Image Cover Sheet

CLASSIFICATION	SYSTEM NUMBER
UNCLASSIFIED	153464

TITLE

REQUIREMENTS SPECIFICATION & TRACKING METHODOLOGY \(RSTM\). APPENDIX D: FUNCTIONALITIES AND REQUIREMENTS OF ACAS, TALBAS AND TASC PROTOTYPES

System Number:

Patron Number:

Requester:

Notes:

DSIS Use only:

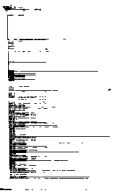
Deliver to:

APPENDIX D.
FUNCTIONALITIES AND REQUIREMENTS OF ACAS, TALBAS AND TASC PROTOTYPES

Contract Number: W7701-4-3358

Final Version

C. HELLEUR
SCIENTIFIC AUTHORITY



Le Groupe CGI inc.
Québec
May 23, 1995

APPENDIX D.
FUNCTIONALITIES AND REQUIREMENTS OF ACAS, TALBAS AND TASC PROTOTYPES

Contract Number: W7701-4-3358

Final Version

Le Groupe CGI inc.
Québec
May 23, 1995

TABLE OF CONTENTS

1. INTRODUCTION

One of the objectives of the current project was to analyze three prototypes developed for the Air Transport Group in order to validate their existing functionalities with the users and to determine new requirements if required. The aim adjacent to requirements capture and validation was to acquire some knowledge on the approach used to build the prototypes.

The three prototypes analyzed are:

- ACAS (Air Command Airlift Scheduler),
- TALBAS (Transport Aircraft Loading and Balancing System),
- TASC (Transport Aircraft Scheduling System).

These prototypes adress the user's requirements with respect to the planning, scheduling and loading of army aircrafts transportation. A brief description of each prototype is presented in the next sections followed by the results of the meetings with the users and designers.

2. ACAS PROTOTYPE

2.1 Analysis and validation context

For the analysis, the ACAS prototype was available at DREV on a PC platform running in the Windows environment. In addition, a document describing the prototype has been provided and capt. James Richardson, designer of the prototype has been visited at the St-John Royal Military College. This visit has been very useful to clarify certain functionalities of the prototype.

A meeting was held in Trenton with capt. Sexsmith. This person is currently responsible for the quaterly airlift program.

2.2 Aim and description of the project

The aim of the ACAS project was to provide a tool to support the Air Transport Group activities with respect to the airlift planning and scheduling. Requests for transportation (mission) are scheduled several months in advance. The first part of the planning is done in Trenton (ATG HQ) where the person responsable for the scheduling receives and registers the requests, plans the requests within a specific time frame and resolves the conflicts. The final planning and conflict resolution is done in Winnipeg (Air Command) as well as the handling of unscheduled requests.

The ACAS interface is based on the use of a board with the identification of missions assigned to aircraft type. The missions are represented by a colored bar identifying the user and they are located within a specific time period. The main interface represents a computerized version of the magnetic board used in the manual process. The prototype also provides access to a database handling information on bases, aircrafts, users and requests. A detailed description of the prototype can be found in [Helleur 94].

ACAS has been developed on a PC platform and operatates in Windows environment using the Borland C++ compiler and the Paradox database. The methodology for the development of ACAS was incremental prototyping.

2.3 Historic of the project

The following resume the main steps within the ACAS development process:

- Started in May 1993, a first prototype version was developed in a rapid period of time (2-3 days). This version was presented to Air Command, Winnipeg.
- September 1993, validation of the prototype with a user group at DREV.
- Following this meeting, development of the second version of the prototype.
- December 1993, demonstration and validation of the prototype with the ATG HQ.
- Following this meeting, development of the third version of the prototype.

- March 94, a copy of the prototype was provided to users for experimentation.
- Since March 94, continue flow of comments and feedbacks are sent from the ATG HQ to capt. James Richardson using fax and phone. The prototype is now upgraded to version six (6.0).
- November 94, last demonstration of the prototype to Air Command, Winnipeg.
- According to ATG HQ Trenton, the prototype satisfies most of the requirements and it can be used.
- Air Command Winnipeg do not use the prototype yet.
- The current version (6.0) of the prototype will be distributed to ATG HQ Trenton and Air Command Winnipeg;

2.4 *Characteristics of the ACAS prototype*

The following table resumes the main features of the ACAS prototype, the supporting activities, the priority related to each feature as well as the benefits expected.

Prototype Features	Supported Activities	Benefits	Priority
Database accesses through dialogue boxes: • Bases (identification) • Users (identification, estimated hours/month) • Aircrafts (identification, related bases, available aircrafts and overtasked aircrafts) • Requests (identification, priority, quantity, itinerary (locations, passagers, freight, tasks)	Query capabilities of resource information Information capture pertaining to: • availibility of aircratfs • hours allocation • user requests • itineraries • request prioritization	DA, IO, E	1
Graphical Scheduling Board • Colour coded bar to represent the task • Click and drag to move the task • Double-click to display the associated request • Calendar bar • Overtask View	Magnetic Board	E, F	1
Report Generator	Management reports Statistics Gathering	S, RD, SD, A, E	1
Setting Formats: • Calendar date (start month, end month) • User colors • Holidays specification • Approval date (no modifications anterior to approval date) • Security (password)			1
On-line help (to be provided)			

LEGEND

Priority Scale:

1	Essential
2	Important
3	Highly Desirable
4	Desirable

Benefits:

S	Speed
A	Error Reduc. /Accuracy
E	Ease of use
F	Flexibility
DA	Enhanced Data Access
IO	Info Organization
RD	Reduce Workload
SD	Standardization

2.5 *Results of the meeting*

Capt. Sexsmith from ATG HQ Trenton is the operational currently involved in the quaterly airlift programme. He has experimented with the ACAS prototype and knows very well all the functionalities. Capt. Sexsmith has been met in order to obtain some feedback on the use of ACAS.

In a general way, the comments are very positive and the prototype satisfies most of the user's requirements. The graphical representation and manipulation of tasks as well as the data accesses to bases, users, requests and aircrafts through dialogue boxes is very useful. However, the prototype is currently not used for the quaterly scheduling process mainly because the capture of the user requests is a very long process and augment the workload. The results of the user meeting lead to the specification of new requirements. These are the following:

- the requests should be created directly by the users using an electronic support and the information must be accessible to the operational for manipulation with ACAS. This requirement is essential for an efficient use of the prototype. Otherwise, the operational must re-enter all the requets received from the users, it takes a significative amount of time having for effect to increase the workload rather than to reduce it;

- a trace of all modifications made to a request must be automatically kept. In the current version, a task can be graphically moved and the original request related to the task permit to recover in any time the original graphical display of tasks. This capability should be enhanced by recording all modifications made to the original tasks (requests);

- the priority assigned to a request can have a value between 1 and 8. For more flexibility it is requested to add an additionnal letter (A to Z) to specify the priority;

- patterns should be provided to capture the legs associated with a request. The user can select among a set of existing legs instead of re-entering the same information each time;

- the number of duty codes specified with the request should not be limited. It must be possible to add more than two duty codes;

- the locations specified within a leg are currently a set of hard-coded values. The prototype should be modified to provide editing capabilities for the locations (add new locations, delete locations, modify existing ones) as it is now implemented for bases, aircrafts, etc;

- the quaterly airlift plan (QAP) report is currently produced using the Lotus software application as a supporting tool. This report is then distributed to more than fifty different entities. The preparation and distribution of this report takes a lot of time. The ACAS prototype provides the capability to create the QAP. It should also provides the user the capability to create additional various reports on forecast and non-forecast activities sorted

by any criteria such as user, type of aircraft, dates, etc. All reports must be printable and it should also be very useful to have the capability to send the reports electronically using a distribution list;

- the performance of the system is acceptable, except for the consultation operation. Even if the user does not change anything to a screen it takes a very long time to close the window. This operation should be very fast as long as there is no modification to the database.

3. TASC PROTOTYPE

3.1 Analysis and validation context

For the analysis, the TASC prototype was available at DREV on a SparcStation running in the X-Windows environment. In addition, a document describing the prototype has been provided and M..Serge Roy, designer of the prototype made a brief presentation.

During the current project, the prototype was supposed to be presented and discussed with users from Trenton but for technical reasons the prototype has not been demonstrated.

3.2 Aim and description of the project

The aim of the TASC prototype was to provide a tool to support bases activities with respect to the aircraft tasking and scheduling. TASC is designed to support the daily and weekly operations and not the long term planning as ACAS. The scheduling is currently done manually using a magnetic board representing the crew members and the assigned missions. It is primarily based on the QAP provided by the ATG HQ but changes occur daily depending on the current situation (weather, resources, cancellations, modifications, urgency, etc). The communication between the person responsable for the scheduling and the aircrew members is a very important aspect and several human factors must be taken into account by the schedulor.

The interface of TASC is based on the use of a board with the identification of flight missions located within a specific time frame. It is similar to a prototype developed by the U.S Defense for the CF-18 tasking and scheduling (ACESS prototype). Click and drag facilities are used to move the mission. The information screen can be displayed by a double-click on a mission and the user can also define flight legs and crew assigned to a mission. The prototype also supports the K1017 form, which contains all information related to a specific flight (itinerary, flight hours, PAX on/off, etc). A brief description of TASC can be found in [Helleur 94].

TASC has been developed on a Unix platform and operates in a X-Windows environment. The current version of the prototype does not provide database facilities, data are hard-coded. The methodology used for the development of TASC was incremental prototyping but working sessions with users were not very used.

3.3 Historic of the project

This is not possible to reconstituate all the historic of the project and to describe the main steps of the prototype development because the designer and responsable of this project at DREV has left when the prototype analysis started. However, as said previously, TASC is derived from the ACESS prototype. ACESS has been developed within the Advanced Technology Battle Management System (ATBMS) project which is a cooperative R&D

project between the Canada and the United States. TASC has been developed at DREV and was demonstrated in Trenton.

3.4 *Characteristics of the TASC prototype*

The following table resumes the main features of the TASC prototype. The supporting activities, the priority related to each feature as well as the benefits expected are not provided because the prototype has not been demonstrated and discussed with users.

Prototype Features	Supported Activities	Benefits	Priority
Database accesses through dialogue boxes: • Flight (identification, authorization) • Flight Legs (proposed leg, actual leg) • Crew (identification, selection)	Query Capture information		
Graphical Scheduling Board • Coded bar to represent the flight mission • Click and drag to move the flight mission • Double-click to display the associated flight info • Calendar bar			
Flight Report (K1017 form)			
Setting Formats: • Calendar date (start date, end date) • Fonts			

LEGEND

Priority Scale:

1	Critical
2	Essential
3	Important
4	Highly Desirable
5	Desirable

Benefits:

S	Speed
A	Error Reduc. /Accuracy
E	Ease of use
F	Flexibility
DA	Enhanced Data Access
IO	Info Organization
RD	Reduce Workload
SD	Standardization

3.5 Results of the meeting

The TASC prototype has not been demonstrated and discussed with users within the scope of the current project. However, capt. Burns and the officer working on the day-to-day planning operations have been visited in Trenton. The main task of the officer is to organize schedules and itineraries as efficiently as possible with respect to the resources constraints, vacation, acceptable flying hours and competence. He must also resolve conflicting situations in accordance with priorities and compute some statistics on aircraft use. The scheduling is based on the missions supported in the QAP.

The main interface of TASC does not reflect exactly the magnetic board used by the task officer. TASC represents graphically the missions while the magnetic board used in Trenton represents the aircrew members (aircraft officer, first officer, etc) related to the missions (training, normal trip, tactical airlift, etc). This magnetic board provides an excellent picture of the current and planned operations. It is also consulted by aircrew. The color codes used to identify the missions are very important and visual (green is related to training, white is related to normal trip, blue is related to tactical airlift, yellow is related to vacation). These color codes are different from the color codes used in ACAS (where the color code are related to users). As mentionned by the task officer, decisions are often taken based on some information that he keeps in his mind (the communication with the aircrew members is an amportant aspect of this job). The task officer currently involved in the scheduling process does not think that a computerized system will provide real benefits and will permit to reduce workload. But in the case of a system development, the "big" picture of the magnetic board is very important and should be reproduced as is.

4 TALBAS PROTOTYPE

4.1 Analysis and validation context

For the analysis, the TALBAS prototype was available at DREV on a PC platform running in the Windows environment. In addition, a document describing the prototype has been provided and capt. James Richardson and M. Vincent Leduc, designers of the prototype have been visited at the St-John Royal Military College. This visit has been very useful to clarify certain functionalities of the prototype.

A meeting was held in Trenton with major Pichette and another air officer. These two peoples are involved in aircraft load planning activities.

4.2 Aim and description of the project

The main concern of the TALBAS project was to provide a tool to support the personnel involved in the preparation of CC130 aircraft load plans. The current manual method consists to build load arrangements by shuffling plastic templates representing items to be transported on a form containing a scale diagram of the aircraft cargo floor. Constraints pertaining to aircraft floor limitations, dangerous cargo, cargo/personnel movement priorities, aircraft weight and balance, placement of passengers and baggage must be taken into account.

The graphical interface of TALBAS represents a picture of the CC130 aircraft floor plan including information on the aircraft balance and the list of items to load. The user has the possibility to add items in the list among a set of predefined objects. More than twenty different types of objects are currently available (passenger, child, wheeled vehicle, baggage, ILTIS, GRIZZLY, trailer vehicle, etc). Each item in the list can be manually load in the aircraft and the aircraft balance is automatically calculated. Automatic unload is available while the automatic load will be provided in a future version. The prototype also provides access to a database handling information on mission, aircrafts, passengers and cargo. A detailed description of the prototype can be found in [Helleur 94].

TALBAS has been developed on a PC platform and operatates in Windows environment using the Borland C++ compiler and the Paradox database. The methodology for the development of TALBAS was incremental prototyping.

4.3 Historic of the project

The following resume the main steps within the TALBAS development process:

- The first version of the prototype was developed in September 93. This version included basic functionalities such as the display of the aircraft plan and a minimal sets of objects to load (standard size pallets and passengers).

- Following this first version, a logical data model has been developed and domain experts have been met in order to acquire knowledge on the definition and integration of new objects.
- In February 94, a second version of the prototype was demonstrated to users from Trenton. This version integrated the load capability of new vehicles.
- Since February 94, continue flow of comments and feedbacks are sent from Trenton to M. Vincent Leduc using fax and phone. The prototype has evolved during this period of time.
- March 95, a new working session was planned in Trenton with users and M.Vincent Leduc.

4.4 Characteristics of the TALBAS prototype

The following table resumes the main features of the TALBAS prototype, the supporting activities, the priority related to each feature as well as the benefits expected.

Prototype Features	Supported Activities	Benefits	Priority
CC130 Floor Window: • Floor • Objects to load • Aircraft constraints checking • Permissible Dry CG • Dry CG • Load Balance Indicator	Load/Unload Aircrafts Balance Load Verify Constraints	S, A, E, RD	1
Available Item List • Passenger • Miscellanous Objects • Wheeled Vehicle • Trailer Vehicle • Tracked Vehicle	Definition of objects/passengers to load		1
Manual Load/Unload Automatic Load/Unload • Passenger • Objects • Vehicle	Load/Unload Aircraft	S, A, E, RD	1
Definition of: • Mission • Aircraft			1
Manifest Generation • Additional information about mission, aircraft, cargo and PAX • Printing facility			2

LEGEND

Priority Scale:

1	Essential
2	Important
3	Highly Desirable
4	Desirable

Benefits:

S	Speed
A	Error Reduc. /Accuracy
E	Ease of use
F	Flexibility
DA	Enhanced Data Access
IO	Info Organization
RD	Reduce Workload
SD	Standardization

4.5 Results of the meeting

TALBAS has been demonstrated and discussed with two peoples involved in the aircraft balancing and loading activities. The conclusion is that the graphical interface is very useful and simple to use, the prototype supports the required functionalities but the following two major requirements must be implemented in order to use the prototype:

- the list of equipments currently available must be enhanced to include most of equipment types that can be loaded in an aircraft. A limited list of equipment reduce the interest to use the prototype;

- a capability of full automatic loading is required. The user wants to specify a quantity of available aircrafts and the list of items to load. The automatic load should distribute items in all available aircrafts with the optimum balance charge. This capability would reduce significantly the workload.

The users also specify the following new desirable requirements:

- the quantity of aircrafts required should be automatically calculated (estimated) when specifying the list of equipments to transport;

- the aircraft name should be indicated on the main graphical interface;

- the user should be able to modify the load master data;

- the item no. should probably be used as the ECC (equipment number).

5 CONCLUSION

The primary objective of these meetings was to validate the existing prototypes with the users in order to discover new requirements, to determine a priority for future developments and to determine the benefits of each requirement.

This objective has not been successfully reached. One of the main reason, is that the meetings held in Trenton were more a rapid discussion and demonstration of the prototypes rather than an intensive working session. It is difficult to establish requirement priorities and benefits within a short period of time. The availability of resources as well as the context and location of the meeting are also important factors. It is useful to visit the site of an operational for understand and visualize the work environment but it is often not an appropriate place for discussion. In conclusion to this report, the last thing that can be mentionned is that prototypes are easier to transport and demonstrate if they are developed on a portable plateform.

6 REFERENCES

[Helleur 94] Helleur C., Richardson J., Roy S., "Requirement Capture and Prototyping for Airlift Information System", Feb 1994

[Roy S] Roy S., Taylor I., Genest J., Savard G., "Scheduling of the Air Transport Fleet"