Chapter 7 – CONCLUSION

As it is stated in the Terms of Reference and Programme of Work Research of NATO RTG SAS-045 "Computer-Aided Decision Support Tool for Mission Planning in Disaster Relief and Military Operation", the main goal of this research is to propose a framework for a generic and flexible decision support tool that can be used in effective management of helicopter missions both during humanitarian and military operations. The research procedure has consisted of conducting the problem analysis, investigating the concept of solutions and determining relevant technical requirements.

Since NATO's involvement in international disaster assistance has a long history, and the Euro-Atlantic Disaster Response Coordination Centre (EADRCC) and Euro-Atlantic Disaster Response Unit (EADRU) were established in 1998 to formalize NATO's role and responsibility in disaster assistance activities, it is well-known that 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. Thus, this study has aimed to design computer-based decision support tools (DSTs) which enhance the rapid and effective response capability of NATO commanders at operational and tactical levels during both Article V and Non-Article V Operations.

To achieve the objectives tasked, the work has been carried out in three phases which constitute the modules of this document.

First, the problem areas, processes and functions have been analyzed and defined, and 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. A generic scenario is defined in the context of an emergency event in a known area which has been realized by NATO, and NATO has decided to respond to the mission, given the basic information about the number of operational bases, helicopters, crew, logistics (facilities, fuel, etc.), embarkation and debarkation nodes for traffic control, maintenance, refuelling, etc. NATO planners estimate the real time requirements based upon this data, and the requesting body within NATO generates the needed NATO Request for Air Transport Format (NARAT). Then, the Air Transport approving authority as the decision maker will receive transport requests in the form of a NARATs and is expected to generate a practical solution. Since both disaster relief and military operations pose quick response situations where time is the key limiting factor and helicopter moves should be planned and conducted very rapidly, the speed in generating good solutions on a quasi real time basis affects the overall performance of helicopter operations. At this point, the intended DST will help the decision maker find an execution plan of tasks with replanning capability.

The decision-making framework has been determined by analyzing the planning process involving both military and civil agents, procedures, and resources at the time of any crisis in the crisis centers both at the local (municipal) and central (governmental) levels.

Since the intended DST should satisfy all current information, communication and technical requirements needed for robustness, speed, open architecture, accessibility to accurate data on a real-time basis, standardization, inter- operability, flexibility, re-planning possibility, capability to deal with randomness, fuzziness and incompleteness, what-if analysis capability, technology surveys were conducted 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 required models have been developed and solution procedures and algorithms have been proposed to generate efficient and realistic plans. This 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. In the technical requirement module, information management system, database interfacing module, and the protocols are described and the information support tool dependencies 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. Thus, it is strongly recommended that this work be extended to build a prototype and implementable system to be used during helicopter operations among NATO nations.