Chapter 1 – INTRODUCTION

Recent disasters such as the Tsunami in Southeast Asia in December 2004 have shown how difficult it is to provide rapid response during disaster relief, which is highly dependent upon the efficiency of the existing communication and the coordination systems. Faced with the transportation problem due to the destroyed infrastructure and the difficulty to access the affected area, the logistic support, search and rescue activities and the transportation of first aid services is mainly provided by helicopters. Not only in disaster relief operations helicopters naturally have a very important role in fulfilling transportation and support and special tasks in joint and combined military operations. Thus a quick and efficient answer to multiple concurrent tasks requires a structured methodology for scheduling and tasking helicopters.

1.1 PURPOSE OF THE RESEARCH

Although NATO's involvement in international disaster assistance has a long history, the establishment of the Euro-Atlantic Disaster Response Coordination Centre (EADRCC) and Euro-Atlantic Disaster Response Unit (EADRU) in 1998 has formalized NATO's role and responsibility in disaster assistance activities. The EADRCC headed by the Director Civil Emergency Planning aims to coordinate the responses of the Euro-Atlantic Partnership Council (EAPC) countries to disasters occurring in EAPC area, to act as the focal point for information sharing among EAPC countries, and to maintain close liaison with the United Nations and the European Union as well as other organizations involved in international disaster response[1]. The effectiveness of disaster assistance is highly dependent upon the degree of pre-planning and preparedness, the exchange of information and the ability to supply resources and services. Thus, the decision makers in command of controlling or managing a disaster relief mission need standard and interoperable procedures, guidelines, and regulations to respond quickly and effectively to an emergency situation.

Furthermore, effective decision making is needed in both Article V and Non-Article V Operations at all command levels. Specifically, operational and tactical level planners need to generate practical and flexible plans for missions supported by helicopters during a crisis situation. In this respect, they should have rapid access to reliable information in a standard format and coordinate helicopter mission planning. Thus it is important to develop computer-based decision support tools (DSTs) which enhance the rapid and effective response capability of NATO commanders at operational and tactical levels.

The main goal of this research is to provide the basis for developing a generic and flexible decision support tool for effective management of helicopter missions by conducting the problem analysis, investigating the concept of solutions and determining relevant technical requirements.

The research will address the operational and tactical decisions concerning management of helicopters during disaster relief and military operations. It aims to recognize the fundamental capabilities needed by the Alliance and NATO nations and to recommend ways of improving or defining a formal structure for their decision making process. Helicopter mission management points to planning, re-planning, scheduling and maintaining control of various processes in operations involving helicopters. This tool is expected to be used as an operational tool.

[1] NATO's Role in Disaster Assistance, 2000.

1.2 BACKGROUND

At the November 1999 Meeting in Brussels, Turkey invited NATO nations and agencies to cooperate in a study which addresses planning and analytical issues relating to helicopter management in various emergency operations. The Panel decided to receive a detailed briefing at the May 2000 Meeting.

At the May 2000 Meeting in Lillehammer, the Studies Analysis and Simulation (SAS) Panel recommended Turkey to submit a formal proposal and Terms of Reference (TOR) for an exploratory team (ET) on helicopter logistics to be discussed at the November 2000 Meeting as it is mentioned on the decision sheet (AC/323(SAS)DS/5) dated 23 June 2000.

At the November 2000 Meeting in Brussels, the Panel decided to set the exploratory team ET.W as it is mentioned on the decision sheet (AC/323(SAS)DS/6) dated 18 December 2000.

The first meeting of ET.W was held in April 2001 in Brussels to prepare the first version of the TOR. The second meeting of ET.W was held in September 2001 in Istanbul to finalize the TOR, Programme of Work (POW) and Technical Activity Plan (TAP).

At November 2001 ET.W proposed to create the Research Task Group (RTG) SAS-045 “Computer-Aided Decision Support Tool for Mission Planning in Disaster Relief and Military Operation”. This proposal has been welcomed by the SAS Panel and approved by Research and Technology Board (RTB) at the March 2002 Meeting.

Between November 2001 and March 2005, the RTG SAS-045 held seven meetings, respectively in Brussels, Cologne, Warsaw, Paris, The Hague, Ankara and Brussels, and completed the research on the proposed POW.

1.3 SCOPE

To achieve the objectives tasked, the group shared its work in three phases which constitute the modules of this document.

First, it is aimed to analyze the problem areas, processes and functions and to carry out technology surveys. Consequently the technology mapping and capability matrix will be developed using the identified current needs and capability gaps of existing decision support tools. Operational description of the problem is presented mainly in three aspects: operational context (environment, desired capability and scope), mission types (key mission tasks and functions) and decision-making framework.

Considerable effort was dedicated by the group to carry out three technology surveys on decision support tool technologies, information technologies, and geographical information systems, digital maps and mission data compilation technologies. This investigation was completed by preparing a fourth report on existing models, data and knowledge management repositories and planning process in NATO organizations.

In the concept of solution phase, the set of rules and policies, criteria, parameters, exogenous and endogenous input factors have been determined and the outputs of the decision support tool have been defined. Then, the required models have been developed and solution procedures and algorithms have been proposed to generate efficient and realistic plans. Thus, the concept of solution module presents the mathematical modeling description (i.e. the inputs, constraints, objective functions and outputs), the resolution method (mixed integer programming, heuristics), and computational results on testing scenarios.

The technical requirement phase of this study contains in detail all relevant technical requirements that may directly lead to the development of such a system. The links between existing NATO systems and the interfaces between NATO databases have been explicitly identified and the conformity with these has been sought. In the technical requirement module, information management and database interfacing module, protocols are set out. Database management systems are described and the information support tool dependencies upon other NATO infrastructures and information systems are defined.

The experience and the output of RTG SAS-045 clearly show that valuable expertise and know-how have been accumulated and necessary infrastructure has been planned so as to develop the intended prototype DST. In the last section, concluding remarks and recommendations to extend the activities of RTG SAS-045 in this direction are proposed.