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Research Using In Vivo Simulation of Meta-Organizational Shared Decision Making (SDM)

Task 5: creation of a user friendly knowledge tool

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Defence R&D Canada – Centre for Security Science

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Abstract

Introduction: This report, along with its knowledge database tool, represents completion of Task 5 of the work stream “Research Using in Vivo Simulation of Meta-Organizational Shared Decision Making (SDM)”, one component of the Technology Innovation Fund (TIF) program on Meta-organizational Collaboration that has been designed to assist in understanding challenges faced by the Canadian Forces (CF). The objective of the stream is to conduct basic research into shared decision making through the analysis of case studies, exercises and simulations.

Method: Task 5 involved the development of a knowledge database tool organised by the various components of the shared-decision making (SDM) framework entitled *Model of Inter-Organizational Problem Solving*. The database tool purpose, organization and features are described in this report.

Results and Discussion: During research undertaken to develop the *Model for Inter-organizational Problem Solving* (Task 1) and the design and implementation of an experimental plan to test the *Model* (Tasks 2 and 3), a body of literature was collected and referenced in the various Task reports. Additional peer-reviewed articles and grey literature were consulted for the purpose of completing Task 4: Modeling communication and decision making functions. This knowledge base of information sources has been organized in MS Access by the key components of the *Model* for ease of use by the operational and analytic communities within DRDC.

Résumé

Introduction : Ce rapport présente la Tâche 5 du projet « *Recherche par la simulation in-vivo sur la prise de décision partagée des méta-organisations* », une composante du programme de recherche sur les méta-organisations financé par le Fond pour l’innovation technologique (Technology Innovation Fund – TIF), mis en place afin d’améliorer la compréhension des défis auxquels font face les Forces canadiennes (FC) en matière de collaboration inter-organisationnelle. L’objectif de ce projet est de mener une recherche fondamentale sur la prise de décision partagée, au moyen d’études de cas, d’exercices et de simulations.

Méthode : La Tâche 5 consiste en la création d’un outil de connaissance sous forme de base de données organisée selon les éléments du modèle de prise de décision partagée nommé *Modèle de la résolution inter-organisationnelle de problèmes*. L’objectif, la structure ainsi que les caractéristiques de cet outil sont décrits dans ce rapport.

Résultats et discussion : Au cours de la recherche entreprise dans le but de développer le *Modèle de la résolution inter-organisationnelle de problèmes* (Tâche 1) et la conception ainsi que la mise en œuvre du plan expérimental servant à tester le Modèle (Tâches 2 et 3), un important corpus de littérature a été recueilli et cité dans les rapports des différentes Tâches. Des articles scientifiques additionnels et des rapports ont été consultés afin de compléter la Tâche 4 intitulée : Modélisation des fonctions de communication et de prise de décision. Ces sources d’information ont été organisées dans le logiciel MS Access d’après les composantes clés du Modèle, de manière à pouvoir être facilement consultées et manipulées par le personnel de RDDC.

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Executive summary

Research Using In Vivo Simulation of Meta-Organizational Shared Decision Making (SDM) - Task 5: User Friendly Knowledge Tool

Louise Lemyre¹ et al.; DRDC CSS CR 2011-34; Defence R&D Canada – CSS.

Introduction: This report describes the MS Access knowledge database tool created for Task 5 of the project entitled Research Using in Vivo Simulation of Meta-Organizational Shared Decision Making (SDM), one of the seven work streams of the Technology Innovation Fund (TIF) project that has been designed and implemented to assist in understanding and addressing the collaboration challenges faced by the Canadian Forces (CF). The CF has become increasingly involved in collaborating with various non-traditional partners to find and to implement solutions to address complex problems both domestically and internationally. Understanding inter-organizational decision making processes and outcomes thus becomes an important factor towards improving interoperability in such a multi-organizational environment.

The objective of Task 5 is to provide the analytical and operational communities within DRDC with easy access to key information sources and references linked to the *Model for Inter-organizational Problem-solving* developed in Task 1 of the SDM research project and implemented and tested under Tasks 2, 3 and 4.

Method: Headed by Dr. Lemyre, the Gap-Santé research team at the University of Ottawa created a *Model for Inter-organizational Problem Solving* under Task 1 of the project. Task 2 involved the development of a research plan for an *in vivo* simulation experiment as well as qualitative interviews. Task 3 comprised testing the shared decision-making (SDM) framework using qualitative interviews with key decision makers having played a role in major events and testing an *in vivo* experimental simulation of shared decision making in a complex scenario. Task 4 focused on analysing the findings from the various data sources and methods implemented in previous tasks to develop potential considerations and guidelines with respect to communication, decision-making and problem-solving in multi-organizational environments during extreme events. The present Task 5 entails the creation of a bibliographic database in MS Access based on the various references collected throughout the research process to ensure easy access to salient information and key findings of the study.

Results: The final version of the user friendly knowledge tool contains a total of 479 references. The database was designed for users with little knowledge of the MS Access software. In order to promote easy navigation, the tool was organized according to the following 7 main categories reflecting concepts found in the *Model for Inter-organizational Problem-solving*: ‘Problem Solving in Various Organisational Structures’; ‘Decision-making Models’; ‘Problem Solving Approaches’; ‘Time’; ‘Resources’; ‘Complexity’ and ‘Case Studies’. A total of 34 pre-defined reports were created in the database with respect to these categories. Printing options are also available.

Task 5 concludes the Research Using in Vivo Simulation of Meta-Organizational Shared Decision Making (SDM) project. Though the database this report refers to contains an extensive

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number of peer-reviewed articles, grey literature and other types of references relating to the shared decision-making (SDM) framework, further research is needed to fully understand the implications of the *Model*.

Sommaire

Recherche sur le partage de décision des méta-organisations en utilisant la simulation *in vivo* – Tâche 5 : Outil bibliographique convivial

Louise Lemyre² et al.; DRDC CSS CR 2011-34; R & D pour la défense Canada – CSS .

Introduction : Ce rapport décrit l’outil bibliographique convivial sous forme de base de données, tel que constitué pour la Tâche 5 du projet intitulé ‘*Recherche par la simulation in vivo sur la prise de décision partagée des métaorganisations*’, l’un des sept chantiers du Fond pour l’innovation technologique (Technology Innovation Fund – TIF), un programme de recherche conçu et mis en place afin d’améliorer la compréhension des défis auxquels font face les Forces canadiennes (FC) en matière de collaboration interorganisationnelle. Les FC collaborent de plus en plus avec de nombreux partenaires non traditionnels afin de trouver et de mettre en place des solutions pour faire face aux problèmes complexes, que ce soit au niveau national ou international. Le fait de comprendre les processus ainsi que les résultats de prise de décision interorganisationnelle est donc un élément important pour améliorer l’interopérabilité dans un contexte multiorganisationnel.

L’objectif de la Tâche 5 est de fournir au personnel opérationnel et analytique de DRDC un accès direct à des sources d’information clés, ainsi qu’à des références bibliographiques liées au *Modèle pour la résolution interorganisationnelle des problèmes* développé lors de la Tâche 1 du projet de recherche sur la prise de décision partagée et ainsi que mis en œuvre et testé au cours des Tâches 2, 3 et 4.

Méthode : Dirigée par la Professeure Lemyre, l’équipe de recherche Gap-Santé de l’Université d’Ottawa a développé un *Modèle pour la résolution interorganisationnelle des problèmes* sous la Tâche 1 du projet. La Tâche 2 a consisté en la conception d’un plan de recherche concernant une expérience de simulation *in vivo*, de même que des entrevues qualitatives. La Tâche 3 du projet a eu comme objet de tester le modèle de prise de décision partagée par le biais d’entrevues avec des preneurs de décision clé ayant joué un rôle dans des événements importants, ainsi que l’utilisation d’une simulation expérimentale *in vivo* de prise de décision présentant un scénario complexe. La Tâche 4 a porté sur l’analyse des résultats de recherche afin de développer des considérations potentielles et des directives par rapport à la communication, la prise de décision et la résolution de problèmes dans des milieux multiorganisationnels durant des événements extrêmes. La Tâche 5 présentée dans ce rapport consiste en la création d’une bibliographie sous forme de base de données des diverses références recueillies durant le processus de recherche. Cet outil sert à assurer un accès facile à des informations saillantes ainsi que des résultats de recherche clé de l’étude.

Résultats: La version finale de l’outil bibliographique convivial contient un total de 479 références bibliographiques. La base de données a été conçue pour des utilisateurs ayant peu de connaissance du logiciel MS Access. De manière à favoriser une navigation simple, l’outil a été structuré en fonction de 7 catégories principales rattachées à des concepts trouvés dans le *Modèle pour la résolution interorganisationnelle des problèmes* : ‘La résolution de problèmes dans diverses structures organisationnelles’; ‘Les modèles de prise de décision’; ‘Les méthodes de

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prise de décision'; 'Le temps'; 'Les ressources'; 'La complexité' et 'Les études de cas'. 34 rapports prédéfinis ont été ajoutés à la base de données, selon ces catégories. Plusieurs options sont également disponibles pour ce qui est d'imprimer les rapports.

La Tâche 5 conclut le projet de Recherche par la simulation in vivo sur la prise de décision partagée des métaorganisations. Bien que la base de données sur laquelle porte ce rapport contienne un nombre important d'articles scientifiques révisés par des pairs, de rapports et d'autres types de références bibliographiques liées à la prise de décision partagée, des études supplémentaires sont nécessaires afin d'aboutir à une compréhension plus complète des implications du *Modèle*.

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The following GAP-Santé team members contributed to this draft: Celine Pinsent, PhD, Paul Boutette, MBA, Myriam Gagnon, B.A. (Yr 4), Wayne Corneil, DSc., Cecilia Lemus, Eng., MSc., and Stephanie Blust-Volpato, B.A.

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Preface

This document represents the final draft of *Task 5: Creation of a user friendly knowledge tool*, and is submitted using the DRDC supplied template for Contractor reports. The work has been completed for Defence Research and Development Canada (DRDC) as part of the contract deliverable defined in the project entitled *Research Using In-Vivo Simulation of Meta-Organizational Shared Decision Making (SDM)*, Contract No.: W7714-083659/001/SV. As per contract requirements, the document is provided in both electronic format and printed copy (5).

The completion of the Task 5 report which describes the knowledge database tool and the handover of the knowledge tool application represent the final deliverables of this research project. The research undertaken so far has opened up a number of additional lines of inquiry that have the potential to extend the benefits achieved to-date should research proceed in these areas. Suggestions and considerations related to future research opportunities have been outlined in the Task 4 report.

Document Distribution and Confidentiality

Document distribution and confidentiality protocols as specified in the contract noted above will apply to this document. Please contact Dr. Louise Lemyre, Principal Investigator, University of Ottawa, at louise.lemysre@uOttawa.ca should a change in protocols be requested. Please quote with due reference to Lemyre et al. 2010, Report on Research Using in Vivo Simulation of Meta-Organizational Shared Decision Making (SDM) – Task 5: Creation of a user friendly knowledge tool.

1 Introduction

1.1 Purpose and structure of report

According to the overview of the Technology Innovation Fund (TIF) project (Chouinard, 2009), the Canadian Forces (CF) have become increasingly involved with complex events that defy easy solutions. Complex events result in ripple effects that extend beyond immediate impacts, and are exacerbated by existing vulnerabilities and by the uncertainties inherent in large scale threats and emergencies. As the effects of these events are mitigated, the CF must engage with traditional, non-traditional, and international partners to collaborate on and contribute to solutions to challenging problems. The TIF project was implemented with the overall goal of: *assisting the CF and partnering agencies through an understanding of interagency collaborative behaviour, the effects of inter-agency relationships on collective decision making and the influences of psycho-social factors*. (Chouinard, 2009, p.2)

The current research, *Research Using In Vivo Simulation of Meta-organizational Shared Decision Making*, was designed to support the TIF goal via completion of five specific tasks. This draft report presents the results of *Task 5: Creation of a user friendly knowledge tool*. Task 1 focused on project conceptualization, a review of the relevant literatures, and a series of Canadian and international cases, culminating in the development of the *Model for Inter-organizational Problem-solving*. This *Model* served as the shared decision-making framework, providing the theoretical basis for the remaining tasks. Task 2 involved the development of a research plan for an *in vivo* simulation experiment and qualitative interviews, both of which were then implemented under Task 3. Task 4 focused on analysing the findings from the various data sources and methods implemented in previous tasks to develop potential considerations and guidelines with respect to communication, decision-making and problem-solving in multi-organizational environments during extreme events. Task 5, the topic of the present report and the final task of the research project, involved the development of a user-friendly database that will help direct individuals to key sources and references for each of the main concepts and constructs used throughout the research process.

The following section describes the *knowledge database tool* in terms of its purpose, structure, information sources, accessing and viewing the database, and running pre-defined reports.

2 Description of the Knowledge Database Tool

2.1 Purpose

As described in the Statement of Work for the project, the objective of Task 5 is to “*provide guidance for the operational and the supporting analytic communities through a software-based, user friendly knowledge database tool based upon MS Access. The tool must provide these communities with access to the SDM framework recommendations for shared decision making, where there are differences between the SDM framework and the ICS framework, insight into the limitations of these frameworks, suggestions to overcome the limitations in what circumstances and any other insights that result from the research.*”

As detailed below, the information in the database is organized by the key elements of the Shared Decision-Making (SDM) framework. The reports produced under Task 1 through Task 4 activities are themselves parsed and coded for easy access to recommendations and observations not only on the SDM framework but also on the ICS model and other decision making models examined during the course of the project.

2.2 Database structure

The organizing principle used to construct the database is the Model for inter-organizational problem solving described in Task 1 of the Research Using In-Vivo Simulation of Meta-Organizational Shared Decision Making (SDM) project (see *Figure 1* below).

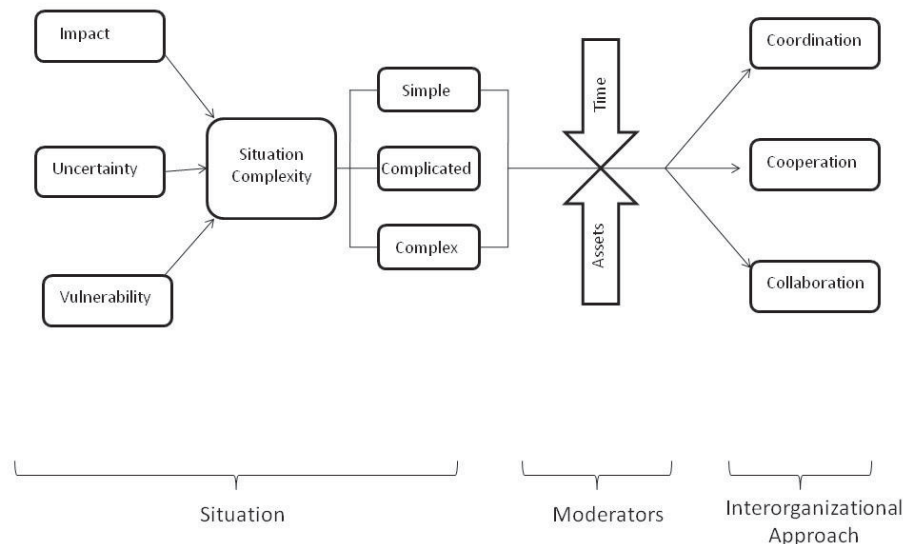


Figure 1: Model for inter-organizational problem solving

The conceptualization of the *Model* aimed at gaining an understanding of inter-organizational problem solving during extreme events (Lemyre et al., 2010³). As illustrated in the previous figure, the *Model* suggests that an optimal approach to inter-organizational problem solving must take into account the following two major components: situational complexity (described as ‘Simple’, ‘Complicated’ or ‘Complex’) and inter-organizational approach (i.e., ‘Coordination’, ‘Cooperation’ and ‘Collaboration’). The *Model* provided inspiration for six of the main reference categories that are found in the database. These categories consist of: 1) Problem solving in various organizational structures, 2) Decision-making models, 3) Problem-solving approaches, 4) Time, 5) Resources, and 6) Complexity. ‘Case studies’ was added as a 7th category to incorporate the nine case studies documented in the Task 1 report. Each of these seven categories is broken down into a number of sub-categories, as depicted in the figure below:

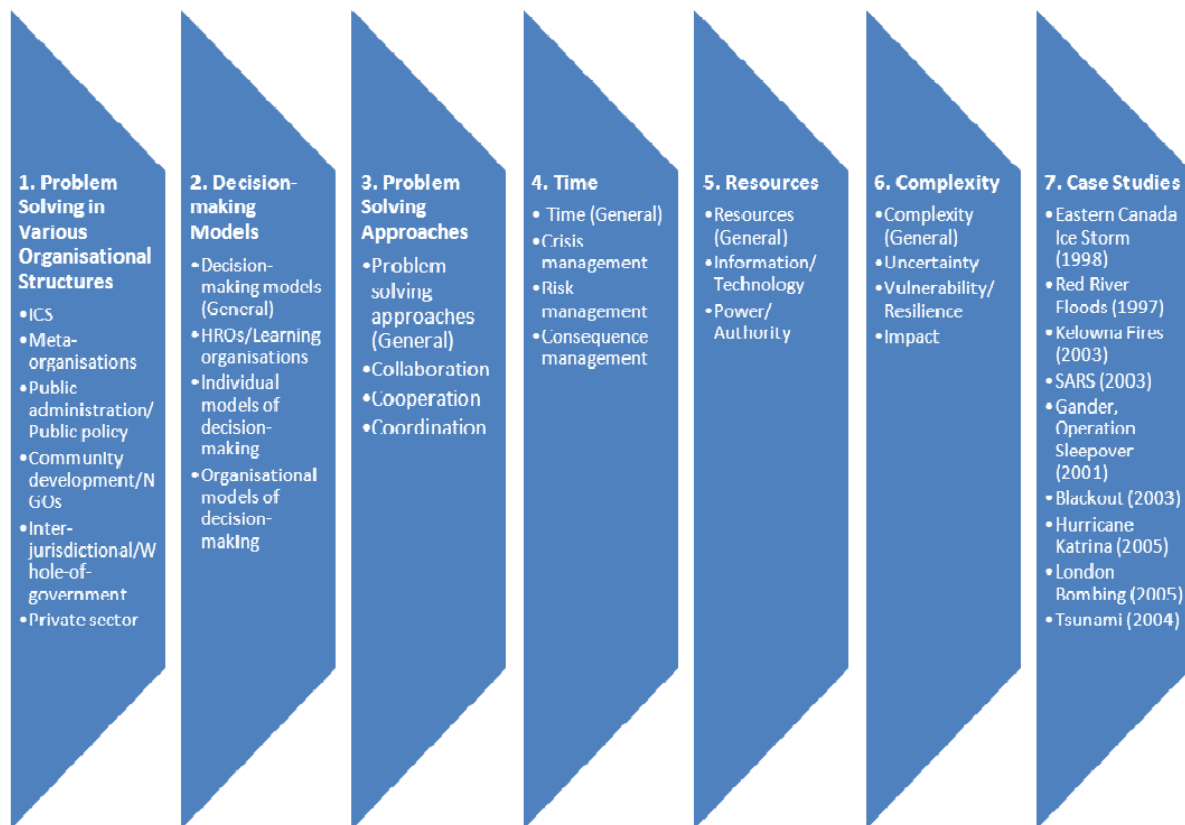


Figure 2: Database categories

³ Lemyre, L., Boutette, P., Pinsent, C., Corneil, W., Johnson, C., Munoz, M. et al. (2009). *Research Using In Vivo Simulation of Meta-Organizational Shared Decision Making (SDM): Task 1: Synthesis of Case Studies to form a SDM framework*.

A total of 479 references are included in the knowledge database tool and are organized by one or more of the categories listed above. For a full list of the references included in the knowledge database tool, see Annex A.

2.3 Building the database of information sources

The foundation of the database lies in the references listed in the previous tasks of the Research Using In-Vivo Simulation of Meta-Organizational Shared Decision Making (SDM) project (Tasks 1-4). However, given that research is on-going, a number of references are included that were not alluded to in the previous contract reports of this project. These references relate to grey literature and peer-reviewed articles, as well as material from prior research undertaken by the GAP-Santé research team. Segments of the contract reports themselves are also referred to in the database allowing users quick access to salient points made in one or more of the Task reports.

The articles retained for database creation purposes had to relate to at least one of the sub-categories listed earlier. In many cases, references related to multiple categories and judgements were made to document accordingly. As an aid in this process, the sub-elements of the *Model*, where relevant, were reviewed to determine “best fit” of a specific article or piece of information. Refer to *Figure 3* below for sub-elements of the factors contributing to situational complexity.

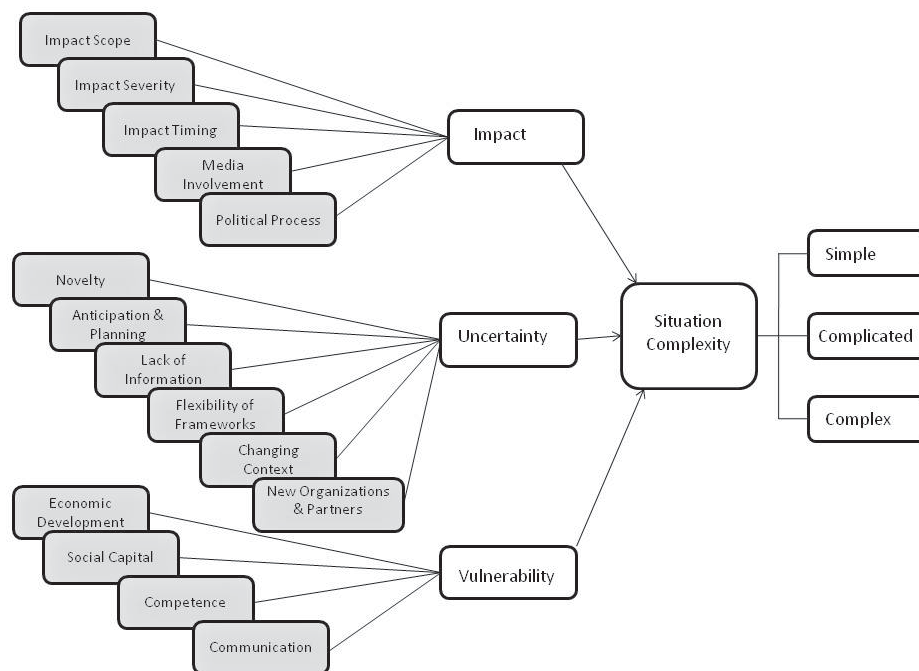


Figure 3: Three factors contributing to situation complexity

The references chosen for inclusion were initially entered into Reference Manager v12, a bibliographic software tool utilised during the course of the various literature searches undertaken in completing the project. The references were subsequently coded with keywords referring to one or more of the categories presented in *Figure 2*. During this process, all abstracts available were obtained and inserted in the relevant fields. Approximately half of the references either did not have abstracts written for them or the abstracts were inaccessible. URLs were also provided when available, in order to create ease of access to original sources of information. With information in Reference Manager updated and coded as per the categories and sub-categories described above, the data was exported, as an interim step, to an MS Excel spreadsheet to facilitate the final organization and cleaning of the data. A select number of bibliographic fields were marked for inclusion in the database knowledge tool and the rest deleted. (Refer to Annex B for list of types of information identified for inclusion.) The ‘embellished’ version of the references was then exported to MS Access.

2.4 Accessing and viewing the database

To limit compatibility issues and provide widest possible dissemination, the knowledge database tool has been formatted to run with **MS Access 2002-2003**. Users with later versions of MS Access should be able to open and view the data. The tool has been designed for users with little or no previous experience with MS Access. It is assumed though that users will be familiar with standard navigation and print functions in MS Office applications, such as MS Word or MS Excel. These functions are not explained in any detail in the information provided below.

The database contains a total of 34 reports, each related to one of the major categories of information. Refer to Table 1 below.

Table 1: Report Descriptions

Report Category	Report Description
<i>List of the references related to Problem-solving in various organizational structures:</i>	Contains all the references related to problem solving in various organizational structures. These structures contain the six following sub-categories: A1) ICS, A2) Meta-organisations, A3) Public Administration/Public policy, A4) Community Development/NGOs, A5) Inter-jurisdictional/Whole-of-government approaches and A6) Private Sector.
<i>List of the references related to Decision-making models:</i>	Contains all the references related to decision-making models, broken down into the four following sub-categories: B1) Models of Decision-making (General), B2) HROs/Learning Organizations, B3) Individual Models of Decision-making and B4) Organisational Models of Decision-making.
<i>List of the references related to Problem-solving approaches:</i>	Contains all the references related to problem solving approaches. The four sub-categories of this report are: C1) Problem Solving Approaches (General), C2) Collaboration, C3) Cooperation and C4) Coordination.
<i>List of the references related to Time:</i>	Contains all the references related to time and time phases. These references are categorized according to: D1) Time (General), D2) Crisis Management,

	D3) Risk Management and D4) Consequence Management.
List of the references related to Resources:	Contains all the references related to resources. The three sub-categories of this report are: E1) Information, E2) Resources and E3) Power/Authority.
List of the references related to Complexity:	Contains all the references related to complexity and Complexity Theory, separated into: F1) Complexity (General), F2) Uncertainty, F3) Vulnerability/Resilience and (4) Impact.
List of references related to Case studies:	G1) Eastern Canada Ice Storm (1998) G2) Red River Floods (1997) G3) Kelowna Fires (2003) G4) SARS (2003) G5) Gander, Operation Sleepover (2001) G6) Blackout (2003) G7) Hurricane Katrina (2005) G8) London Bombing (2005) G9) Tsunami (2004)

Once the knowledge database tool has been launched, users will be able to view information either by “Report Category” or by “Form View”. The *Report Categories* screen (pictured below) provides access to all of pre-defined reports created for the purpose of the database tool. In order to open the reports, the user simply clicks on the appropriate button located to the right of the report title. The report titles correspond to the previously defined category labels. Selecting a report category (e.g., Problem-solving approaches: Collaboration) will automatically display all of the linked references.

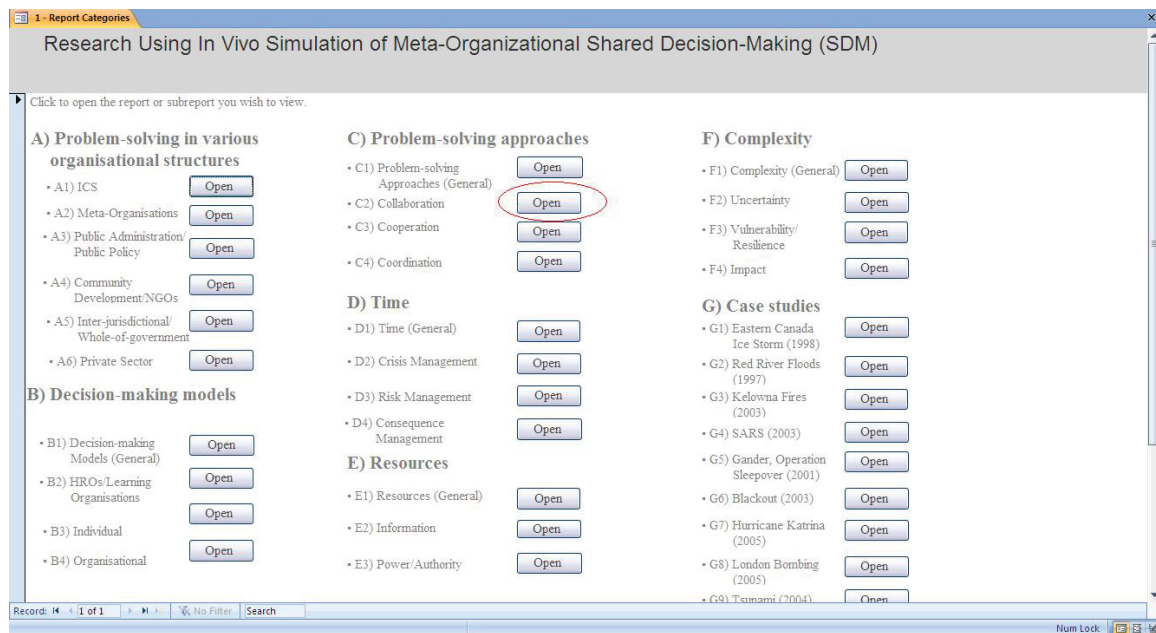


Figure 4: Report Category Screen Screenshot

The “Form View” allows the user to navigate through the bibliographic references by viewing them individually. Each “Form” represents one bibliographic reference from the list of references related to a particular category. The specific category of information is displayed in the title of the form. (Refer to Figure 5 below for an example of a Form screenshot.)

RefID	20
Ref Type	JOUR
Title	Causes of the 2003 Major Grid Blackouts in North America and Europe, and Recommended Means to Improve System Dynamic Performance
Author(s)	Anderson G; Donalek P; Farmer R; Hatziaargyriou M; Kamwa I; Kundur P; Vittal V;
Year	2005
Web/URL	
Source	IEEE Transactions on Power Systems
Abstract	Abstract—On August 14, 2003, a cascading outage of transmission and generation facilities in the North American Eastern Interconnection resulted in a blackout of most of New York state as well as parts of Pennsylvania, Ohio, Michigan, and Ontario, Canada. On September 23, 2003, nearly four million customers lost power in eastern
Volume	20
Issue	4
Start page	1922
End page	1928

Record: 1 of 23 Unfiltered Search

Figure 5: Example of a Form Screenshot

The steps outlined below, provide specific instructions on opening the database, viewing information either by “Report Category” or by “Form View”, running and printing reports and customizing the database.

Opening the knowledge database tool

1. **Double-click** on the knowledge database tool icon labelled “*DRDC SDM Knowledge Tool*”

The *Report Categories* screen form appears (see Figure 6 below). All four tabs in the navigation pane at the left of the screen (‘Tables’, ‘Queries’, ‘Forms’ and ‘Reports’) are minimized.

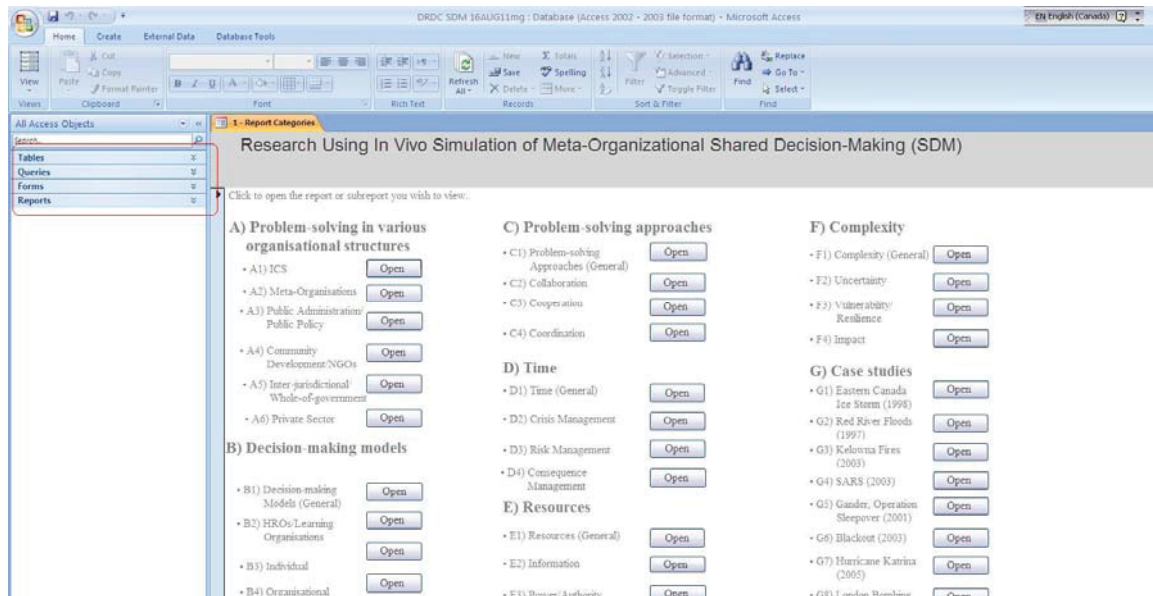


Figure 6: Report Categories Form Screenshot

Viewing reports using the Report Categories screen form

Note: The *Report Categories* screen provides a visual display of all of the reports available to the user. If **Open** is clicked for a particular report, the report will run over the *Report Categories* screen. The *Report Categories* form will remain opened in the background, accessible for the user to return to it at all times by clicking on its label. Users, alternatively, can also access all the reports using the *Report* navigation pane as described later below.

1. With the *Report Categories* screen open, click on the **Open** button for the choice of category. If the report contains multiple records, you can use the scroll function to view the records. Refer to Figure 7 below for an example of a report screen.

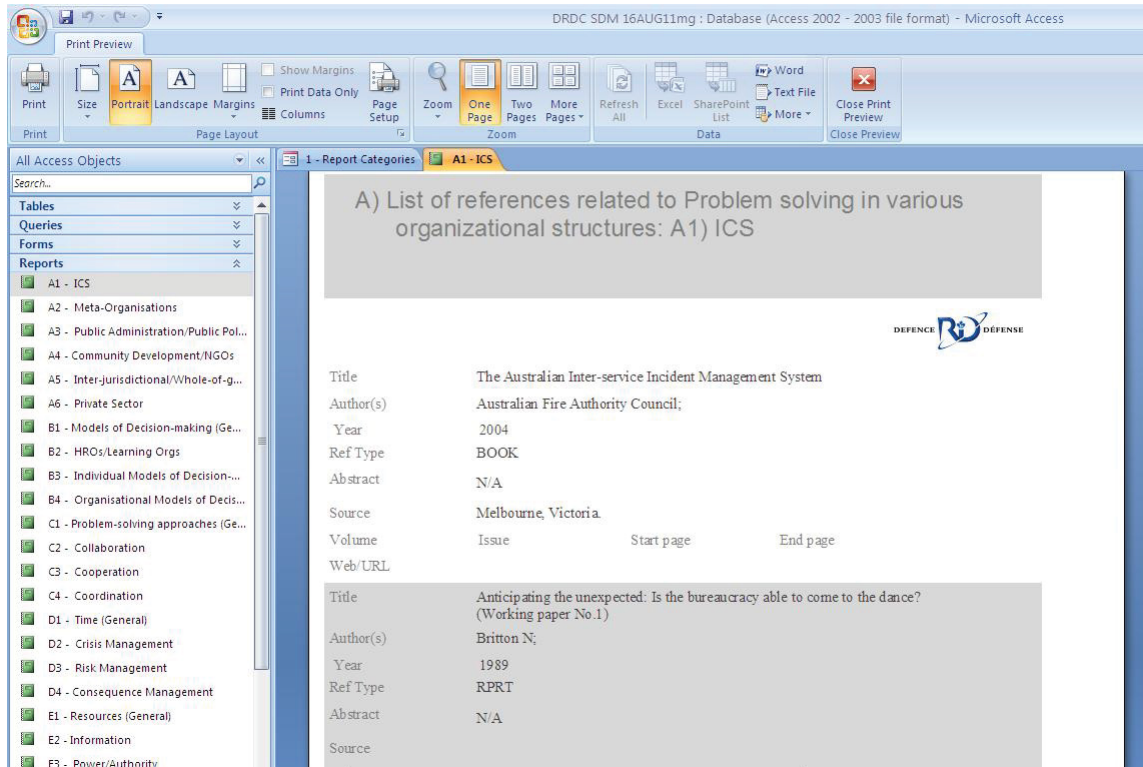


Figure 7: Example of a report's first page (Print Preview)

As illustrated in the screenshot above, each report is structured according to the same template. With the exception of the 'Ref ID' field, all the bibliographic fields listed in Annex B appear on the reports. The first page of each report begins with the title of the report (e.g., A) list of references related to problem solving in various organizational structures: A1 (ICS, with a grey backdrop). Individual records alternate between white and grey backdrops. Pages are numbered.

2. To view records related to another report category, return to the *Report Categories* form by clicking on the '1 – Report Categories' label and click on the appropriate **Open** button next to the desired report title. Refer to Figure 8 below for location of *Report Categories* label.

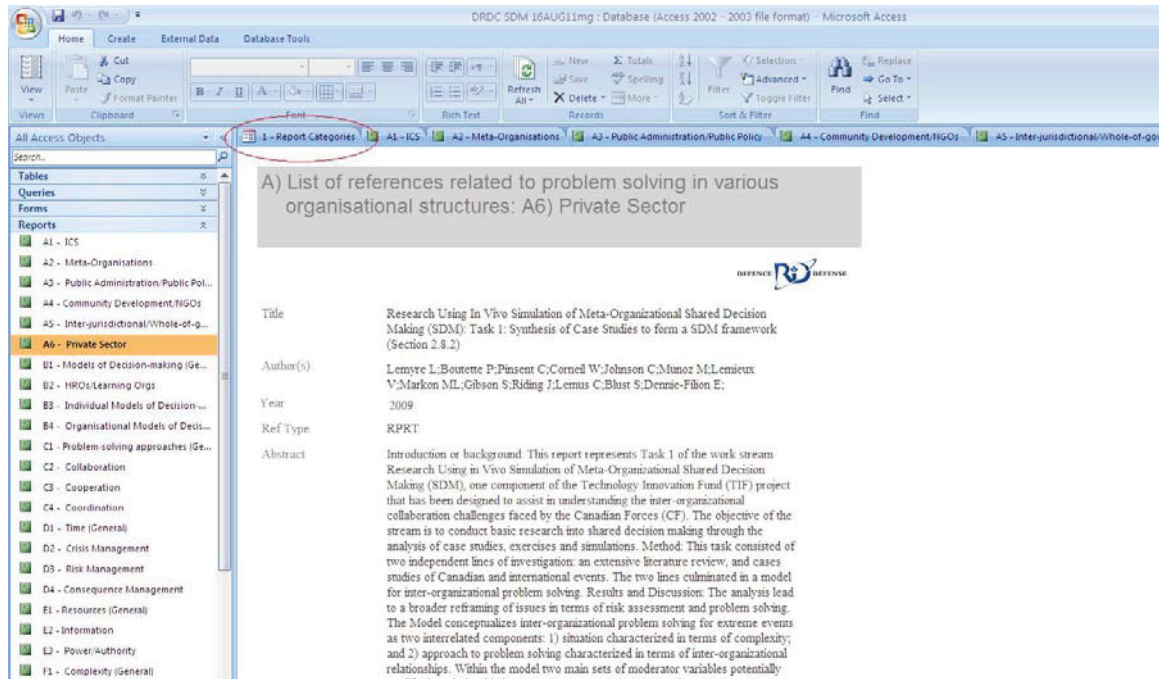


Figure 8: Location of Report Categories form

Viewing reports using the Reports navigation pane

Users can access and view reports using the *Reports* navigation pane. Reports are labelled beginning with a capital alpha character (e.g., C for list of references related to problem solving approaches) followed by the number of the sub-grouping and title (e.g., C3-Cooperation).

1. If not already open, **click** on the *Report* tab to view the list of reports available. **Double-click** on the report you wish to view. Refer to Figure 9 below.

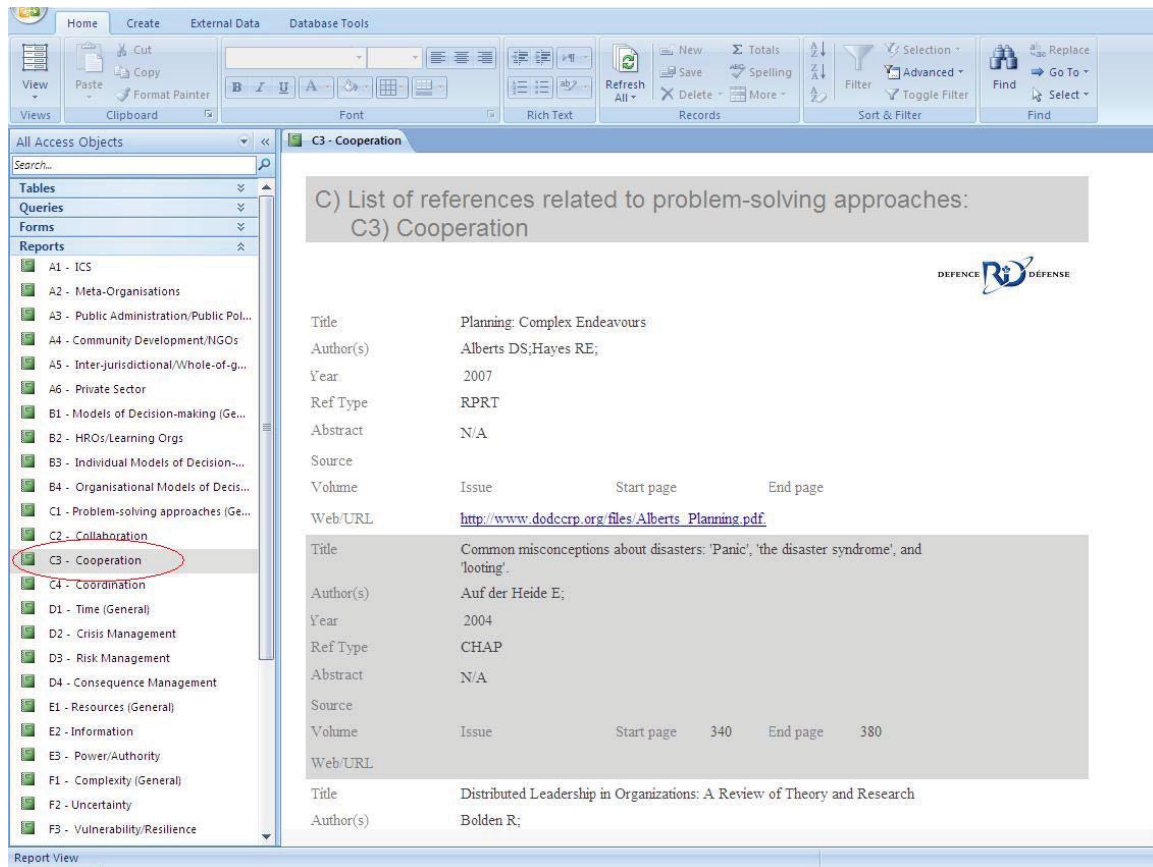


Figure 9: Report navigation pane

Viewing records in Form View

As previously mentioned, the user may also view all of the records entered into the knowledge database tool using *Form View*. These records are displayed one at a time.

1. If not already open, **click** on the *Forms* tab to view the list of forms available.
2. **Double click** on the title of the Form you wish to view (e.g., A1-ICS form). The first record in the ICS grouping will display. Refer to Figure 10 below.

Note: The number of references or records related to the selected category is displayed near the bottom left corner of the form. For example, as shown in Figure 10, there are 15 references relating to the ICS grouping. Use the 'advance arrow' at the bottom of the screen to display the next record. The user may search through the forms relating to a particular category by typing keywords (i.e.: author name) in the search bar located at the bottom of the form.

The screenshot displays a database application window titled 'All Access Objects'. On the left, a list of forms is shown, with 'A1 - ICS Form' selected. The main area displays the 'ICS' form for a specific record. The form fields are as follows:

RefID	302
Ref Type	JOUR
Title	Combining structural forms in the search for policy tools: Incident command systems in US crisis management
Author(s)	Moynihan DP;
Year	2008
Web/URL	ISI:000254989700005
Source	Governance-An International Journal of Policy, Administration, and Institutions
Abstract	As governments search for policy tools to deliver public services, two choices – hierarchy or network – are portrayed as stark alternatives. The U.S. Department of Homeland Security has adopted a practitioner-based innovation known as the Incident Command System (ICS) that assumes that crises require a network of responders, but that these networks should be managed by a hierarchy. While the
Volume	21
Issue	2
Start page	205
End page	229

The bottom status bar indicates 'Record: 10 of 15' and includes a search field.

Figure 10: Example of an ICS record Form View

2.5 Printing reports

To print a report, the user must select the 'File' tab located at the top-left of the screen, and then click on the 'Print' tab. Before printing, the user may view the Print Preview version by right-clicking on the report (in Report View) and selecting 'Print Preview'.

2.6 Customizing reports

In order to help augment the power of the tool, as well as keep it up to date, DRDC has been provided with an unlocked version of the tool. Users have the option of customizing the database in two ways as described below. Only the major steps have been highlighted with appropriate screenshots.

- 1) Users may add a record linked to one of the categories of the *Model for Inter-organizational Problem Solving*;
- 2) Users may create a new category of records and populate it.

Note: The knowledge tool is a live database. In order to prevent losing data during the customization process, we highly recommend that users save a backup copy of the database before making any modifications to the file.

Adding a record to one of the categories of the Model

1. If not already opened, **click** on the *Tables* tab in the navigation pane to view the list of tables available.
2. **Double-click** on the 'References' table to open it.
3. **Scroll** down to the bottom of the table. The next available field is indicated by the word '(New)' in the Reference ID field, and an asterisk on the left-hand side of the screen (see Figure 11). As the user begins typing information in the remaining fields, a new reference number appears in the Reference ID field.

RefID	Ref Type	Title	Author(s)	Year	Web/URL	Source	
467	RPRT	Disaster myths and realities	Wachtendorf T	2007	http://www.riskinstitute.org/PERI/TRAINING/		N/A
468	BOOK	Strengthening Family Resilience	Walsh F;	2003		Publisher: The	N/A
469	ELEC	Home Depot prepares for Katrina	Ward A;	2005	http://www.ft.com/cms/s/0/2e968106-1829-11da-a1c1-000114000000		N/A
470	ELEC	Crisis communications remain flawed	Warrick J;	2005	http://www.washingtonpost.com/wp-dyn/content/s		N/A
471	JOUR	Collective mind in organizations: Heedful interrelating	Weick KE;Robe	1993		Administrative	The concept
472	ELEC	Social Media in Times of Crisis: Mumbai	Wesgerber C;	2009	http://myweb.stedwards.ed/corinnew		N/A
473	JOUR	Don't panic! Short and long term psychological reactions	Wessely S;	2005		Journal of Mer	The possibil
474	JOUR	Blackout: Solutions that won't cost a fortune	White D; Rosch	2003		The Electrical J	N/A
475	JOUR	Early detection of disease outbreaks using the Internet	Wilson K;Brow	2009		CAMJ	Rapidly ideo
476	ELEC	India rural governments and service delivery, volume II:	World Bank;	2006	http://www.un.org		N/A
477	CONF	Supporting Collaborative Sensemaking in Map-Based En	Wu A;Zhang X;	2009			N/A
478	CONF	Cultural and institutional conditions for high reliability t	Xiao Y; Plaster	2004		Proceedings fr	What propo
479	JOUR	Epidemiologic Clues to SARS Origin in China	Xu RH; He JF; E	2004		Journal of Em	An epidemii
480	CHAP	Resiliency development of organizations, leaders and er	Youssef CM;Lu	2005		Authentic Leac	N/A
481	JOUR	Task Cohesion As A Facilitator of Team Decision-Making	Zaccaro SJ;Gua	1995	http://www.ics.org/ICS/1995RZ87500003	Military Psych	In this study
482	NEWS	Gander, the little town that opened its heart: More than	Zacharias Y;	2002		The Vancouver	Newfoundl
483	CONF	Supporting Collaborative Sensemaking in Map-Based En	Zhang X;	2009			N/A
484	BOOK	The Resilient Enterprise	Sheffi Y;	2007		Publisher: MIT	What happe
486	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L; Pins	2011			N/A
487	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L; Pins	2011			N/A
488	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L; Pins	2011			N/A
490	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L;Bout	2009			Introductor
491	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L;Bout	2009			Introductor
492	RPRT	Research Using In Vivo Simulation of Meta-Organization	Lemyre L;Bout	2009			Introductor
*(New)							

Figure 11: New Field in 'References' Table

4. In order to link the new record added to categories of the *Model*, the user must scroll to the right (using the scrollbar located at the bottom of the screen) until he/she is able to view the 'Yes/No' type columns relating to each sub-category of the database. The 'References' table contains 34 fields relating to the sub-categories illustrated in Figure 2, beginning by 'ICS' and ending with 'Tsunami' (see Figure 12).

The screenshot shows the Microsoft Access 2002 interface. The title bar indicates the file is 'D:\DC SOM 3\AUG11ing - Database (access 2002 - 2003 file format) - Microsoft Access'. The menu bar includes File, Edit, Format, Database Tools, and Database. The 'Database Tools' menu is open, showing options like Tables, Relationships, and Security. The 'References' table is selected in the left pane, and the 'References' table is also selected in the main pane. The table has columns for 'Table Name', 'Table Type', 'Table Description', 'Table Owner', 'Table Schema', 'Table Columns', 'Table Constraints', 'Table Relationships', 'Table Permissions', 'Table Security', 'Table Audit', 'Table Backup', 'Table Restore', 'Table Maintenance', 'Table Monitoring', 'Table Troubleshooting', 'Table Support', 'Table Documentation', 'Table Training', 'Table Certification', 'Table Accreditation', 'Table Registration', 'Table Licensing', 'Table Compliance', 'Table Standards', 'Table Best Practices', 'Table Guidelines', 'Table Policies', 'Table Procedures', 'Table Processes', 'Table Workflows', 'Table Templates', 'Table Examples', 'Table Samples', 'Table References', 'Table Citations', 'Table Bibliography', 'Table Glossary', 'Table Index', 'Table Table of Contents', 'Table Appendix', 'Table Index', 'Table Table of Contents', 'Table Appendix'.

Figure 12: Report ‘Yes/No’ Type Sub-Category Fields

By default, all the sub-category fields related to the newly entered records will read 'No' (Value = 0), indicating that they are not linked to any category. Users must enter '+1' in the column of each field they wish to link the new record to. Modified columns reading 'Yes' will then appear in the related predefined forms and reports.

- Repeat these five steps for each new record to be added.

Creating a new category of records

1. If not already opened, **click** on the *Tables* tab in the navigation pane to view the list of tables available.
2. **Double-click** on the 'References' table to open it.
3. **Right-click** on the table's label and select 'Design View'.
4. In Design View, **scroll** to the bottom of the list of field names and enter the name of the new category in the next available field. In the 'Data Type' Column, select 'Yes/No'.

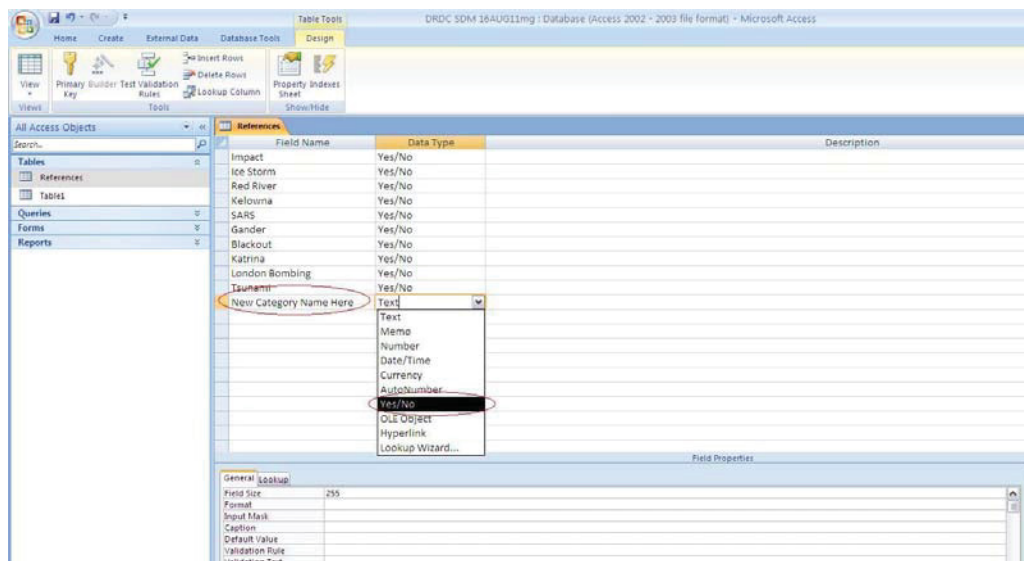


Figure 13: References Table (Design View)

5. **Right-click** on the table's label and select 'Datasheet View'. Follow the steps described in the previous section to add a new record, and link it to the desired category(s).
6. Create a filtered **query** based on the new category.

Author(s)	Year	Web/URL	Source	Abstract	Volume	Issue	Start page	End page	Blackout
Anderson G; D	2005		IEEE Transac Abstract—On August 14		20	4	1922	1928	Yes
Canadian Nuci	2004	http://www.nuclearsafety.gc.ca/pubs_catalogue/up	Retrieved Nov	This report summarizes					Yes
Canadian Nuci	2004	http://www.nuclearsafety.gc.ca/pubs_catalogue/up	Retrieved Nov	This Canadian 3rd Repo					Yes
CBC News;	2004	http://www.cbc.ca/news/background/povetrouble	CBC News	N/A					Yes
Chang SE;McDi	2007	http://www.cbc.ca/news/background/povetrouble	Natural Hazarc	This paper addresses th	41	2	337	358	Yes
City of London	2009	http://www.london.ca/Emergency_Management/P	N/A						Yes
FOCUS;	2004	http://www.sia-ontario.ca/dets.org/memop/FOCUS	N/A						Yes
Government o	2004	http://www.cnic-csn.gc.ca/pubs_catalogue/pubs	N/A						Yes
Cooperation Q	2003	http://www.theimo.com/moveweb/pubs/ceep/IMD_2	Retrieved Oct	N/A					Yes
Independent E	2003	http://www.theimo.com/moveweb/pubs/pressReleas	Retrieved Oct	N/A					Yes
Crisis mgmt Q	2003	http://www.theimo.com/moveweb/pubs/pressReleas	Retrieved Oct	N/A					Yes
Gander Query	2009	http://www.theimo.com/moveweb/siteShared/vbrow	Retrieved Oct	N/A					Yes
HRIOs Learning	2003	http://www.nytimes.com	The New York	N/A					Yes
Ice Storm Query	2009		Introduction or backgro						Yes
Meyer DH; Kan	2004	http://www.nerc.com/page.ahp?cid=57664	Retrieved Oct	N/A					Yes
North America	2009	http://www.nerc.com/page.ahp?cid=171114	Retrieved Oct	N/A					Yes
Impact Query	2003	http://www.publicsafety.gc.ca/prg/em/seize/2003/ta	Retrieved Oct	N/A					Yes
Office of Critic	2009	http://www.oeb.gov.on.ca/088/For+Consumers/Ab	Retrieved Oct	N/A					Yes
Ontario Power	2009	http://www.oep.com/pdf/Annual%20Reports/Ann	Retrieved Nov	N/A					Yes
Public Safety a	2006	http://www.publicsafety.gc.ca/prg/em/seize/2006/ta	Retrieved Oct	N/A					Yes
Katrina Query	2003	http://www.emmg.ca/EMRG-701_Activation_Ontario	Retrieved Oct	N/A					Yes
Kelowna Query	2003	http://www.sierraclub.ca	Retrieved Oct	N/A					Yes
London Bombing	2003	http://www.sierraclub.ca	The Electrical J	N/A	16	9	43	53	Yes

Figure 14: Example of a filtered query – Case Study: Blackout Query

7. Create a **form** based on the filtered query. Refer to predefined forms' design in Design View for an example of a template to follow.

After following the seven previous steps, users will be able to create a new report, or series of reports based on their category(s) of choice. Refer to predefined reports' design in Design View for an example of a template to follow. Users may also modify the design of the *Report Categories* form.

Annex A List of references found in the database

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Annex B Database field names

Field Name	Definition, Comments
RefID	Reference ID: References' unique ID (defined by 'auto number')
RefType	Reference Type
Title	Title
Author(s)	Author(s)
Year	Year
Web/URL	Hyperlink attached if available.
Source	Source
Abstract	If available
Volume	If applicable
Issue	If applicable
Start page	If applicable
End Page	If applicable

Annex C Reference type field abbreviations

Abbreviation	Meaning
BOOK	Book
CHAP	Book Chapter
CONF	Conference Proceeding
ELEC	Electronic Citation/Online Source
GEN	Generic
JOUR	Journal Article
MGNZ	Magazine Article
NEWS	News Report
PCOMM	Personal Communication
RPRT	Report
THES	Thesis/Dissertation
UNPB	Unpublished Work
VIDEO	Video Recording

List of symbols/abbreviations/acronyms/initialisms

CF	Canadian Forces
CORA	Centre for Operational Research and Analysis
DRDC	Defence Research & Development Canada
DRDKIM	Director Research and Development Knowledge and Information Management
FC	Forces canadiennes
GAP	Groupe d'Analyse Psychosociale
HRO	High Reliability Organisation
ICS	Incident Command System
NGO	Non-governmental Organization
MS	Microsoft
R&D	Research & Development
SDM	Shared Decision-making
TIF	Technology Innovation Fund

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Abstract

Introduction: This report, along with an accompanying knowledge database tool, represents completion of Task 5 of the work stream “Research Using in Vivo Simulation of Meta-Organizational Shared Decision Making (SDM)”, one component of the Technology Innovation Fund (TIF) program on Meta-organizational Collaboration that has been designed to assist in understanding challenges faced by the Canadian Forces (CF). The objective of the stream is to conduct basic research into shared decision making through the analysis of case studies, exercises and simulations.

Method: Task 5 involved the development of a knowledge database tool organised by the various components of the shared-decision making (SDM) framework entitled *Model of Inter-Organizational Problem Solving*. The database tool purpose, organization and features are described in this report.

Results and Discussion: During research undertaken to develop the *Model for Inter-organizational Problem Solving* (Task 1) and the design and implementation of an experimental plan to test the *Model* (Tasks 2 and 3), a body of literature was collected and referenced in the various Task reports. Additional peer-reviewed articles and grey literature were consulted for the purpose of completing Task 4: Modeling communication and decision making functions. This knowledge base of information sources has been organized in MS Access by the key components of the *Model* for ease of use by the operational and analytic communities within DRDC.

Résumé

Introduction : Ce rapport présente la Tâche 5 du projet « *Recherche par la simulation in-vivo sur la prise de décision partagée des méta-organisations* », une composante du programme de recherche sur les méta-organisations financé par le Fond pour l’innovation technologique (Technology Innovation Fund – TIF), mis en place afin d’améliorer la compréhension des défis auxquels font face les Forces canadiennes (FC) en matière de collaboration inter-organisationnelle. L’objectif de ce projet est de mener une recherche fondamentale sur la prise de décision partagée, au moyen d’études de cas, d’exercices et de simulations.

Méthode : La Tâche 5 consiste en la création d’un outil de connaissance sous forme de base de données organisée selon les éléments du modèle de prise de décision partagée nommé *Modèle de la résolution inter-organisationnelle de problèmes*. L’objectif, la structure ainsi que les caractéristiques de cet outil sont décrits dans ce rapport.

Résultats et discussion : Au cours de la recherche entreprise dans le but de développer le *Modèle de la résolution inter-organisationnelle de problèmes* (Tâche 1) et la conception ainsi que la mise en œuvre du plan expérimental servant à tester le Modèle (Tâches 2 et 3), un important corpus de littérature a été recueilli et cité dans les rapports des différentes Tâches. Des articles scientifiques additionnels et des rapports ont été consultés afin de compléter la Tâche 4 intitulée : Modélisation des fonctions de communication et de prise de décision. Ces

sources d'information ont été organisées dans le logiciel MS Access d'après les composantes clés du Modèle, de manière à pouvoir être facilement consultées et manipulées par le personnel de RDDC.

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.)

meta-organization; shared decision making framework; problem solving approaches; complex situations; in vivo simulation; coordination, collaboration