CORA Task #170 NATO SAS-093 Survey Tool Development – Final Report

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CORA TASK #170

NATO SAS-093 SURVEY TOOL DEVELOPMENT

FINAL REPORT

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FOR

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NATO SAS-093 Survey Tool Development Final Report

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REVISION HISTORY

Revision	Reason for Change	Origin Date
Version 01	Initial Release	31 March 2014

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1   INTRODUCTION

1.1   Background

DRDC has designed and implemented a prototype of a survey tool for NATO SAS-093. This survey tool needs to be modified to improve the current functionality and design in order to be suitable for distribution to survey participants. DRDC has identified a need for a contractor to carry out this work since there is neither the time nor the skill within the organization to carry out this work. The intent is for the survey tool to be a standalone application that can be emailed and/or mailed in CD form to survey participants.

1.2   Objective

The objective of this contract is to modify the design and improve the current functionality of the prototype NATO SAS-093 Survey Tool currently implemented in MS Access 2003. The tasks included:

- **Task A – Information Gathering Phase**: Receive the current survey tool and all information on the purpose of the survey in order to fully identify and capture the design and implementation requirements in regards to the User Interface (UI) of the survey tool, the survey tool software functionality, and any other specifications that would impact the design or implementation of the survey tool.

- **Task B – Survey Questions/Design**: Provide feedback to the client on the content of the questions and survey design.

- **Task C – Design Phase**: Modify the current design of the NATO SAS-093 survey tool including the look, feel, and functionality of the GUI.

- **Task D – Implementation Phase**: Modify the survey tool prototype to take into account all of the design requirements.

- **Task E– Documentation Phase**: Document the design of the survey tool and its functionality in a brief report in sufficient detail for the Technical Authority (TA) to review the final design and implementation work. Additionally, provide help to write a brief user guide on how respondents need to use the tool; this help guide could also take the form of help within the survey tool application.

1.3 Document Overview

This document is organized into the following sections:

- Section 1   This section introduces and provides an overview of this document;

- Section 2   This section identifies reference material used in producing this document;

- Section 3   This section describes the requirements;

- Section 4   This section describes the user interface.

- Section 5   This section lists the conclusions.

2   REFERENCE MATERIAL

2.1   Documents and Files

Survey – Part I	NATO SAS-093 Risk-Based Planning Survey context and questions
20140120-Survey – Part I_JM Comment	NATO SAS-093 Risk-Based Planning Survey context and questions and comments
20140224-Concept of Analysis Survey Planning NATO SAS 093_J	Concept of Analysis: Risk-based Planning Analyst Surveys, Part I to III
Eunomia.mdb	Prototype survey, implemented in Access
http://k101.unob.cz/n/	Example NATO survey

3   REQUIREMENTS AND APPLICATION DESIGN

The following sections outline the requirements and resulting design for the NATO SAS-093 Survey Tool. The requirements were derived from discussions held during the kickoff meeting and analysis of the reference material provided to CAE from DRDC. It should be noted that the implications that result from being required to run on computers on the DWAN network were not clear from the SOW, and resulted in significant unforeseen time being spent exploring suitable options for implementing the survey tool.

3.1   Hardware and System Configuration

The survey tool must be compatible with computers that run on both the Defence Wide-Area Network (DWAN) and the Defence Research Establishment Network (Drenet). Computers on these two networks run a different host OS as follows:

- DWAN – Windows XP, SP3

- Drenet – Windows 7

In order to guarantee functionality on both networks, the survey tool was developed to be compatible on Windows XP, SP3, and was tested on both platforms.

There are no special hardware or system requirements for the survey tool beyond the specification of the OS.

The user of the survey tool should not be required to have administrations privileges in order to use the application.

3.2   Design Decisions

The prototype survey tool was developed using Microsoft Access 2003 to present users with forms to enter data with the survey content stored in the database file. Access was chosen by DRDC as a rapid method of prototype development. For CORA Task #170, CAE was not constrained to use Access.

The long-term vision for future surveys is a centralised server that provides a web-based interface to allow users to take the survey remotely. However, given the tight timeframe of this task, a centralised solution was not feasible. Furthermore, hosting the survey on a third-party solution such as Survey Monkey was not an option as there are concerns over loss of control over hosting of the data.

Therefore, the survey tool was designed to be distributed to participants via e-mail, with the results of the solution to be e-mailed back. The e-mailing of results is a manual process and is not built-in to the survey tool.

As the survey tool needs to be sent to participants, CAE deemed the following requirements to be desirable:

- The survey tool was designed to be relatively small in size, as many e-mail filters block attachments over a certain size (e.g. 5MB).

- The survey tool was designed to present the questions in a clear and professional format that guides the user through the survey.

- The survey tool was designed to not require any additional tools or libraries to run.

With these requirements defined, CAE decided to implement a stand-alone application for the survey tool that runs on Windows XP, SP3, rather than use a front-end for Access.

Modern Windows applications usually make use of either the Windows Presentation Foundation (WPF) or Windows Forms as the framework to render the user interface (UI), both of which require the .NET framework. However, Windows XP Service Pack 3 does not include the .NET framework by default. Distributing .NET with the survey tool was not an option, as this would significantly increase the size of the application, and would require that the user have administrator rights. Therefore, CAE decided that the survey tool would be designed without using .NET.

For reasons similar to .NET, CAE ruled out Java as a possible technology as it is not part of the core Windows distribution and would require additional libraries to be installed with administrator rights.

With these constraints, the only option left for a stand-alone application was to develop a solution that produced a native Windows application. CAE considered two options:

- Using C++ in combination with a framework such as the Microsoft Foundation Classes (MFC), Qt, or wxWidgets, or;

- Visual Basic 6 (VB6).

For a large application that runs solely on Windows 7 or 8, the choice between these two would likely result in C++ being selected as these technologies are both modern and versatile. However,

programming applications with any of these frameworks requires specialised knowledge and typically requires longer development cycles. VB6 has two distinct advantages:

- Application development time is usually quicker than development of C++ applications, and;

- DRDC has in-house familiarity with developing VB6 applications.

Therefore, CAE decided that the stand-alone application would be developed using VB6.

When developing VB6 applications, a wide variety of controls are available to the designer when implementing the UI. However, many controls that would normally be considered when implementing an application of this type needed to be ruled out as they are not part of the core VB runtime that is part of Windows. For example, the ActiveX tabbed window was considered initially but CAE ruled out its use since the associated library requires administrator rights to be properly registered. Therefore, CAE designed the application to only use core VB6 controls.

The survey content provided by DRDC is defined by a combination of questions and lists of methodologies. In the prototype, these were stored in tables within the database. For a standalone application, CAE considered using a database file as a backend for storage of the data. However, given the relative simplicity of the data structures that hold the questions and methodologies, CAE decided to use an XML file to store the input data for the survey. This approach allows the wording of existing questions, or the addition of new methods, to be made without changes to the code.

The output of the survey needs to be sent back to the survey organisers. This will be done via e-mail. Therefore, the survey tool will have an export capability that generates one output text file that can be sent back to DRDC.

Finally, during the course of development of the survey tool, CAE became aware that the DRDC e-mail filters have very restrictive policies on what attachments are permitted. This raised the possibility that sending the application via e-mail, even as a zip or other file format, would not be permitted. CAE explored this with the TA and it was determined that DRDC will be able to host the application file on a publicly available FTP site.
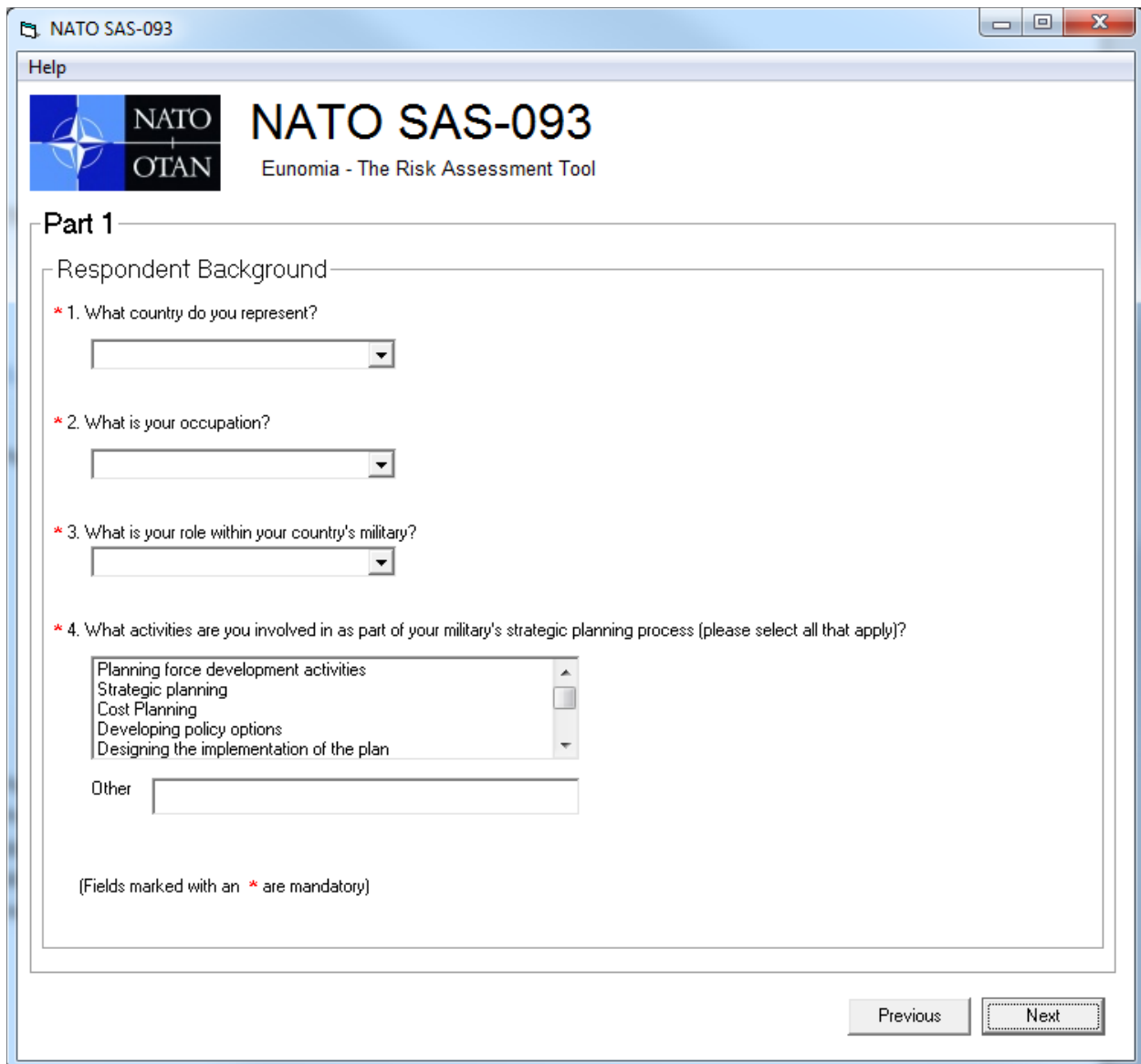
4   USER INTERFACE

The following sections outline the user interface for the NATO SAS-093 Survey Tool.

4.1   User Interface – Part I

As described in the previous section, CAE implemented the survey tool as a stand-alone application written in VB6. The survey tool was designed to have a common look and feel, and to be intuitive to the survey participants. The survey can be easily navigated through buttons that allow the participants to move forward and backwards through the questions. Figure 4-1 and Figure 4-2 shows screen shots of a typical page in Part I of the survey.

The following design features are present:

- Combo boxes are used to narrow the list of available answers.

- If the user selects "Other" for lists in combo boxes, text boxes appear that allow the user to specify their answer.

- Multi-combo boxes are used to allow the user to select multiple answers from a list of available answers. The instructions in the questions provide guidance to the participants that multiple selections are allowed. In addition, tooltips will appear when the user hovers over the list, providing further instruction on how to select multiple answers.

- Asterisks are used to indicate that answers are mandatory for certain questions. If the user attempts to proceed without answering these questions, a pop-up box will appear to notify the user of which question(s) have not been answered (see Figure 4-3).

- The "Previous" and "Next" buttons allow the user to navigate easily between grouping of questions.

- Some questions have follow-on sections. For example, question 9 has parts (b) or (c) which depend upon the answer to part (a). For questions such as these, the question is updated dynamically based upon the participant's answers (see Figure 4-4).

- When the user gets to the last page of the survey, an "Export Answers" and "Exit" button will appear on the survey tool. When the answers are exported, a file will be created that can be mailed back to DRDC.
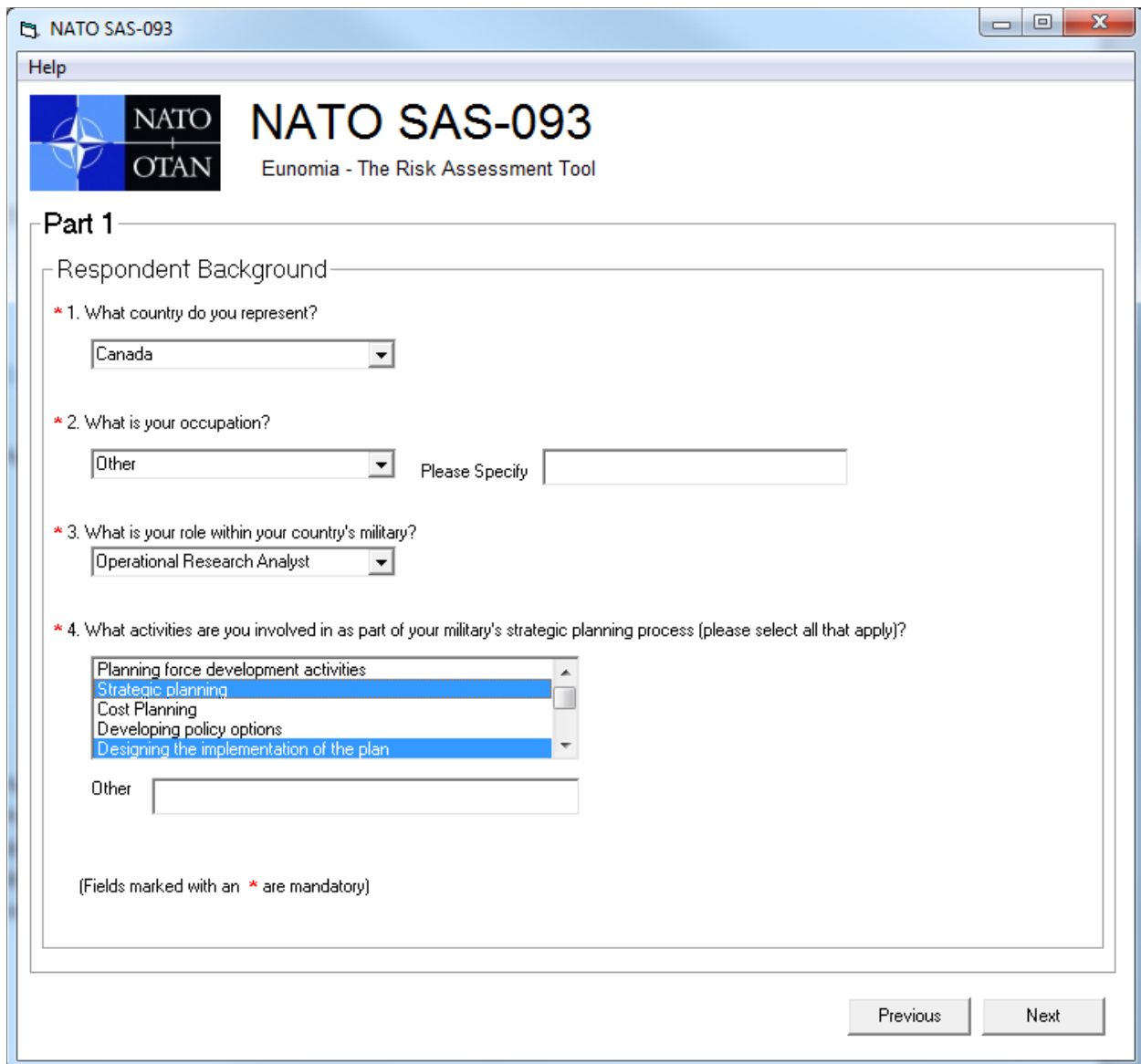
Figure 4-1: Questions 1 through 4 of Part I of Survey

Figure 4-2: Questions 1 through 4 of Part I of Survey, with Answers
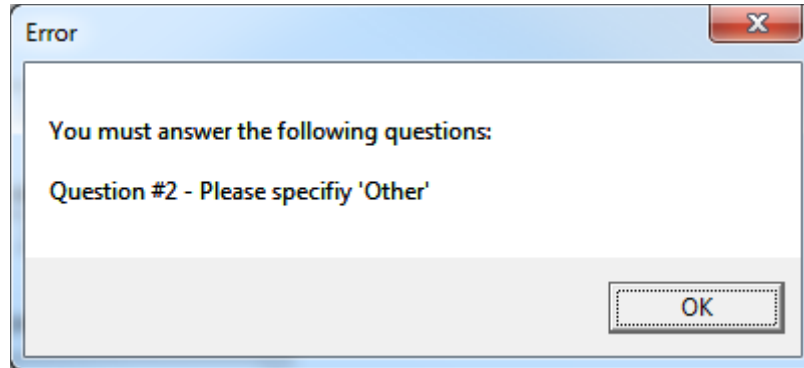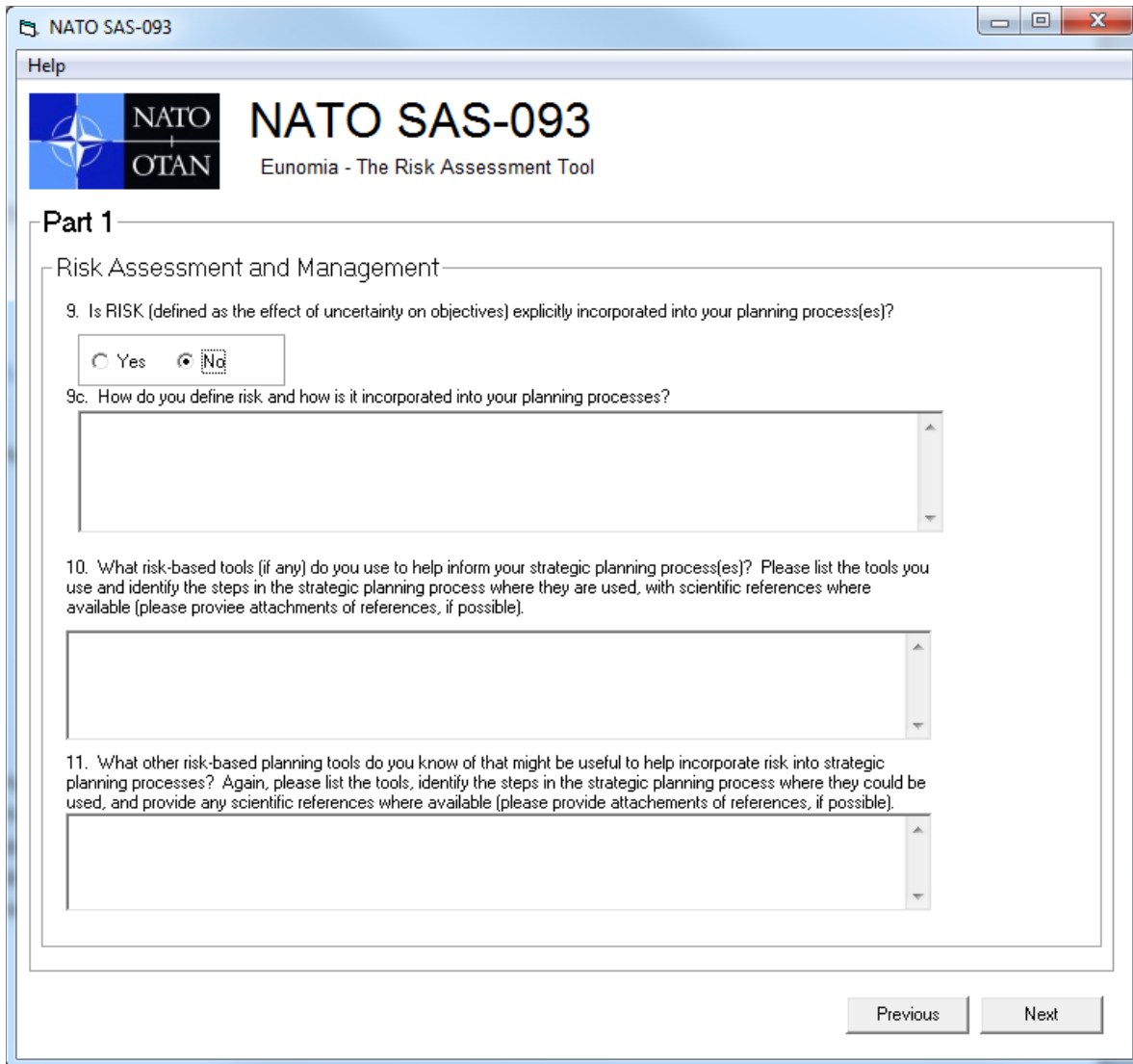
Figure 4-3: Error Message Pop-up Box

Figure 4-4: Illustration of Dynamic Questions

4.2   User Interface – Part II

CAE designed two possible implementations for Part II of the survey. These are presented in the following sections.

Due to the additional effort spent on exploring the multiple implementation options related to the unknown constraints of the survey tool, the amount of time available for implementation of the survey

tool was reduced. As a result, CAE was only able to provide a design for Part II of the survey and not an implementation.

4.2.1 Option A

4.2.1.1 First Page

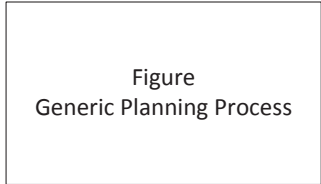The first page of Option A (see Figure 4-5) includes the following elements:

- Descriptive text outlining the objectives of the page.

- Descriptive text describing the Generic Planning Process, with associated figure.

- Descriptive text outlining the instructions to completing this page of the survey.

- Complete listing of Analysis Methods, organized by their associated "Category" (e.g., Information Management, Operations). The Analysis Methods are presented with 'Multiple Select' checkboxes.

- "Next" button that submits the users' responses and directs them to the next page of the survey.

Page instructions: Users will select ALL Analysis Methods that they have applied to the Generic Planning Process; one Analysis Method can be applicable to more than one stage of the Planning Process (this distinction is not made on this page). Multiple selections under each category (e.g., Information Management) can be made. A user can 'roll over' each Analysis Method for a description of that method.

Generic Planning Process

Descriptive Text: Objective of page

Descriptive Text: Overall description of Generic Planning Process

Figure
Generic Planning Process

Descriptive Text: Instructions

Information Management
- ☒ Generic Optimization Method
- ☐ Hewlett-Packard Return Map
- ☒ Polar Charts, Radar Charts
- ☐ Histogram or Bar Graph
- ☐ ....

Operations
- ☐ Traditional primary data collection techniques
- ☐ Mathematical and statistical analysis performed on quantitative data
- ☐ Approaches based purely on academic theory and principles
- ☒ PM techniques
- ☐ ....

Performance Assessment
- ☐ Resource Allocation Methods
- ☐ ....

Risk
- ☐ Risk Communication
- ☐ ....

Simulations
- ☐ Wargaming
- ☐ ....

Soft Anlaysis
- ☐ Supply Chain Management Methods
- ☐ ....

Statistical Analysis
- ☐ BIS / GIS
- ☐ ....

Strategy
- ☐ Options Analysis
- ☐ ....

Theory
- ☐ Queuing Methods
- ☐ ....

Next

Figure 4-5: Option A, Page 1

4.2.1.2   Second Page

The second page of Option A (see Figure 4-6) includes the following elements:
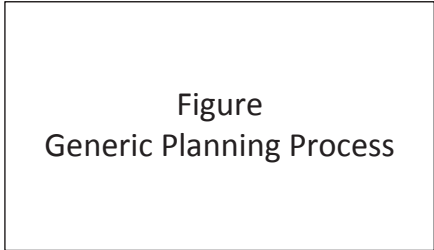
- Descriptive text outlining the objectives of the page.

- Descriptive text outlining the instructions to completing this page of the survey.

- Generic Planning Process figure for reference.

- Complete listing of ONLY the Analysis Methods selected in Page 1, organized by their associated "Category" (e.g., Information Management, Operations).

- Complete listing of all stages in the Generic Planning Process under each Analysis Method. Multiple selections under each Analysis Method can be made.

- "Done" button that submits the users' responses and completes the survey.

Page instructions: Users will review each Analysis Method and determine which stages of the Generic Planning Process they have applied the method to. Users will select each stage that is applicable (multiple selections under each category is possible). Once a stage is selected, a text box appears allowing the users to describe how they applied the method to that specific planning stage.

Generic Planning Process

<u>Descriptive Text</u>: Objective of page

<u>Descriptive Text</u>: Instructions

Figure
Generic Planning Process

Information Management

Generic Optimization Method

- ☒ Higher Level Guidance
- ❑ Internal Environment
- ❑ External Environment
- ☒ Option
- ❑ ……….

Polar Charts, Radar Charts

- ❑ Higher Level Guidance
- ❑ Internal Environment
- ☒ External Environment
- ❑ Option
- ❑ ……….

Operations

PM Techniques

- ❑ Higher Level Guidance
- ☒ Internal Environment
- ❑ External Environment
- ☒ Option
- ❑ ……….

Performance Assessment

……….

RIsk

……….

Done

Figure 4-6: Option A, Page 2

4.2.2   Option B

4.2.2.1   First Page

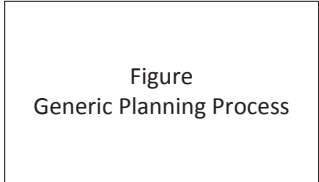The first page of Option B (see Figure 4-7) includes the following elements:

- Descriptive text outlining the objectives of the page.

- Descriptive text describing the Generic Planning Process, with associated figure.

- Descriptive text outlining the instructions to completing this page of the survey.

- Complete listing of Analysis Methods, organized by their associated "Category" (e.g., Information Management, Operations). The Analysis Methods are presented with 'Multiple Select' checkboxes.

- "Next" button that submits the users' responses and directs them to the next page of the survey.

Page instructions: Users will select ALL Analysis Methods that they have applied to the Generic Planning Process; one Analysis Method can be applicable to more than one stage of the Planning Process (this distinction is not made on this page). Multiple selections under each category (e.g., Information Management) can be made. A user can 'roll over' each Analysis Method for a description of that method.

Generic Planning Process

Descriptive Text: Objective of page

Descriptive Text: Overall description of Generic Planning Process

Figure
Generic Planning Process

Descriptive Text: Instructions

Information Management

- ☒ Generic Optimization Method
- ☐ Hewlett-Packard Return Map
- ☒ Polar Charts, Radar Charts
- ☐ Histogram or Bar Graph
- ☐ ……….

Operations

- ☐ Traditional primary data collection techniques
- ☐ Mathematical and statistical analysis performed on quantitative data
- ☐ Approaches based purely on academic theory and principles
- ☒ PM techniques
- ☐ ……….

Performance Assessment

- ☐ Resource Allocation Methods
- ☐ ……….

Risk

- ☐ Risk Communication
- ☐ ……….

Simulations

- ☐ Wargaming
- ☐ ……….

Soft Anlaysis

- ☐ Supply Chain Management Methods
- ☐ ……….

Statistical Analysis

- ☐ BIS / GIS
- ☐ ……….

Strategy

- ☐ Options Analysis
- ☐ ……….

Theory

- ☐ Queuing Methods
- ☐ ……….

Next

Figure 4-7: Option B, Page 1

4.2.2.2   Second Page

The second page of Option B (see Figure 4-8) includes the following elements:

- Descriptive text outlining the objectives of the page.

- Descriptive text outlining the instructions to completing this page of the survey.

- Generic Planning Process figure for reference.

- Complete listing of ONLY the Analysis Methods selected in Page 1, organized by their associated "Category" (e.g., Information Management, Operations).

- Complete listing of all stages in the Generic Planning Process under each Analysis Method (via drop down box).

- An "Add or Remove" function that allows the users to select stages of the Generic Planning Process in which they have applied the Analysis Method.

- "Next" button that submits the users' responses and directs the users to the next page of the survey.

Page instructions: Users will review each Analysis Method and determine which stages of the Generic Planning Process they have applied the method to. Users will select each stage that is applicable via a drop down box. The "Add" function will finalize the selection (multiple selections under each category is possible). Alternatively, the "Remove" function will delete a previously chosen stage, if required. Once each Analysis Method has been completed, the "Next" button is used to submit the responses and direct the users to the next page.

Generic Planning Process

Descriptive Text: Objective of page

Descriptive Text: Instructions

Figure
Generic Planning Process
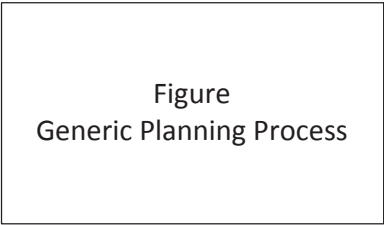
Information Management

Generic Optimization Method

| Higher Level Guidance ▼ |
| Internal Environment |
| External Environment |
| Option |
| Constraints |
| ………. |

Add
Remove

Higher Level Guidance
Option

Polar Charts, Radar Charts

| Higher Level Guidance ▼ |
| Internal Environment |
| External Environment |
| Option |
| Constraints |
| ………. |

Add
Remove

External Environment

Operations

PM Techniques

| Higher Level Guidance ▼ |
| Internal Environment |
| External Environment |
| Option |
| Constraints |
| ………. |

Add
Remove

Internal Environment
Option

Performance Assessment

……….

RIsk

……….

Next

Figure 4-8: Option B, Page 2

4.2.2.3   Third Page

The third page of Option B (see Figure 4-8) includes the following elements:
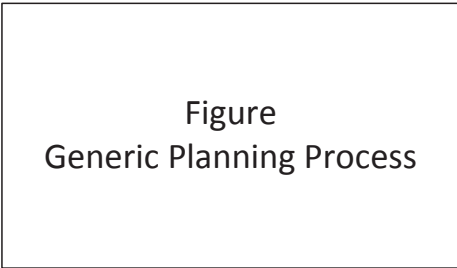
- Descriptive text outlining the objectives of the page.

- Descriptive text outlining the instructions to completing this page of the survey.

- Generic Planning Process figure for reference.

- Complete listing of ONLY the Analysis Methods selected in Page 1, organized by their associated "Category" (e.g., Information Management, Operations).

- Complete listing of previous selected stages (from previous page) in the Generic Planning Process under each Analysis Method.

- A text box beside each Generic Planning Process stage that allows the users to describe how each Analysis Method was applied to that stage.

- "Done" button that submits the users' responses and completes survey.

Page instructions: Users will describe how each Analysis Method has been applied to the stages of the Generic Planning Process previously selected.

Generic Planning Process

Descriptive Text: Objective of page

Descriptive Text: Instructions

Figure
Generic Planning Process

Information Management

Generic Optimization Method

| Higher Level Guidance | |
| Option | |

Polar Charts, Radar Charts

| External Environment | |

Operations

PM Techniques

| Internal Environment | |
| Option | |

Performance Assessment

……….

RIsk

……….

Done

Figure 4-9: Option B, Page 3

4.3   Survey Content

The questions in the survey were drawn from two sources:

- The *Survey – Part I* (with comments) document provided the context and questions for Part I of the survey.

- The *Methods* table and the forms from the prototype survey tool database were used to define the list of methodologies for risk-based planning for Part II of the survey.

5   CONCLUSIONS

The requirements for the design and user interface for the NATO SAS-093 Survey Tool were determined. Driven by the requirement that the survey tool work on a computer with Windows XP and no administrator rights, several options were explored for implementing a stand-alone application. The decision was made to use VB6 to implement the application using only core library routines and controls. An implementation of Part I of the survey was designed and completed. Due to time constraints, Part II could only be designed and not implemented. The design was fully documented and could be implemented in future work.

APPENDIX A   ADDITIONAL INFORMATION

A.1   Definitions and Acronyms

API   Application Programming Interface

CAE   CAE

CORA   Centre for Operational Research and Analysis

DRDC   Defence Research and Development Canada

DWAN   Defence Wide Area Network

GUI   Graphical User Interface

MFC   Microsoft Foundation Classes

NATO   North Atlantic Treaty Organisation

TA   Technical Authority

UI   User Interface

VB   Visual Basic