Image Cover Sheet

CLASSIFICATION	SYSTEM NUMBER 155547
UNCLASSIFIED	

TITLE

CONSENSUS DECISION SUPPORT PROGRAM \(CDSP\)

System Number:

Patron Number:

Requester:

Notes:

DSIS Use only:

Deliver to: FF

DEPARTMENT OF NATIONAL DEFENCE
CANADA

OPERATIONAL RESEARCH AND ANALYSIS

DIRECTORATE OF MATHEMATICS AND STATISTICS

DMS RESEARCH NOTE RN 9505

CONSENSUS DECISION SUPPORT PROGRAM (CDSP)

by

Adam Teather

DECEMBER 1995

OTTAWA, CANADA

National Défense
Defence nationale

OPERATIONAL RESEARCH AND ANALYSIS

CATEGORIES OF PUBLICATION

ORA Reports are the most authoritative and most carefully considered publications of the ORA scientific community. They normally embody the results of major research activities or are significant works of lasting value or provide a comprehensive view on major defence research initiatives. ORA Reports are approved personally by DGOR, and are subject to peer review.

ORA Project Reports record the analysis and results of studies conducted for specific sponsors. This Category is the main vehicle to report completed research to the sponsors and may also describe a significant milestone in ongoing work. They are approved by DGOR or DORA and are subject to peer review. They are released initially to sponsors and may, with sponsor approval, be released to other agencies having an interest in the material.

Directorate Research Notes are issued by directorates. They are intended to outline, develop or document proposals, ideas, analysis or models which do not warrant more formal publication. They may record development work done in support of sponsored projects which could be applied elsewhere in the future. As such they help serve as the corporate scientific memory of the directorates.

ORA Journal Reprints provide readily available copies of articles published with ORA approval, by ORA researchers in learned journals, open technical publications, proceedings, etc.

ORA Contractor Reports document research done under contract for ORA agencies by industrial concerns, universities, consultants, other government departments or agencies, etc. The scientific content is the responsibility of the originator but has been reviewed by the scientific authority for the contract and approved for release by DGOR or DORA.

DEPARTMENT OF NATIONAL DEFENCE

CANADA

OPERATIONAL RESEARCH AND ANALYSIS

DIRECTORATE OF MATHEMATICS AND STATISTICS

DMS RESEARCH NOTE NO. 9505

CONSENSUS DECISION SUPPORT PROGRAM (CDSP)

by

Adam Teather
Co-op Student, September - December 1995

OTTAWA, CANADA   DECEMBER 1995

ABSTRACT

This report documents the functionalities of each screen in the graphical user interface (GUI) enhanced version of the Consensus Decision Support Program (CDSP). The report contains a brief overview of the CDSP methodology as well as illustrations of CDSP's algorithm and screens.

i

TABLE OF CONTENTS

CONSENSUS DECISION SUPPORT PROGRAM (CDSP)

I. INTRODUCTION

1. At Reference [1], DGOR tasked a two phase project to revise the CDSP program for use by a less knowledgeable user, with a more user friendly Windows-like graphical user interface (GUI), with enhanced analytical capabilities. Phase I of this project defined the detailed program requirements. In particular, the Phase I project team completed the following tasks:

    a.   Determine what, if anything, is poor about the current version of the CDSP user interface and to comment on what a better user interface should do and what it should look like; and

    b.   Identify desirable add-ons of a research nature to the current CDSP.

Phase I was completed 15 Dec 94. Phase II of this project involved the implementation of these recommendations.

2. Phase II of this project, begun in September 1995, commenced the implementation of an improved GUI for CDSP using Visual Basic. The new version of CDSP maintained original analytical capabilities by using the original CDSP routines, and focussed on redesigning the interface of the original version of CDSP to make the program more user friendly.

II. PURPOSE

3. The purpose of this report is to document the functionalities available at each screen of the new CDSP in order to give users and potential users a basic understanding of what this software can do. There are a number of screens, each of which is used to perform a different

- 2 -

task: a Ranking screen (to input the ranking information); a Menu screen (to allow users to run CDSP and Statistical Analysis); a CDSP Solution screen (to display the CDSP solution and allow further analysis); a Statistical Analysis screen (to display the level of agreement between rankers); a Statistical Analysis Against CDSP Solution screen (to display the level of agreement between the rankers and the CDSP solution); and a Step-by-Step Solution screen (to display the CDSP solution in a step-by-step walk through of the program). (See Annex B for examples of each screen).

III.   OVERVIEW OF THE CDSP METHODOLOGY[1]

4.   The Consensus Decision Support Program (CDSP) was designed to promote the reaching of consensus in committee decisions. CDSP is designed for use by a committee which is faced with a list of alternatives (or "options") to be prioritized, where each member of the committee (or "ranker") ranks the options, with ties possible. Employing preference logic, CDSP processes the assessments of the rankers, determines the strict dominations and the possible coalitions for or against each option and produces a consensus ranking, given the level of majority which is set by the user.

5.   It is important to note that the strength of the CDSP methodology is that no artificial weights or rating scales are required - it is solely the rank ordering by each player that counts. This approach ensures that no individual can subvert the process by playing the system to his or her advantage (see Annex A).

6.   The assumptions which are implicit to the CDSP approach are the following:

        a.   Each member of the committee has an equal voice;

---

[1]   This overview was adapted from Reference [4].

- 3 -

b.   Each member of the committee has an adequate knowledge of the alternatives being prioritized, and must rank each one;

c.   Each member of the committee agrees with the common goals of that committee.

7.   CDSP operates through the four-step process below in an iterative fashion, declaring a winner or winners at each stage, then removing the winner(s) from further consideration and repeating the process with the reduced option set.

STEP1   Identify any option which dominates every other option and declare it the winner of this iteration.

STEP2   Temporarily remove from the set under consideration those options which dominate no other options and are dominated by at least one other option.

STEP3   Determine stable outcomes for each player. If the set of stable outcomes represents a reduction from the set under consideration, then repeat steps 1 through 3 with the reduced set. Otherwise declare all options in set as tied winners of this iteration.

STEP4   Remove the winning option(s) from the set under consideration, reinstate all temporarily eliminated options from steps 2 and 3, and commence the next iteration at Step 1.

8.   A PC-based software implementation of the CDSP algorithm was developed in 1987 by Mr. E.J. Emond of the Directorate of Mathematics and Statistics. The CDSP package has been applied in numerous committee environments within the department, including the Army

- 4 -

Equipment Board Secretariat, and has been used to assist that body in achieving consensus in prioritizing the Army's capital equipment goals.

9.   A worked example is presented in Annex A to illustrate the underlying CDSP algorithms, which are documented in detail in references [2] and [3]. An overview is also given in Reference [4].

IV.   LIST OF CDSP'S SCREENS AND THEIR FUNCTIONALITIES

10.   The Opening screen asks the user whether or not there is an existing project file[2]. The user must enter the name of the project file if one exists.

11.   The Ranking screen is the screen which records all information about the rankings. From this screen, the user can perform a number of tasks:

    a.   Complete a ranking by "click-and-drag" method. The user selects the option and drags it across to the ranked list and drops it in the appropriate box (repeat this process until all options have been ranked).

    b.   Restart the program (go back to the opening screen)

    c.   Change the number of rankers in a project. If the number of rankers is decreased, then the most recently completed rankings are excluded.

    d.   Change the majority size. The minimum value for the majority size is the first integer greater than half the number of rankers; this is the number which

---

[2]   A project file is a file which contains all relevant information about the project. In this case, the project file contains the following information: the number and names of rankers, the number and names of options, the majority size, and access to the ranking information.

- 5 -

should be used when running CDSP. It is possible to increase the majority size but this will result in more tied options in the CDSP solution; therefore, it is not recommended. In fact, if the majority size equals the number of rankers, then using the program is pointless since unanimous consent would be needed to give an answer different from "All options tied".

e.   Change a ranking which has already been completed. This is a new feature of CDSP.

f.   Change the name of an option. This change will take effect through all the rankings. (i.e. The user doesn't need to go through all the rankings and change the option name in each one.)

g   Change the name of the ranker. The same name is allowed. (i.e. The same user can enter two rankings.)

h.   Decide whether or not to save the current ranking. (Click either Save Ranking or Restore.)

j.   Restore the ranking information which was present before any changes were made.

k.   Make comments about any option. (This is not fully functional.)

m.   Quit the program.

n.   On-line help is not yet available but this will become available with the next upgrade of CDSP.

- 6 -

12.   The Menu screen is the screen which appears when all the ranking information for the project has been entered. From this screen, the user can perform a number of tasks:

  a.   Restart the program.

  b.   Change the number of rankers in a project. If the number of rankers is increased, then the user is sent into the Ranking screen to complete the new ranking(s).

  c.   Change the majority size.

  d.   Change a ranking which has already been completed.

  e.   Change the name of an option.

  f.   Run CDSP.   The new version of CDSP uses the original CDSP to perform the necessary calculations. For this reason, while the program will always give the correct solution, the process takes time to finish running. The solution will be displayed on the CDSP Solution screen. The process may take several seconds to finish running. Please be patient.

  g.   Run statistical analysis. This process will take the ranking information and find the matrix of rank correlation coefficients (Kendall Tau-b values) which gives the relative agreement or disagreement between any two rankers. A value of 1 between two rankers indicates that they are in complete agreement with each other (their rankings are identical). A value of -1 between two rankers indicates that they are in complete disagreement with each other (i.e. If ranker #1 ranked options 1 through 4 in ascending order: 1 2 3 4 and ranker #2 ranked the options in descending order: 4 3 2 1). A value of 0 between two

- 7 -

rankers indicates no agreement or disagreement at all. The statistical analysis routine will also calculate the tail area and the consensus test statistic (for information about these, please see the description of the Statistical Analysis screen). The output of all these calculations will be displayed in the Statistical Analysis screen. The process may take several seconds to finish running. Please be patient.

h.   Quit the program.

j.   On-line help is not yet available but this will become available with the next upgrade of CDSP.

13.   The CDSP Solution screen is the screen which displays the solution after the user runs CDSP. (after all the ranking information for the project has been entered). From this screen, the user can perform a number of tasks:

a.   Restart the program.

b.   Change the number of rankers in a project.

c.   Change the majority size.

d.   Change a ranking which has already been completed.

e.   Change the name of an option.

f.   Run CDSP. This process may take several seconds to finish running. Please be patient.

- 8 -

g.   Run statistical analysis. This process may take several seconds to finish running. Please be patient.

h.   Run statistical analysis against the CDSP solution. This process will take the ranking information and find the vector of correlation coefficients (Kendall Tau-b values) which give the relative agreement or disagreement between the CDSP solution and any ranker. A value of 1 between the solution and a ranker indicates that the ranker is in complete agreement with the solution (the two rankings are identical). A value of -1 between the solution and a ranker indicates that the ranker is in complete disagreement with the solution (ie. If a ranker ranked options 1 through 4 in ascending order: 1 2 3 4 and the CDSP solution ranked the options in descending order: 4 3 2 1). A value of 0 between the solution and a ranker indicates no agreement or disagreement at all. The output of all these calculations will be displayed in the Statistical Analysis Against CDSP Solution screen. This process may take several seconds to finish running. Please be patient.

j.   Show the intermediate steps in the CDSP solution process. (ie. at every iteration CDSP determines which option(s) is/are ranked as the next best option.) This is displayed in the Step-by-step Solution screen.

k.   Create an output file which can be printed from another application. This file contains the following information:

*   Project Name
*   Number of Options
*   Number of Rankers
*   Majority Size
*   Option Names

- 9 -

*   Completed Rankings
*   Matrix of Rank Correlation Between Players (only if the user has run Statistical Analysis)
*   CDSP Solution

m.   Quit the program.

n.   On-line help is not yet available but this will become available with the next upgrade of CDSP.

14.   The Statistical Analysis screen is the screen which displays the rank correlation coefficient matrix (Kendall Tau-b coefficients) which determines the level of agreement or disagreement between any two rankers (after all the ranking information for the project has been entered). This statistical analysis routine tests the hypothesis that the set of rankings is not significantly different from a set of random rankings. This screen also displays the value of the tail area and the test statistic. The test statistic is a value which is determined through comparisons of all pairs of rankings. The tail area refers to the proportion of the area of the Standard Normal curve (0, 1) which is outside the test statistic (i.e. the area under the curve which is greater in magnitude than the test statistic). For purely random rankings, the test statistic will be less than 1.96 in magnitude in 19 cases out of 20. A message is displayed on the screen which indicates whether or not the level of consensus is statistically significant. The user may exit and return to the previous screen at any time.

15.   The Statistical Analysis Against CDSP Solution screen is a screen which displays the rank correlation coefficient vector (Kendall Tau-b coefficients) which measures the level of agreement or disagreement between the solution and each ranker (after all the ranking information for the project has been entered). The user may exit and return to the CDSP Solution screen at any time.

- 10 -

16.   The Step-by-step Solution screen is a screen which displays all of CDSP's intermediate steps on the way to the final solution. Initially, the screen displays a list of all of the rankings with the CDSP Solution's first ranked option(s) highlighted on the screen. As the user proceeds through the next steps, the highlighted option(s) are removed and the next highest ranked option(s) according to the CDSP Solution is highlighted. The user can continue until all the options have been removed from the screen or the user may exit the screen at any time. Upon exiting the screen, the user will return to the CDSP Solution screen.

- 11 -

REFERENCES

1.   DGOR Tasking Memo.   ORA 3552-22260 (DGOR) 4 January 1995.

2.   "Preliminary Report on Consensus Procedures for Priority Ranking by a Committee", by E.J. Emond, DMS Staff Note 4/87, July 1987.

3.   "A Consensus Procedure for Committee Decisions", by E.J. Emond, ORAE Project Report PR448, December 1987.

4.   "Application of the Consensus Decision Support (CDSP) Methodology in Prioritizing the 1995/96 Major Development Program", by D.W. Mason, DLOR-RN-9502, April 1995.

ILLUSTRATION OF CDSP ALGORITHM

(This illustration is taken from Reference [4])

1.   Consider a three-member committee ("players" A, B, and C) faced with the task of prioritizing five options (labelled 1 through 5). The required majority is established as 2 of 3 committee members. The following are the rankings of the five options submitted by the players. Options connected by a dash have been declared tied by that player.

$$A: \quad 1 \ 2\text{-}3\text{-}4 \ 5$$
$$B: \quad 2 \ 4 \ 5 \ 3 \ 1$$
$$C: \quad 1 \ 2\text{-}3 \ 5 \ 4$$

2.   Preference Matrix. The "preference matrix", $P(i,j)$, is the initial focus of the CDSP method. It registers the number of players ranking option I higher than option j. Note that ties are insufficient - the ranking must be strictly higher in order to count. If the number of players strictly preferring I over j meets or exceeds the established majority, then option I is said to "dominate" option j. The preference matrix associated with this example is presented below:

OVER OPTION

		1	2	3	4	5
O	1	-	2	2	2	2
P	2	1	-	1	2	3
T I	3	1	0	-	1	2
O	4	1	0	1	-	2
N	5	1	0	1	1	-

A-1

3. Note that option 1 is ranked first by two of the three players and clearly dominates all other options. The entries in the row for option 1 are all of value 2. Option 1, therefore, is the consensus choice of the committee.

4. One of the features of the CDSP process is that it cannot be subverted by any single player. For example, if a system based on lowest average rank had been employed, then player B would have been able to sway the arithmetic to favour option 2 by placing option 1 last in his list.

$$\text{Option 2 avg rank} = (3 + 1 + 2.5) / 3 = 2.17$$
$$\text{Option 1 avg rank} = (1 + 5 + 1) / 3 = 2.33$$

5. CDSP operates in an iterative fashion. In each iteration the winner(s) is declared, removed from consideration, and the process repeated. Two general methods are employed in the process - dominance methods, and the analysis of stable outcomes.

6. <u>Analysis of Dominance</u>. If any row in the preference matrix contains all values greater than or equal to the majority, then that option dominates all others and is the clear consensus choice. In this example, option 1 dominates the others and is selected the winner in the first iteration. Removing the row and column associated with option 1 leaves the following reduced preference matrix to start the second iteration:

	2	3	4	5
2	-	1	2	3
3	0	-	1	2
4	0	1	-	2
5	0	1	1	-

A-2

7. As all rows now contain at least one value less than the majority, no further winners can be declared at this stage using dominance.

8. However, we can temporarily remove some clear non-winners from the field at this stage by using the dominance argument. Any row in which every value is less than the majority value of 2 cannot win outright. At best it might be tied with all the rest. But if there is at least one value in the corresponding column which is 2 or greater, then at least one other option dominates it. Hence, the dominated option can be temporarily eliminated from consideration in this iteration.

9. Option 5 can be eliminated from consideration in the second iteration using this argument, as all values in the option 5 row are less than 2 and at least one value in the option 5 column is 2 or greater. Note that the method is not declaring option 5 to be last in the overall ranking, simply that it cannot win in the second iteration. Option 5 will be thrown back into the ring to start the third iteration. The (temporarily) reduced preference matrix then becomes:

	2	3	4
2	-	1	2
3	0	-	1
4	0	1	-

10. Option 4 now can be eliminated using the same argument (it dominates no options and is dominated by option 2), leaving only options 2 and 3 in the hunt. The resulting preference matrix below cannot be reduced any further using dominance arguments.

A-3

```
       2    3
    ┌─────────┐
 2  │  -    1 │
 3  │  0    - │
    └─────────┘
```

11.   <u>Analysis of Stable Outcomes</u>. Once dominance methods have been exhausted, the CDSP algorithm proceeds to an analysis of stable outcomes. An option is called a "stable outcome" for a given player if the player could propose to support the option and no majority coalition of other players would prefer supporting any other option that is less favourable to that player. There are a few associated rules for stable outcomes:

a.   A player would not propose to support his/her lowest ranking choice(s), as the player has nothing to lose by letting others determine the winner(s).

b.   Even if a given outcome passes the tests above, it is not stable if there exists a higher ranking outcome for that player which is already determined to be stable. The player would always support his/her highest ranking stable outcome(s).

12.   In this example, the ranking of options 2 and 3 by each player are as follows:

A: 2-3

B: 2 3

C: 2-3

Neither player A nor C has a stable outcome, as options 2 and 3 are tied for last place (at this stage, with 1, 4, and 5 out of the running) and would not qualify as stable outcomes under rule a. in the paragraph above. Option 2 is stable for player B, as A and C cannot

A-4

form a coalition that strictly prefers option 3. Option 2, as the only stable outcome, is declared the winner in the second iteration.

13. In general, the subset of stable outcomes may well include more than one option. If so, then the entire process of analysing dominance and stable outcomes is repeated on the reduced subset until either a clear winner emerges or the option set cannot be further reduced. If the latter occurs, the options in the irreducible set are declared as tied winners.

14. This particular example has been kept small in order to illustrate clearly all aspects of the CDSP method, resulting in the relatively simplistic stable outcomes situation described above. Reference [2] contains some more complex examples of the analysis of stable outcomes.

15. After each iteration the winner(s) is removed and the process repeated. In this example, options 1 and 2 have been removed to start iteration three, giving the following preference matrix.

	3	4	5
3	-	1	2
4	1	-	2
5	1	1	-

16. No winner can be declared by dominance, as all rows contain at least one value less than the majority of 2. Option 5 can be removed as a non-winner in this iteration as it was in iteration two, leaving options 3 and 4 and the matrix below:

	3	4
3	-	1
4	1	-

A-5

17.   This matrix cannot be further reduced by dominance arguments, so stable outcomes are then assessed. The rankings of options 3 and 4 for each player are as shown below.

A: 3-4

B: 4 3

C: 3 4

There are no stable outcomes for player A (options 3 and 4 are tied for last choice). Option 4 is stable for player B, and option 3 is stable for player C. Therefore, the subset of options is not further reducible and options 3 and 4 are declared co-winners of iteration three. Note that option 3, which survived longer than option 4 during iteration two, does not win over option 4 once option 2 has been removed from the picture.

18.   Option 5, the only remaining option, is the de facto winner of iteration 4, giving the following final ordering:

Consensus Ranking: 1 2 3-4 5

ANNEX B
TO DMS RN 9505
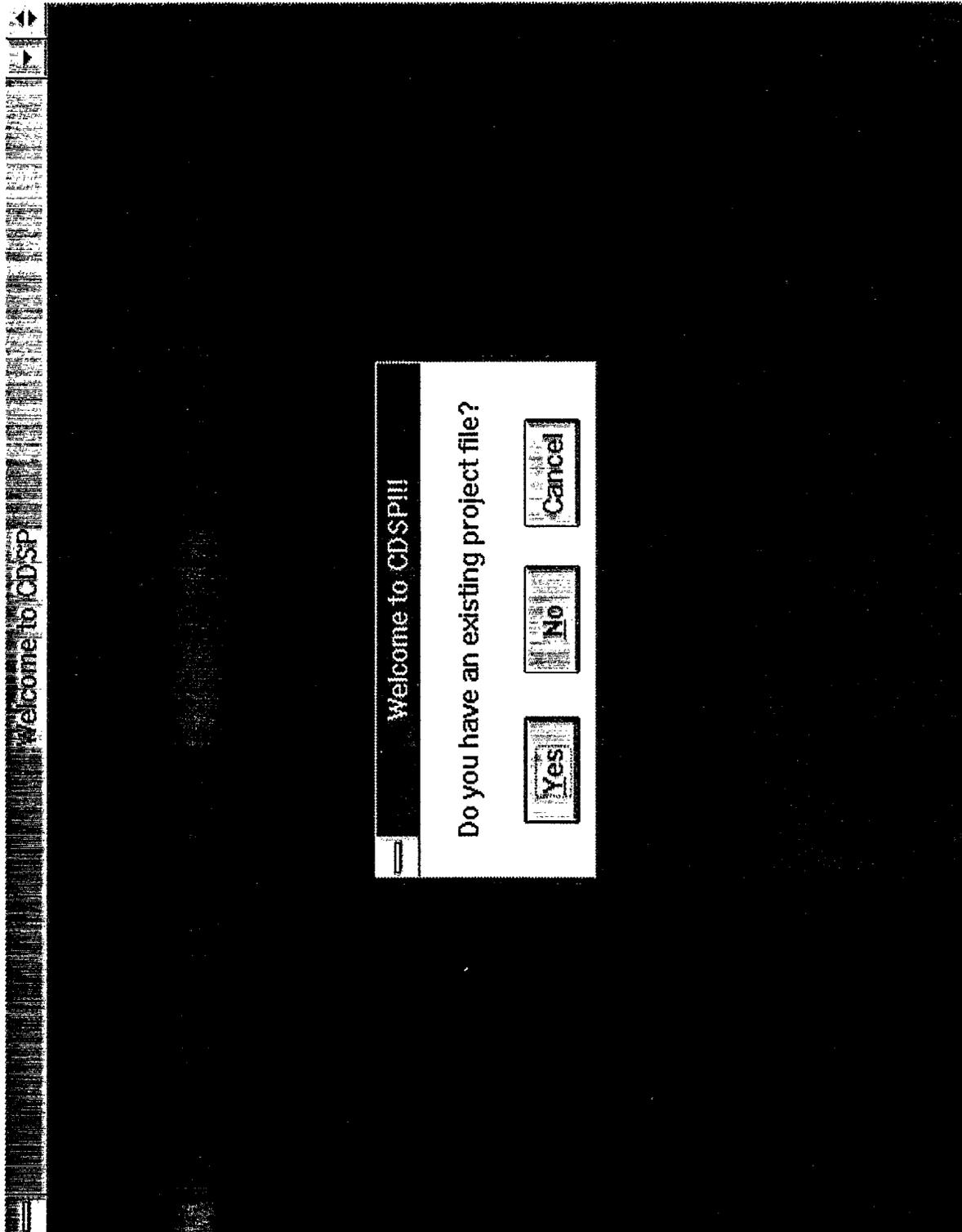DATED DECEMBER 1995

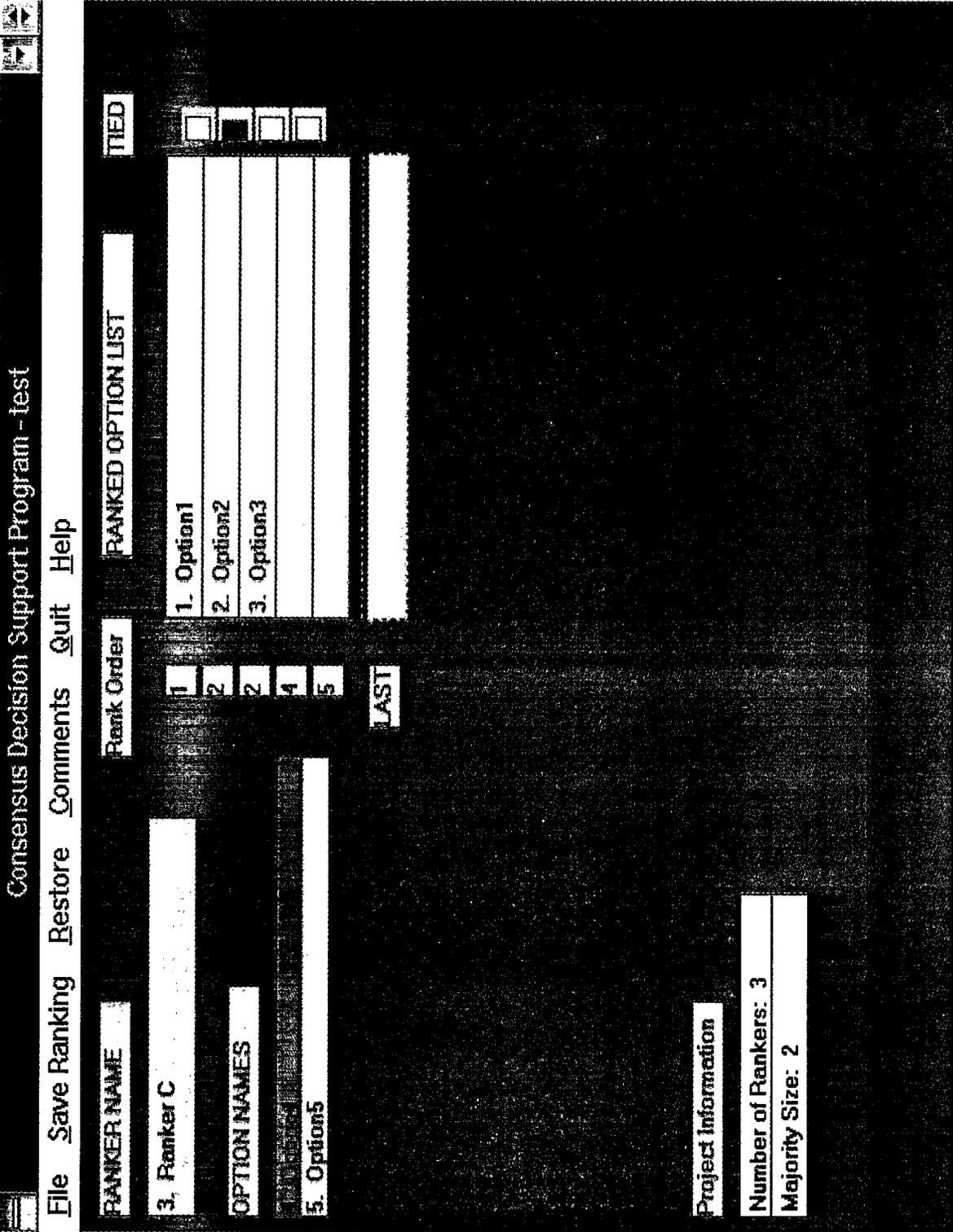## ILLUSTRATION OF CDSP'S SCREENS

B-1
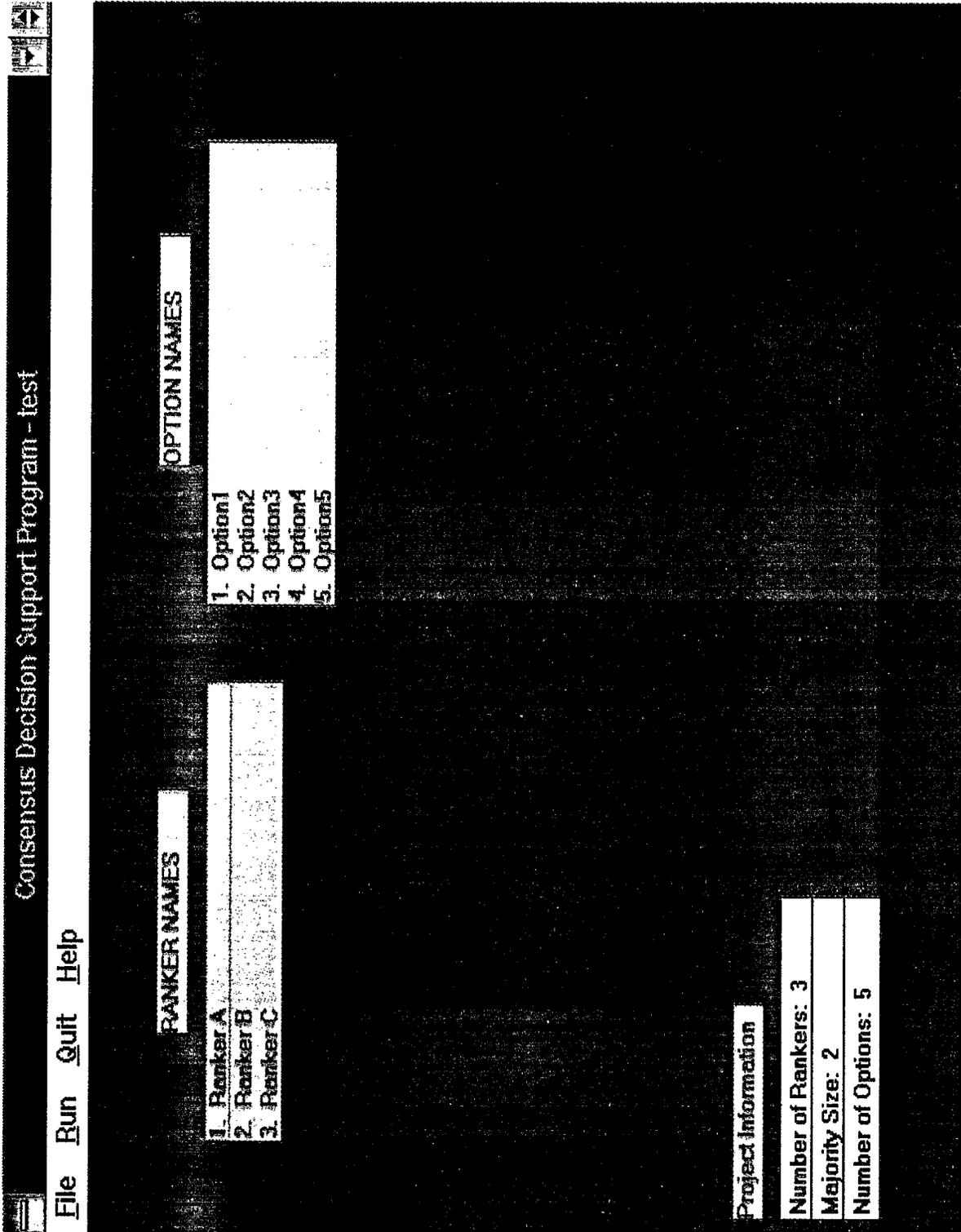
Figure B-1: Opening Screen

B-2

Figure B-2: Ranking Screen

B-3

Consensus Decision Support Program - test

File   Run   Quit   Help

RANKER NAMES

1. Ranker A
2. Ranker B
3. Ranker C

OPTION NAMES

1. Option1
2. Option2
3. Option3
4. Option4
5. Option5

Project Information

Number of Rankers: 3

Majority Size: 2

Number of Options: 5

Figure B-3: Menu Screen

B-4

Consensus Decision Support Program SOLUTION - test

File Run Display Output Quit Help

CDSP Ranked Solution List

TIED

Rank Order

1	1. Option1
2	2. Option2
3	3. Option3
3	4. Option4
5	5. Option5

Project Information

Number of Rankers: 3

Majority Size: 2

Figure B-4: CDSP Solution Screen

B-5

Statistical Analysis: Matrix of Kendall Tau-B Coefficients - test

Exit

	1	2	3
1. Ranker A	1	-.36	.88
2. Ranker B	-.36	1	-.32
3. Ranker C	.88	-.32	1

For purely random rankings, the test statistic will be less than 1.96 in magnitude in 19 cases out of 20.

The level of consensus is NOT statistically significant

Statistical Information

Consensus Test Statistic: .16

Tail Area: .438

Figure B-5: Statistical Analysis Screen

B-6

Correlation Between CDSP Solution and Each Player's Rankings - test

Exit

	CDSP Solution
1. Ranker A	
2. Ranker B	-.11
3. Ranker C	.89
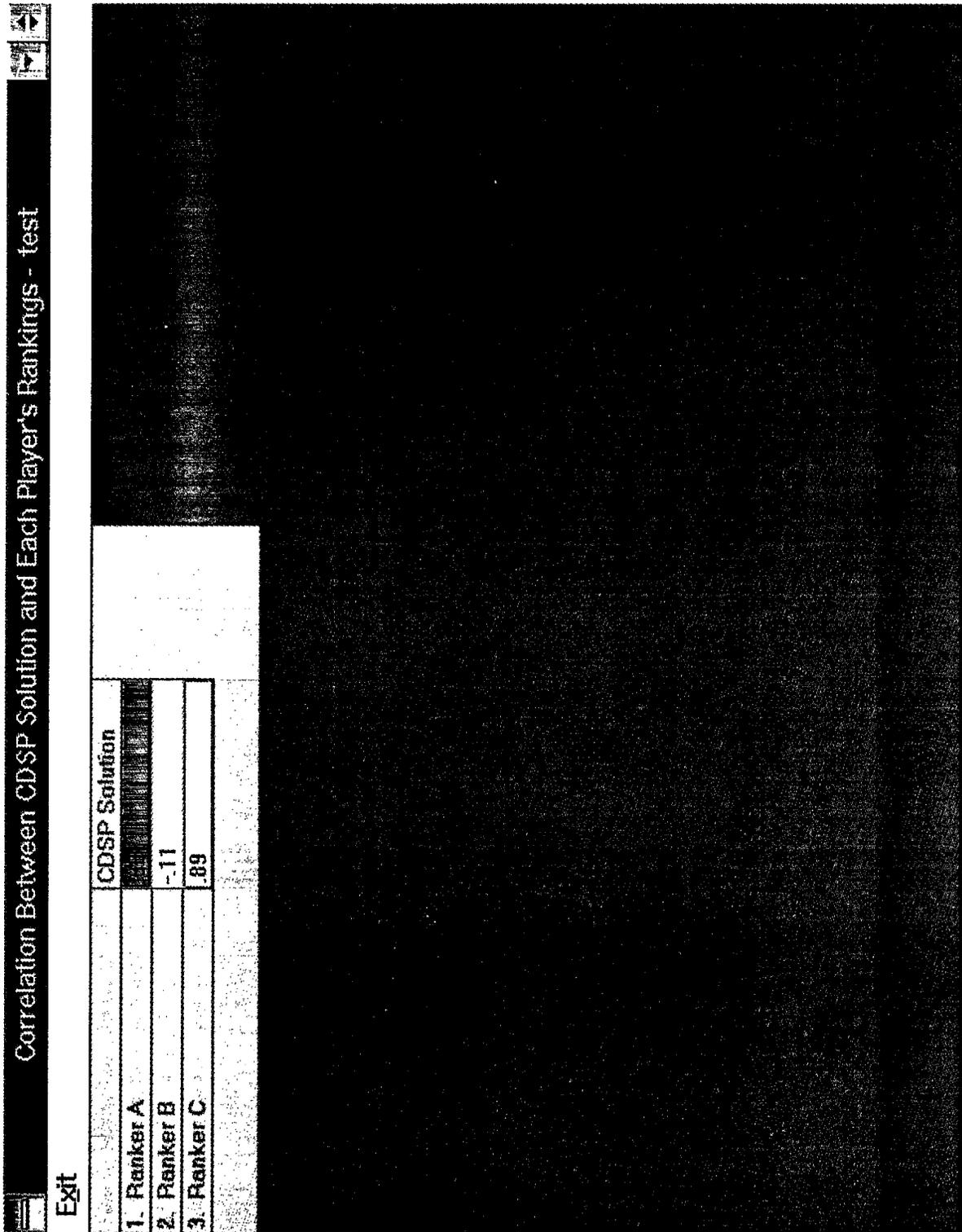
Figure B-6: Statistical Analysis Against CDSP Solution Screen

B-7

Figure B-7: Step-by-Step Solution Screen

UNCLASSIFIED

SECURITY CLASSIFICATION OF FORM
(highest classification of Title, Abstract, Keywords)

DOCUMENT CONTROL DATA
(Security classification of title, body of abstract and indexing annotation must be entered when the overall document is classified)

1. ORIGINATOR (the name and address of the organization preparing the document. Organizations for whom the document was prepared e.g. Establishment Sponsoring a contractor's report, or tasking agency, are entered in Section 8). DGOR/DMS National Defence Headquarters Ottawa, Ontario, K1A 0K2	2. SECURITY CLASSIFICATION (overall security classification of the document, including special warning terms if applicable) UNCLASSIFIED

3. TITLE (the complete document title as indicated on the title page. Its classification should be indicated by the appropriate abbreviation (S, C or U) in parentheses after the title) Consensus Decision Support Program (CDSP)

4. AUTHORS (last name, first name, middle initial) Teather, Adam

5. DATE OF PUBLICATION (month Year of Publication of document) December 1995	6a. NO OF PAGES (total containing information. Include Annexes, Appendices, etc.) 30	6b. NO OF REFS (total cited in document) 4

7. DESCRIPTIVE NOTES (the category of document, e.g. technical report, technical note or memorandum. If appropriate, enter the type of report e.g. interim, progress, summary, annual or final. Give the inclusive dates when a specific reporting period is covered.) DMS Research Note

8. SPONSORING ACTIVITY (the name of the department project office or laboratory sponsoring the research and development. Include the address). DGOR

9a. PROJECT OR GRANT NO. (if appropriate, the applicable research and development project or grant number under which the document was written. Please specify whether project or grant.) 3563-41303-3	9b. CONTRACT NO. (if appropriate, the applicable number under which the document was written.) ---

10a. ORIGINATOR's document number (the official document number by which the document is identified by the originating activity. This number must be unique to this document.) DMS Research Note 9505	10b. OTHER DOCUMENT NOS. (Any other numbers which may be assigned this document either by the originator or by the sponsor.) ---

11. DOCUMENT AVAILABILITY (any limitations on further dissemination of the document, other than those imposed by security classification.) (X) Unlimited distribution ( ) Distribution limited to defence departments and defence contractors: further distribution only as approved ( ) Distribution limited to defence departments and Canadian defence contractors; further distribution only as approved ( ) Distribution limited to government departments and agencies; further distribution only as approved () Distribution limited to defence departments; further distribution only as approved ( ) Other (please specify):

12. DOCUMENT ANNOUNCEMENT (any limitation to the bibliographic announcement of this document. This will normally correspond to the Document Availability (11). However, where further distribution (beyond the audience specified in 11) is possible, a wider announcement audience may be selected.)

UNCLASSIFIED

SECURITY CLASSIFICATION OF FORM

13. ABSTRACT (a brief and factual summary of the document. It may also appear elsewhere in the body of the document itself. It is highly desirable that the abstract of classified documents be unclassified. Each paragraph of the abstract shall begin with an indication of the security classification of the information in the paragraph (unless the document itself is unclassified) represented as (S), (C), or (U). It is not necessary to include here abstracts in both official languages unless the test is bilingual).

This report documents the functionalities of each screen in the graphical user interface (GUI) enhanced version of the Consensus Decision Support Program (CDSP). The report contains a brief overview of the CDSP methodology as well as illustrations of CDSP's algorithm and screens.

14. KEYWORDS, DESCRIPTORS or IDENTIFIERS (technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus, e.g. Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus-identified . If it is not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title.)

Decision Support Software
Graphical User Interface
Committee and Consensus

Canada