks and parties handled by the item. Examples of the level of aggregation are ‘individual systems,’ ‘battle group,’ or ‘theatre.’ Examples of tasks are ‘combat engineers,’ ‘evacuation,’ or ‘protection,’ while some examples of parties are ‘armed forces,’ ‘refugees,’ or ‘domestic government.’

![Figure 3: Measures of merit interface.](image)

6. **Other information.** This includes a description of the item’s strengths and weaknesses, a SSC track record, documentation references, points of contact for further information and any freely describable additional information.

**AIMED APPLICATION**

The main application of the database is finding methods or models that meet an analyst’s specific requirements. The analyst must be able to search, for instance, all known methods applicable for wargaming using linear programming techniques. Figure 4 shows how the analyst can make his selection and find all items satisfying all or some of these required features. The database will then generate a report on the appropriate items.
MANAGEMENT AND STATUS

At the moment the database has been populated once and no formal periodic update procedures are prevailing. Therefore the database is currently a mere snapshot of the state of the art. Maybe in the future some update procedures will be established. Use of this database is open to all SAS-027 members. Currently the database holds seven methods, 22 models, and 14 combined methods and models. An example of a report generated on a model is given in Figure 5.

CONCLUSIONS

To facilitate the development of methods and models for the comparatively new field of analysis of Small Scale Contingencies, a database is constructed by a NATO Working Group, containing available models and features of these models from several countries. It is hoped that this database improves knowledge exchange between countries as well as reuse of existing methods and models.
All SAS-027 Methods and Models

Analysis of Mobility Platform (AMP)

Description: AMP provides a common platform for the operation of a suite of transportation models, simulations and tools which provides an end-to-end assessment of the strategic deployment of units and sustainment stocks from origin to final destination. Primary OR methodology within the component models is simulation based on rules sets and heuristic algorithms. AMP tracks all requirements within a deployment or sustainment scenario to include airlift, sealift, feeder, maritime, deployed forces, and ashore and airfield prepositioned assets. The dynamic sustainment generation algorithm can be synchronized to the combat situation of the scenario to anticipate account for increased consumption during periods of sustained activity. The theater component of AMP simulates the movement of arriving units and stocks from the air and as parts of embarkation in the doctrinal scenario specified in the TRPEO. These movements are simulated across the entire theater infrastructure (aerial, aircraft, ships, trains, associate networks, and multiple staging areas) to determine the capability of the theater to support the required movement. The intertheater network may be obtained from a current state and node level through highly detailed networks, i.e., bridge strengths, tunnel lengths, etc. Included in the AMP suite are several supporting tools that enhance the analyst’s ability to set up the scenarios. These include the TRPEO Editor (TRPEO) a map-based query and display tool (MapQuest) and an experiment capability which allows an analyst to set up parametric changes to the scenario and then make sequential runs for analysis.

Value for SSG analysis: AMP enables rapid transportation analysis. AMP is a general model but also applicable to specific SSG issues.

Strengths: View reported readiness of units assigned to an SSG

Weaknesses: Can only display U.S. Forces because other NATO forces do not report readiness in the U.S. 80ORTS system

Special requirements: None

Special facilities: POS

Effort for analysis: 1 well-trained person

Effort for maintenance: 1 well-trained person

Additional information:

Category: Methods and models

Method and model description:

Classes / Types: What other types of the output?

Simulation:

Detail levels:

What level of effort is required by the model?

Individual option level

Domains:

On what basis of effort is the method applicable?

Operational planning

Nationalities: By what countries is the method deployed/used?

USA

Figure 5: An example of a report generated on a model.