All Hazards Risk Assessment Transition Project:

Report on Capability Assessment Management System (CAMS) Automation

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IMPORTANT INFORMATIVE STATEMENTS

This work was supported by the Canadian Safety and Security Program (CSSP) (CSSP-2012-TI-1108) which is led by Defence Research and Development Canada's Centre for Security Science. The CSSP is a federally-funded program to strengthen Canada's ability to anticipate, prevent/mitigate, prepare for, respond to, and recover from natural disasters, serious accidents, crime and terrorism through the convergence of science and technology with policy, operations and intelligence.

1 Abstract / Résumé

Under a Canadian Safety and Security Program (CSSP) targeted investigation (TI) project (CSSP-2012-TI-1108), Defence Research and Development Canada's (DRDC) Centre for Security Science (CSS) led the automation of the All Hazards Risk Assessment (AHRA) process and tools, including the automation of scenario development and capability assessment. This report discusses the design objectives and approach that was used for gathering requirements to support the development of the Capability Assessment Management System (CAMS). The CAMS web-based application, which was developed to support the AHRA and systematize capability assessment, is described in greater detail along with the options analysis. Functions that enhance the utility of CAMS software are described. These include the ability to characterize scenarios and maintain an inventory of "master events" and scenarios; the ability to catalogue tasks and maintain a historical record of assessments; and the ability to capture subject matter expert judgement and facilitate comparison and analysis of capability gaps and requirements across the emergency management spectrum.

Dans le cadre d'un projet d'enquêtes ciblées du Programme canadien pour la sûreté et la sécurité (PCSS) (CSSP-2012-TI-1108), le Centre des sciences pour la sécurité (CSS) de Recherche et développement pour la défense Canada (RDDC) a dirigé l'automatisation des outils et du processus d'évaluation tous risques, y compris l'automatisation de l'élaboration des scénarios et de l'évaluation des capacités. Le présent rapport traite de l'approche et des objectifs de conception qui ont été utilisés pour rassembler les exigences nécessaires à la mise au point du système de gestion de l'évaluation des capacités (*Capability Assessment Management System* [CAMS]). L'application Web du système CAMS, élaborée pour appuyer l'évaluation tous risques et systématiser l'évaluation des capacités, est décrite en plus amples détails avec l'analyse des options. Des fonctions qui améliorent l'utilité du logiciel CAMS y sont décrites. Il s'agit notamment de la capacité à caractériser des scénarios et à tenir à jour un inventaire « d'événements principaux » et de scénarios, de la capacité à cataloguer des tâches et à tenir à jour un historique des évaluations ainsi que de la capacité à consigner le jugement de spécialistes et à faciliter la comparaison et l'analyse des écarts et des exigences en matière de capacité à l'échelle du spectre de la gestion des urgences.

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4 Report Details

4.1 Background

4.1.1 General

The DRDC CSS Risk Assessment and Capability Integration (RACI) Section undertook a multi-year, multi-faceted targeted investigation (TI) project (CSSP-2012-TI-1108, ending in 2014), aimed at further exploiting and applying the All Hazard Risk Assessment (AHRA) and building on the AHRA framework thru a multi-year spiral development approach.

Several teams were formed to further the implementation of the AHRA framework. This report specifically deals with the functional requirements evolving from work stream 2 (Capability Assessment) and related automation design and implementation.

4.1.2 Historical evolution

DRDC CSS implemented its first automation tools to support Consolidated Risk Assessment (CRA) in the mid 2000's. The following figures (1 and 2) provide a visual on CRA functionality.

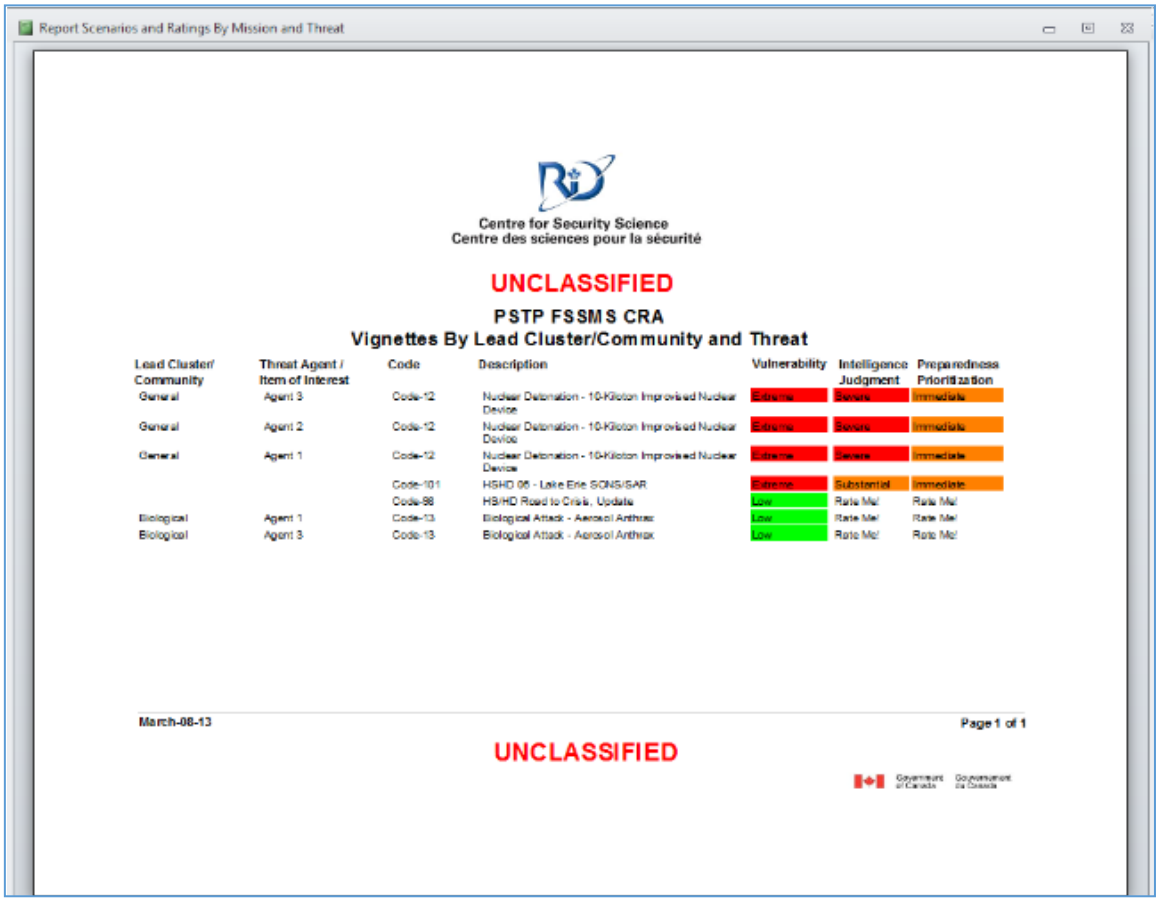


Figure 1 - PSTP FSSSMS CRA Vignettes by Lead Cluster and Threat

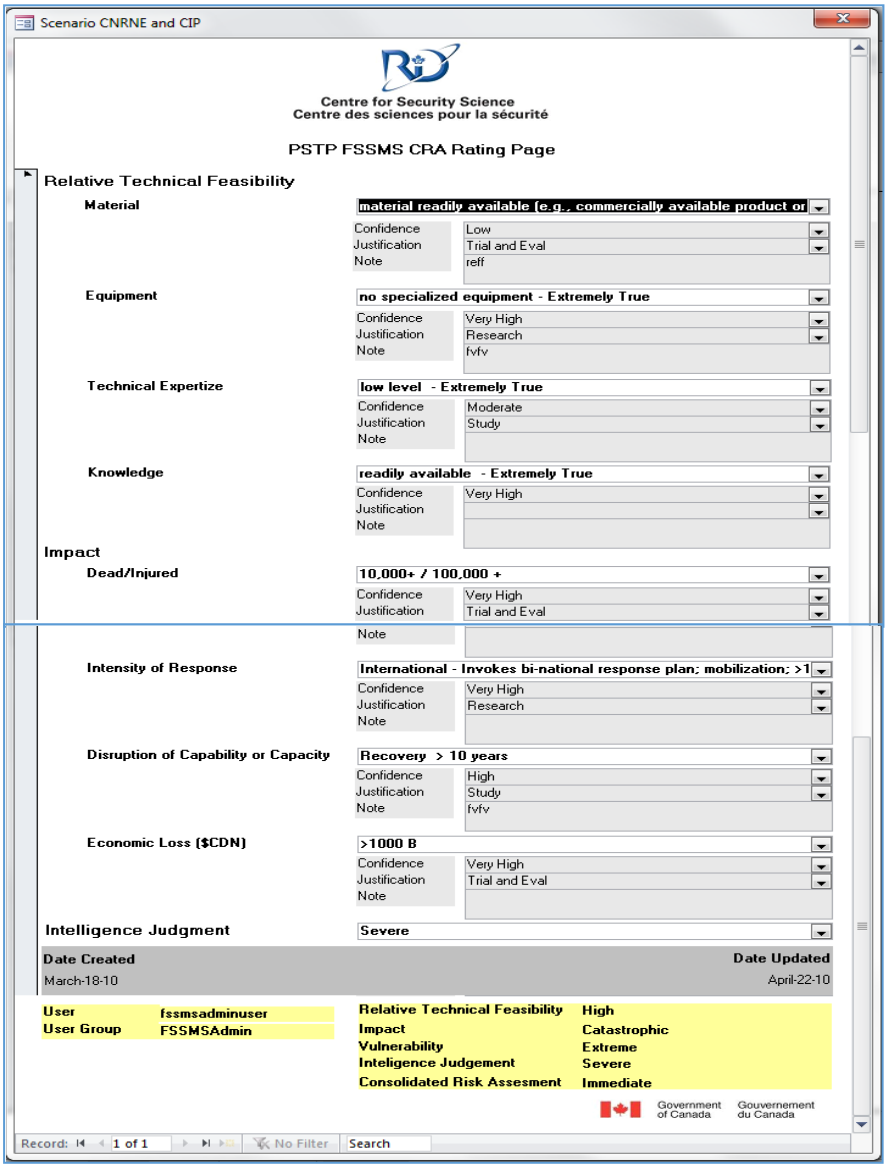


Figure 2 - PSTP FSSMS CRA Rating Page

In the late 2000's, DRDC CSS furthered the implementation of the CRA by implementing its first Full Scale Scenario Management System (FSSMS) along with supporting tools such as the CRA, Vignette Management System (VMS) and Document Management (DM) all integrated in to a suite.[1] The following figures (3 and 4) provide a visual on FSSMS functionality. Some of this work is being pulled into this initiative, where CSS demonstrated a capability assessment was a natural extension of the AHRA Framework.

[1] For additional information, consult: Doug a Hales and Peter Race. *Public Safety Technical Program Planning Scenario Framework Final Report*; DRDC CSS Contractor Report (CR) CR 2010-10; Defence R&D Canada, Centre for Security Science; December 2010, http://cradpdf.drdc-rddc.gc.ca/PDFS/unc103/p534210_A1b.pdf accessed 17 January 2014.

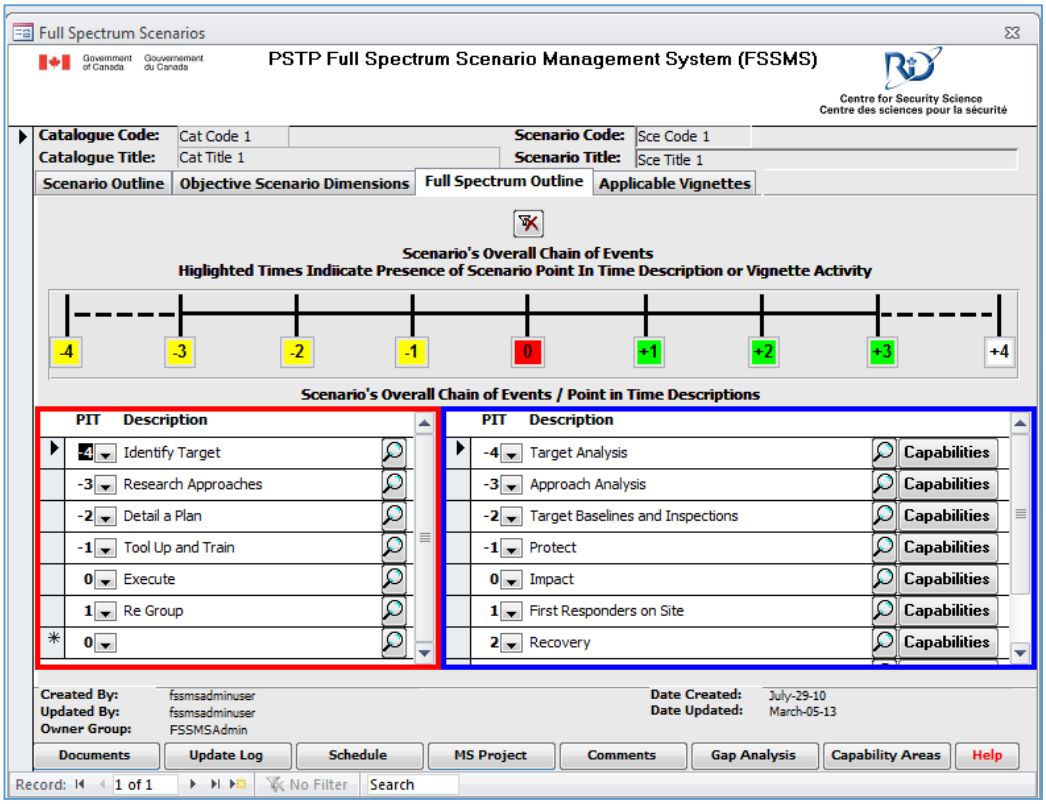


Figure 3 – PSTP FSSMS Chain of Events

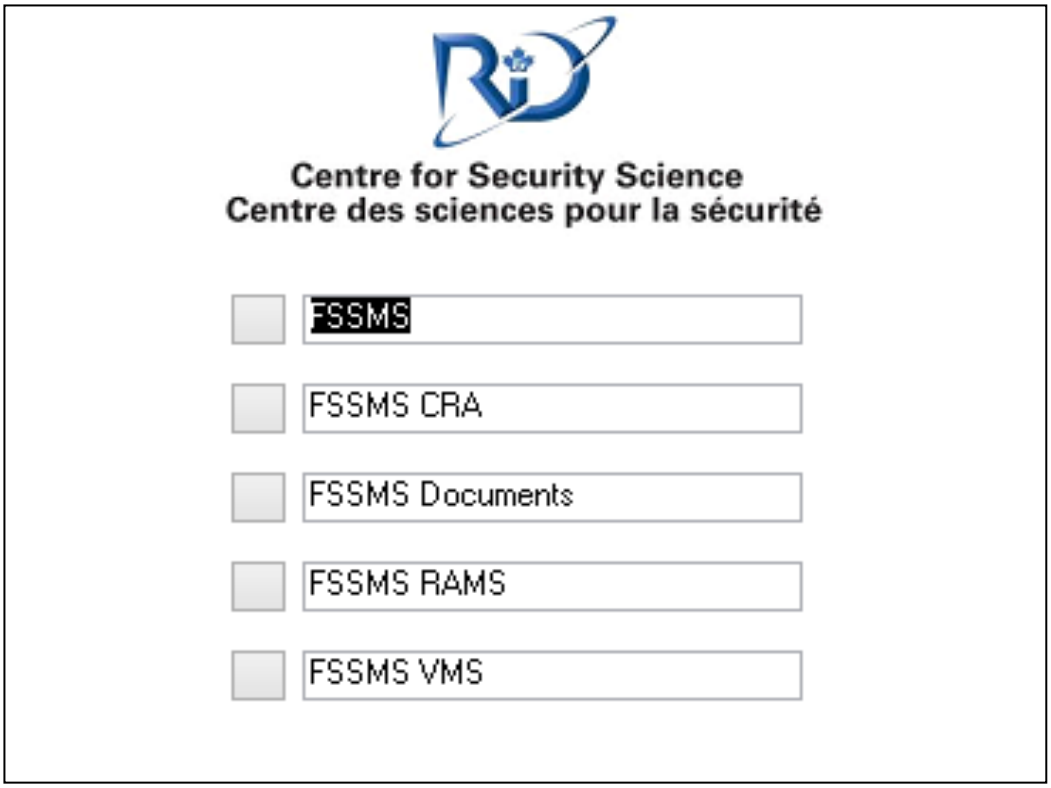


Figure 4 - FSSMS Tool Kit Modules

In the late 2000's work began on the AHRA. The AHRA was developed by Public Safety (PS) Canada in close partnership with DRDC CSS, and follows an annual business cycle (see figure 5).

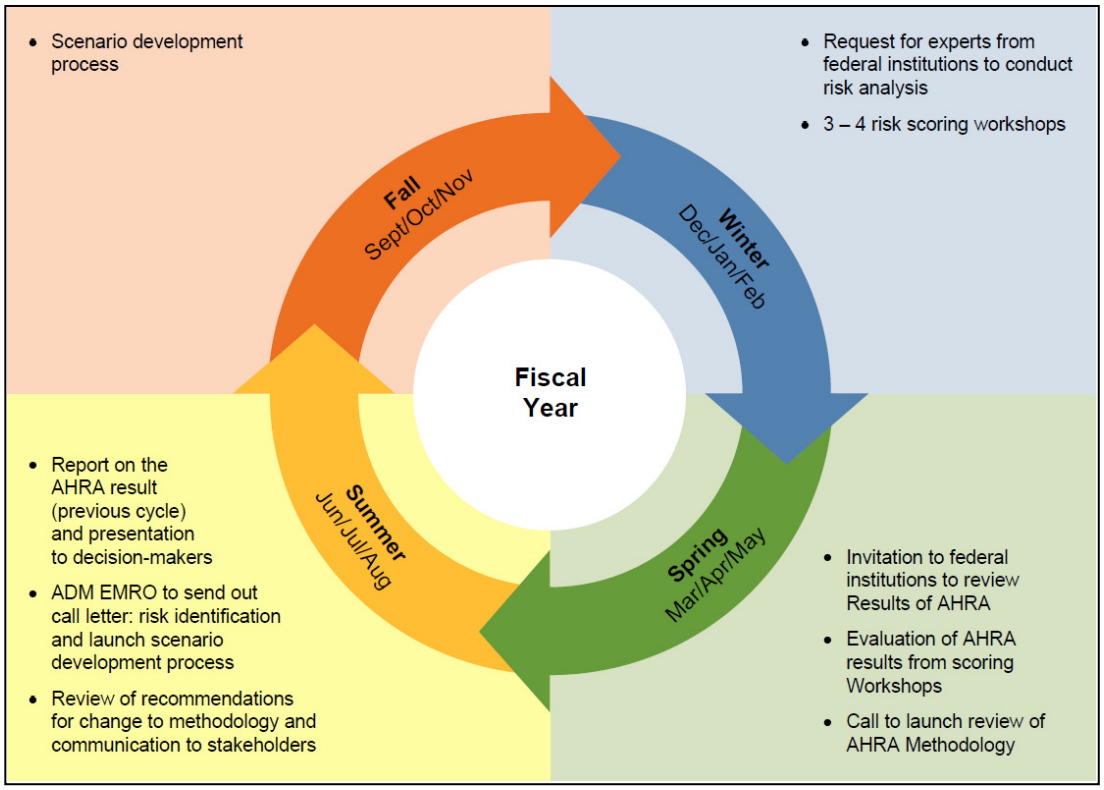
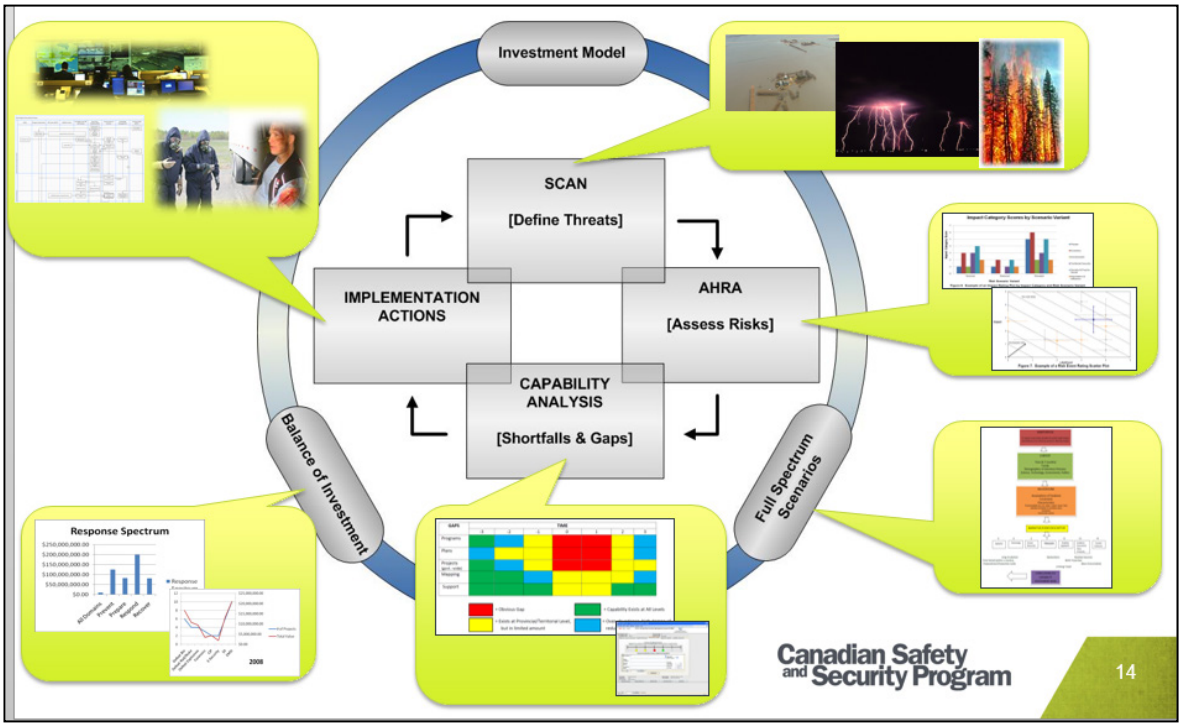


Figure 5 - AHRA Business Cycle

The AHRA in the end leveraged the expertise of DRDC CSS as well as knowledge gained through the design, development and implementation of the CRA and FSSMS. Simple tools were created to assist with documenting scenario's (Risk Event Scenario Template in word format) and Scoring Tool in MS Excel and are currently in production.

4.2 Design Objectives

A need was identified to augment the established AHRA process to address Full Scale Scenario's and Capability Assessment. Note the additions of the Full Scale Scenario and the Capability Assessment modules to a more comprehensive AHRA generic model below (figure 6).



The original FSSMS was deemed to be technically correct however not suitable to a general user community therefore, simplicity in usability was a primary design objective for the Capability Assessment Management System.

Other design objectives included:

- A SharePoint / Web Based Approach
- Use of MS SQL as repository
- Ability to generate analytical reports and graphs
- Minimal maintenance and development costs
- Ability to integrate with other applications and data

Figure 6 - Generic Capability Investment Model

4.3 Approach

4.3.1 Requirements Gathering

Requirements gathering followed two parrallel streams. IM/IT related requirements and Functional Related Requirements

4.3.1.1 Functional Requirements

4.3.1.1.1 Capability Assessment Framework

As part of the AHRA Transition targeted investment project, a pilot capability assessment was conducted to implement concepts we had developed/nurtured over the years. Monitoring the development of the capability assessment framework was key to understanding requirements and opportunities for automation.

The approach taken by DRDC CSS to develop the framework including the selection and development of a full scale scenario (Pandemic), the identification of a master events list, the identification of capabilities associated to the master events list buy DRDC / CSS and SME's and the identification of tasks associated to the capabilities.

DRDC in partnership with SME's (PHAC, Health Canada and others) conducted a table top exercise (TTX) to rate the tasks associated with the capabilities and events along the full spectrum of time defined in the full scale Pandemic scenario. Simple spreadsheets and associated charting tools. Pencils and pens and scotch tape were used to conduct the table top exercise, record the ratings and report the results.

Of significant value in terms of requirements was gaining the understanding that a simple spread sheet like interface would gain highest acceptance with the user community and that by allowing for multiple user to rate tasks on line enabled on line reporting of results in real time during an exercise. Other anticipated benefits would be the significant time saving for the facilitators by ensuring that data relationships be maintained from scenario development, thru capability and task development then on to rating.

4.3.1.1.2 Exercise Perseverance – Capability Assessment Table Top Exercise After Action Report

The results of the TTX were document in the After Action Report by co-authors Peter Avis, Doug Hales and Shaye Friesen.[2] The following extracts confirm the overall acceptability of the Framework:

1. *The proof-of-concept capability assessment confirmed the requirement, and appetitive, for a formal process to link risk assessment to investment planning. In the case of national level risks, investment priorities and planning, public and private, authorities are fragmented and programs and decision cycles are rarely fully aligned. A common planning framework offers the opportunity to promote integration and a common process the opportunity to develop best practices.*

[2] Doug Hales, Peter Avis and Shaye Friesen, *Exercise Perseverance: Capability Assessment Table Top Exercise After Action Report*; DRDC CSS Technical Report (TR) DRDC CSS TR 2013-010; October 2013, http://cradpdf.drdc-rddc.gc.ca/PDFS/unc129/p538062_A1b.pdf accessed 17 January 2014.

2. *The capability assessment methodology proposed was based on experience to date. It was generally well accepted by the HP community, notably core concepts such linking capabilities to the EM pillars, adoption of mission/function/task analysis and communal 'ownership' of task inventories. A number of refinements to the scoring schema were suggested and should be trialed.*

Within the report, many visualization of the data related to the Pandemic Scenario and Capability Assessment are included and formed a significant input to the required reports and visuals for the Capability Assessment Management System (CAMS).

Of interest is the visible mapping between the logic model presented in the report and the AHRA generic capability investment model. The logic model (figure 7) details the relationships further which were identified in the AHRA vision (see figure 6).

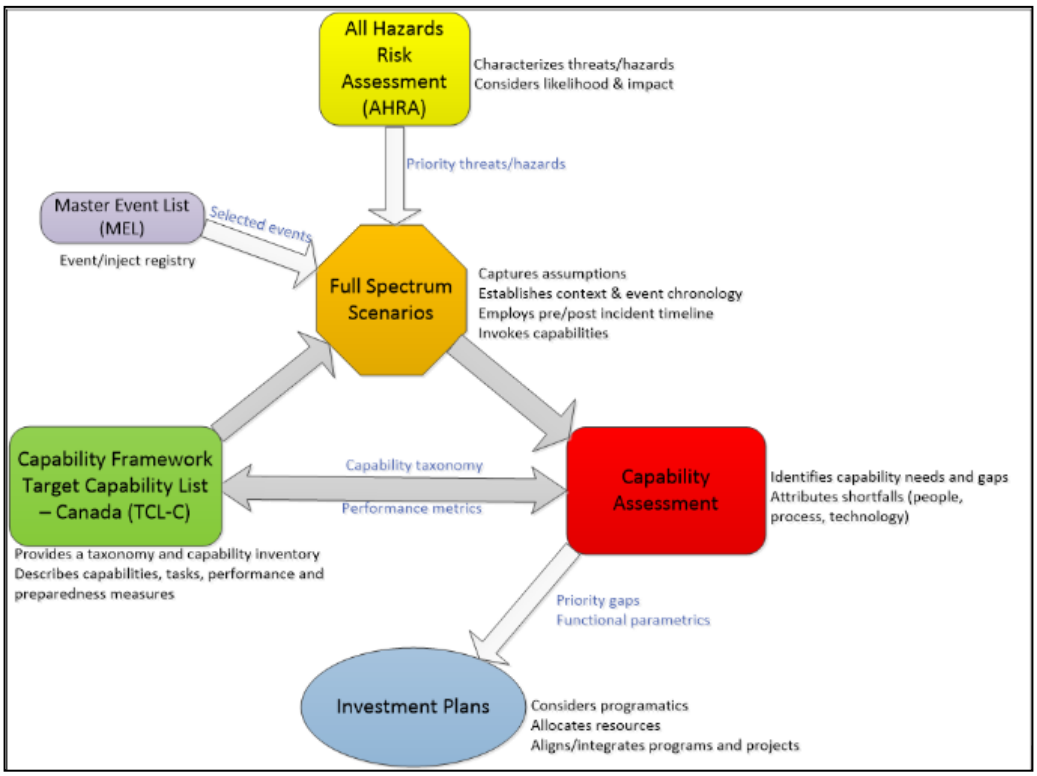


Figure 7 - Capability Framework Logic Model

Breaking things down in to business processes the resulting visual is (figure8):

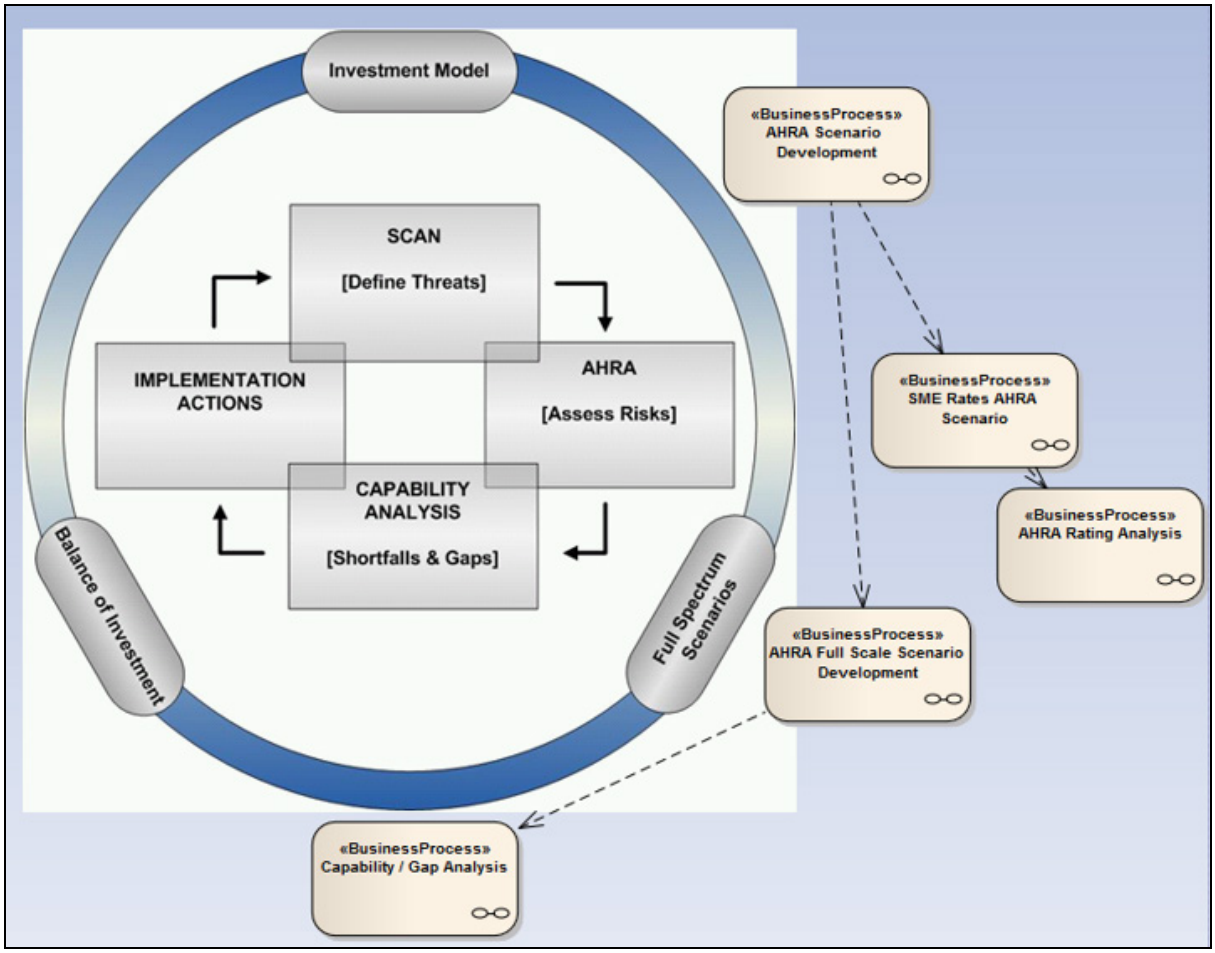


Figure 8 - ARHA Business Process Break Down

From the above and the User's Guide which was prepared for the TTX the application of the capability framework was identified as a multiple step process as follows (figure 9):

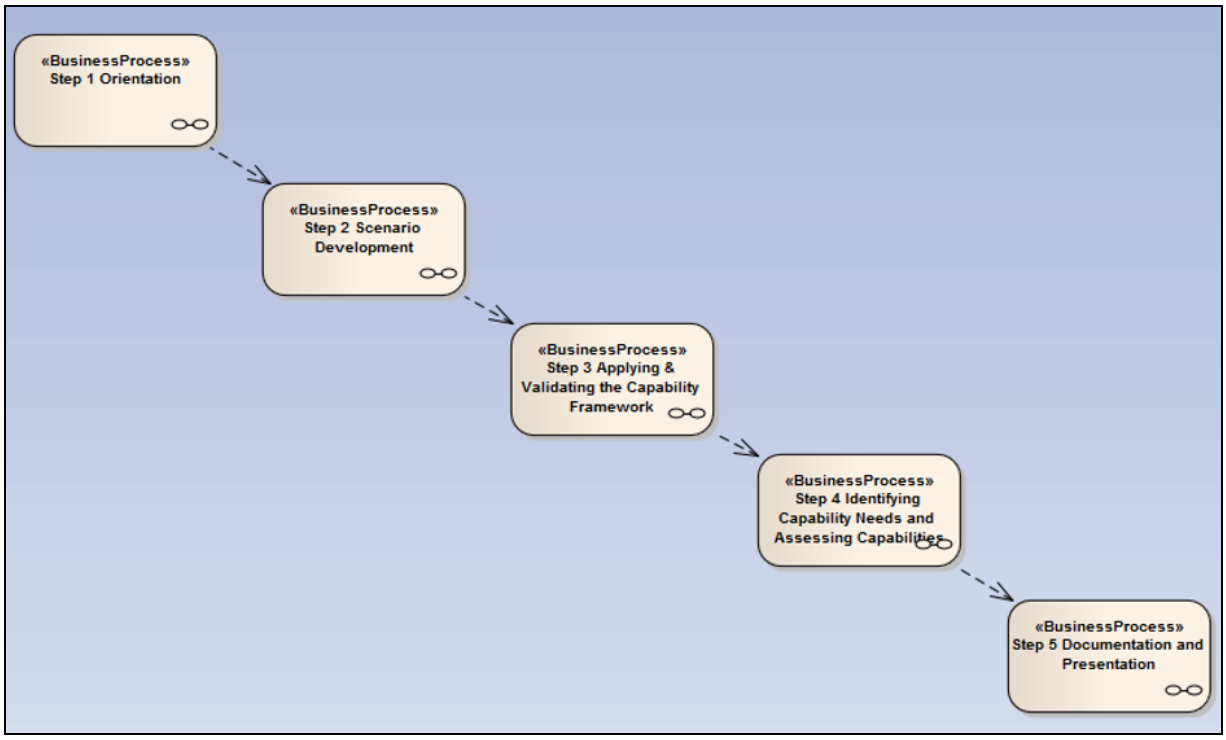


Figure 9 - Capability Assessment Business Process Breakdown to Steps

4.3.1.1.3 Validation via Prototype

To validate the requirements a prototype Capability Assessment Management System (CAMS) was created in MS Access and all data from the Pandemic Scenario and TTX was imported. Reports were produced and compared with the published Pandemic TTX results and validated.

The following is walk-through of the use of the prototype CAMS.

4.3.1.1.3.1 Create Scenario

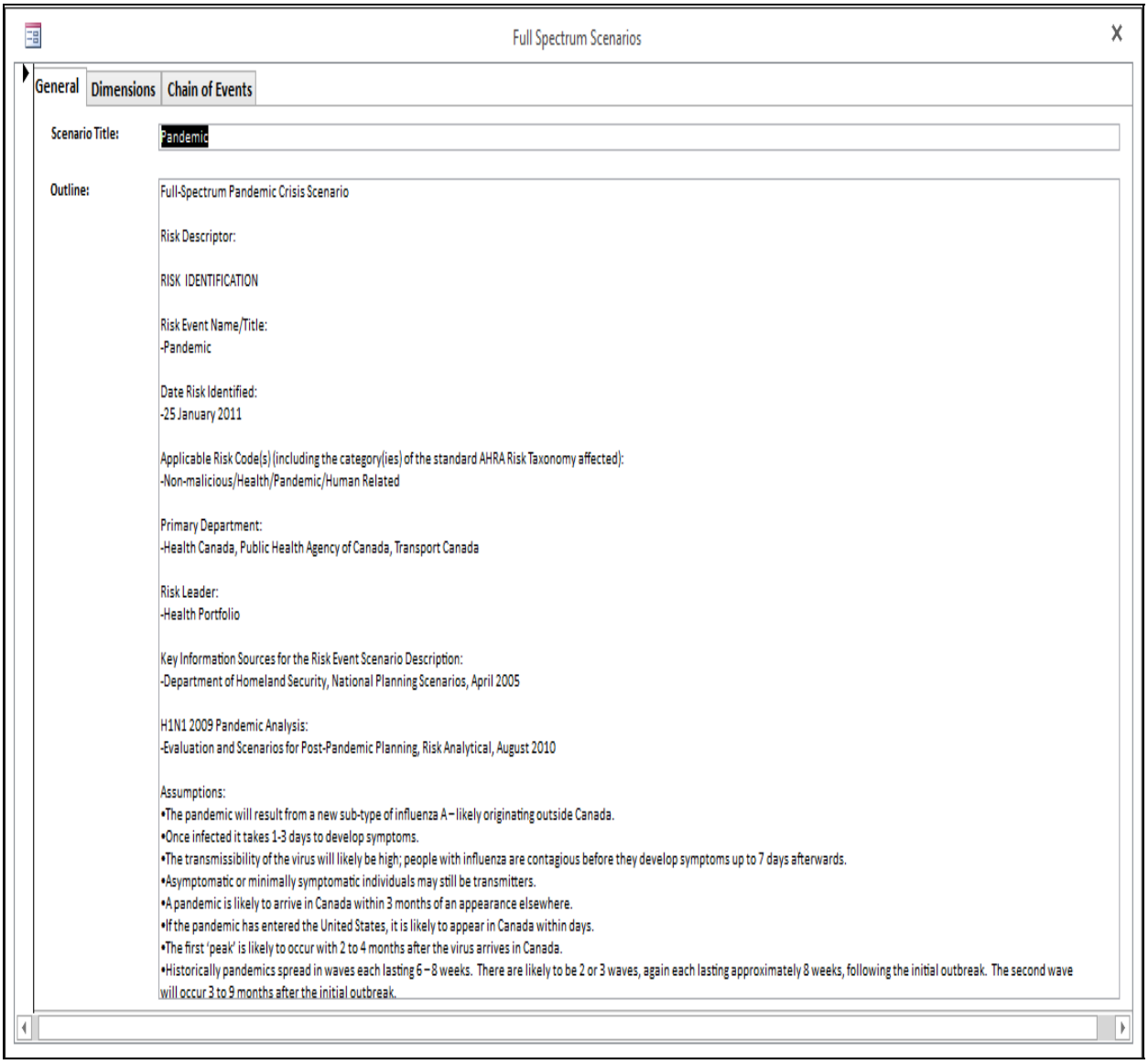
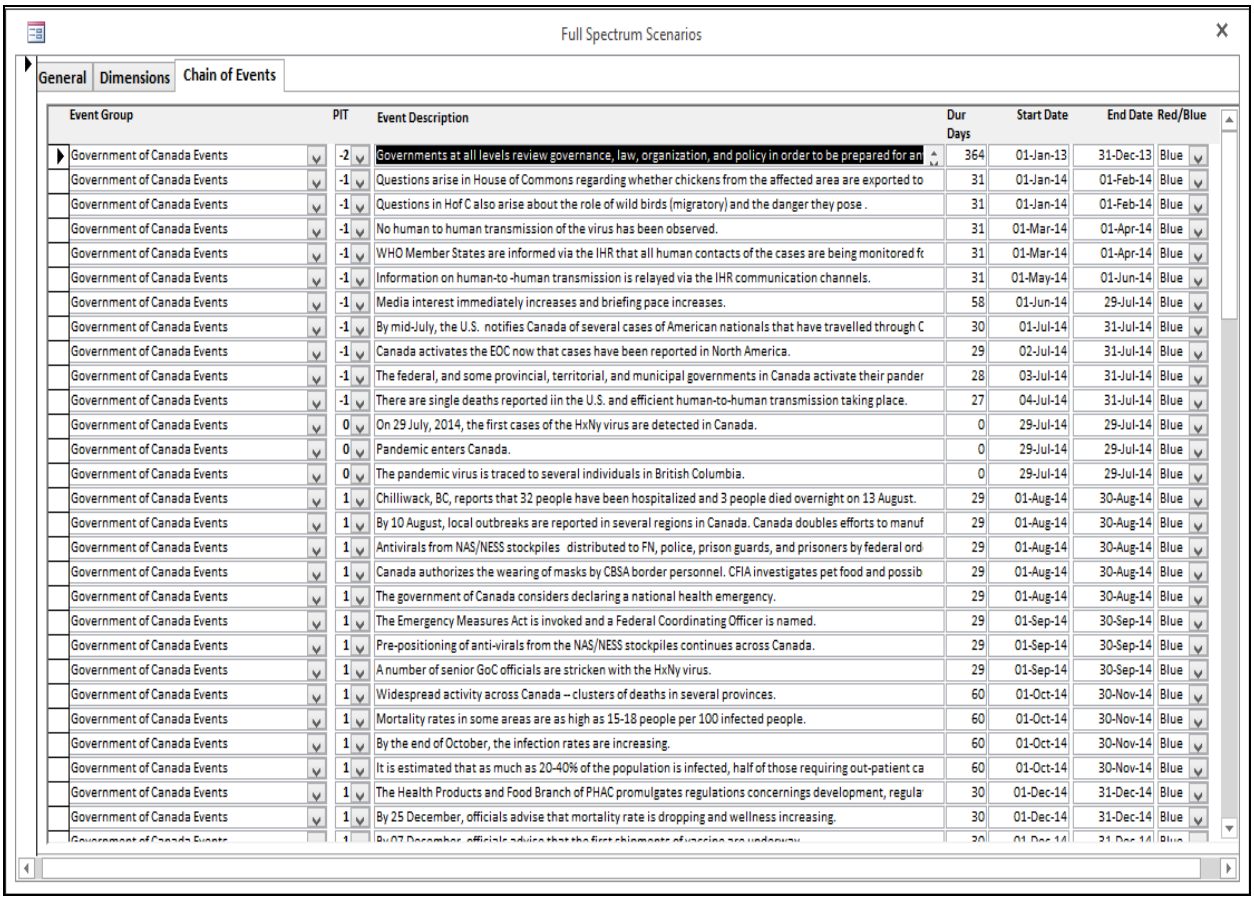


Figure 10 - Create Scenario

Scenario creation in CAMS is accomplished by creating a new scenario then filling in the title and an outline of the scenario.

4.3.1.1.3.2 Create Events

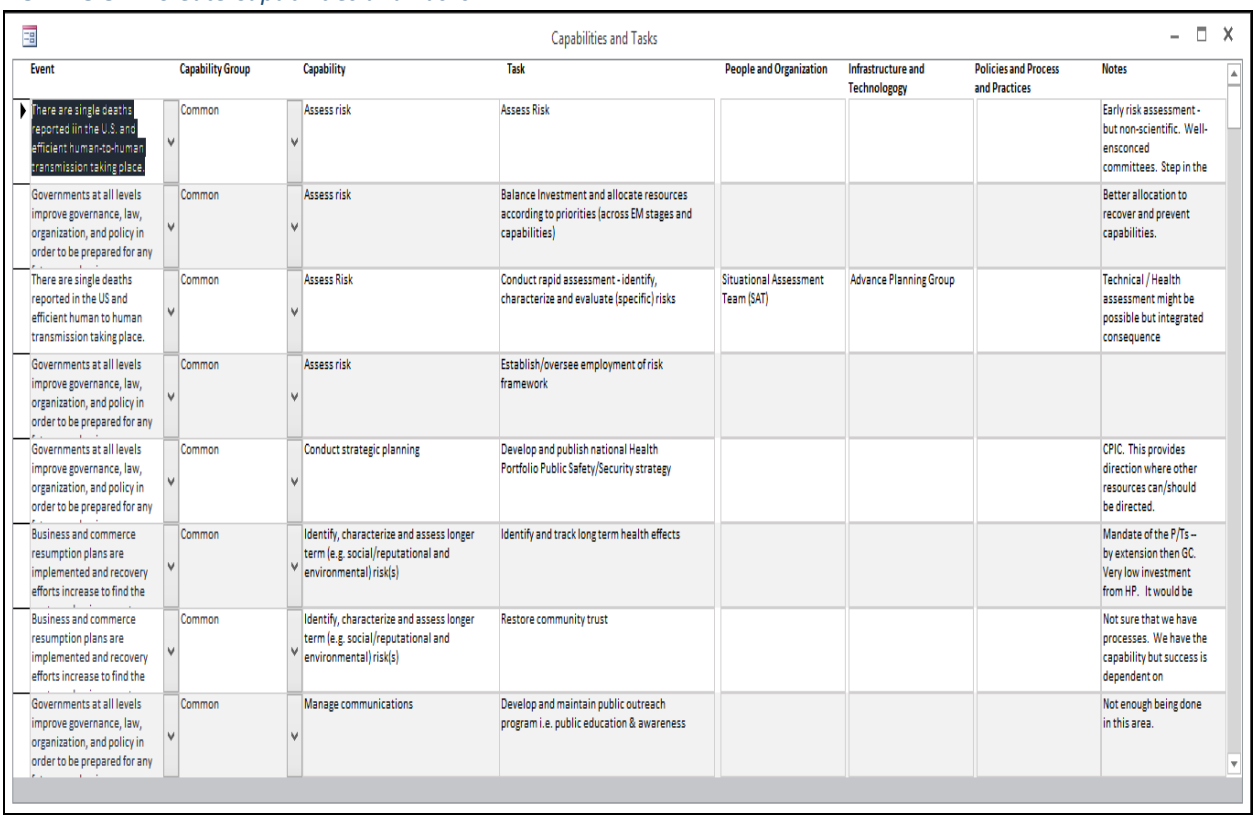


Event Group	PIT	Event Description	Dur Days	Start Date	End Date	Red/Blue
Government of Canada Events	-2	Governments at all levels review governance, law, organization, and policy in order to be prepared for an	364	01-Jan-13	31-Dec-13	Blue
Government of Canada Events	-1	Questions arise in House of Commons regarding whether chickens from the affected area are exported to	31	01-Jan-14	01-Feb-14	Blue
Government of Canada Events	-1	Questions in Hof C also arise about the role of wild birds (migratory) and the danger they pose .	31	01-Jan-14	01-Feb-14	Blue
Government of Canada Events	-1	No human to human transmission of the virus has been observed.	31	01-Mar-14	01-Apr-14	Blue
Government of Canada Events	-1	WHO Member States are informed via the IHR that all human contacts of the cases are being monitored fc	31	01-Mar-14	01-Apr-14	Blue
Government of Canada Events	-1	Information on human-to -human transmission is relayed via the IHR communication channels.	31	01-May-14	01-Jun-14	Blue
Government of Canada Events	-1	Media interest immediately increases and briefing pace increases.	58	01-Jun-14	29-Jul-14	Blue
Government of Canada Events	-1	By mid-July, the U.S. notifies Canada of several cases of American nationals that have travelled through C	30	01-Jul-14	31-Jul-14	Blue
Government of Canada Events	-1	Canada activates the EOC now that cases have been reported in North America.	29	02-Jul-14	31-Jul-14	Blue
Government of Canada Events	-1	The federal, and some provincial, territorial, and municipal governments in Canada activate their pander	28	03-Jul-14	31-Jul-14	Blue
Government of Canada Events	-1	There are single deaths reported iin the U.S. and efficient human-to-human transmission taking place.	27	04-Jul-14	31-Jul-14	Blue
Government of Canada Events	0	On 29 July, 2014, the first cases of the HxNy virus are detected in Canada.	0	29-Jul-14	29-Jul-14	Blue
Government of Canada Events	0	Pandemic enters Canada.	0	29-Jul-14	29-Jul-14	Blue
Government of Canada Events	0	The pandemic virus is traced to several individuals in British Columbia.	0	29-Jul-14	29-Jul-14	Blue
Government of Canada Events	1	Chilliwack, BC, reports that 32 people have been hospitalized and 3 people died overnight on 13 August.	29	01-Aug-14	30-Aug-14	Blue
Government of Canada Events	1	By 10 August, local outbreaks are reported in several regions in Canada. Canada doubles efforts to manuf	29	01-Aug-14	30-Aug-14	Blue
Government of Canada Events	1	Antivirals from NAS/NESS stockpiles distributed to FN, police, prison guards, and prisoners by federal ord	29	01-Aug-14	30-Aug-14	Blue
Government of Canada Events	1	Canada authorizes the wearing of masks by CBSA border personnel. CFIA investigates pet food and possib	29	01-Aug-14	30-Aug-14	Blue
Government of Canada Events	1	The government of Canada considers declaring a national health emergency.	29	01-Aug-14	30-Aug-14	Blue
Government of Canada Events	1	The Emergency Measures Act is invoked and a Federal Coordinating Officer is named.	29	01-Sep-14	30-Sep-14	Blue
Government of Canada Events	1	Pre-positioning of anti-virals from the NAS/NESS stockpiles continues across Canada.	29	01-Sep-14	30-Sep-14	Blue
Government of Canada Events	1	A number of senior GoC officials are stricken with the HxNy virus.	29	01-Sep-14	30-Sep-14	Blue
Government of Canada Events	1	Widespread activity across Canada -- clusters of deaths in several provinces.	60	01-Oct-14	30-Nov-14	Blue
Government of Canada Events	1	Mortality rates in some areas are as high as 15-18 people per 100 infected people.	60	01-Oct-14	30-Nov-14	Blue
Government of Canada Events	1	By the end of October, the infection rates are increasing.	60	01-Oct-14	30-Nov-14	Blue
Government of Canada Events	1	It is estimated that as much as 20-40% of the population is infected, half of those requiring out-patient ca	60	01-Oct-14	30-Nov-14	Blue
Government of Canada Events	1	The Health Products and Food Branch of PHAC promulgates regulations concernings development, regula	30	01-Dec-14	31-Dec-14	Blue
Government of Canada Events	1	By 25 December, officials advise that mortality rate is dropping and wellness increasing.	30	01-Dec-14	31-Dec-14	Blue

Figure 11 - Create Events

To create and event, one selects the Event Group then the point in time then enter the event description and timings selecting red or blue from the pull down to identify the event a malicious or not. This replaces the Master Events List shown in the TTX After Action Report (AAR).

4.3.1.1.3.3 Create Capabilities and Tasks



Event	Capability Group	Capability	Task	People and Organization	Infrastructure and Technologogy	Policies and Process and Practices	Notes
There are single deaths reported iin the U.S. and efficient human-to-human transmission taking place.	Common	Assess risk	Assess Risk				Early risk assessment - but non-scientific. Well-ensconced committees. Step in the
Governments at all levels improve governance, law, organization, and policy in order to be prepared for any	Common	Assess risk	Balance Investment and allocate resources according to priorities (across EM stages and capabilities)				Better allocation to recover and prevent capabilities.
There are single deaths reported in the US and efficient human to human transmission taking place.	Common	Assess Risk	Conduct rapid assessment - identify, characterize and evaluate (specific) risks	Situational Assessment Team (SAT)	Advance Planning Group		Technical / Health assessment might be possible but integrated consequence
Governments at all levels improve governance, law, organization, and policy in order to be prepared for any	Common	Assess risk	Establish/oversee employment of risk framework				
Governments at all levels improve governance, law, organization, and policy in order to be prepared for any	Common	Conduct strategic planning	Develop and publish national Health Portfolio Public Safety/Security strategy				CPIC. This provides direction where other resources can/should be directed.
Business and commerce resumption plans are implemented and recovery efforts increase to find the	Common	Identify, characterize and assess longer term (e.g. social/reputational and environmental) risk(s)	Identify and track long term health effects				Mandate of the P/Ts – by extension then GC. Very low investment from HP. It would be
Business and commerce resumption plans are implemented and recovery efforts increase to find the	Common	Identify, characterize and assess longer term (e.g. social/reputational and environmental) risk(s)	Restore community trust				Not sure that we have processes. We have the capability but success is dependent on
Governments at all levels improve governance, law, organization, and policy in order to be prepared for any	Common	Manage communications	Develop and maintain public outreach program i.e. public education & awareness				Not enough being done in this area.

Figure 12 - Create Capabilities and Tasks

To enter a capability first select the reference Event to which it is associated then select a Capability Group and enter a capability and task. This replaces the Capabilities and Task List in the TTX After Action Report.

4.3.1.1.3.4 Rate Tasks

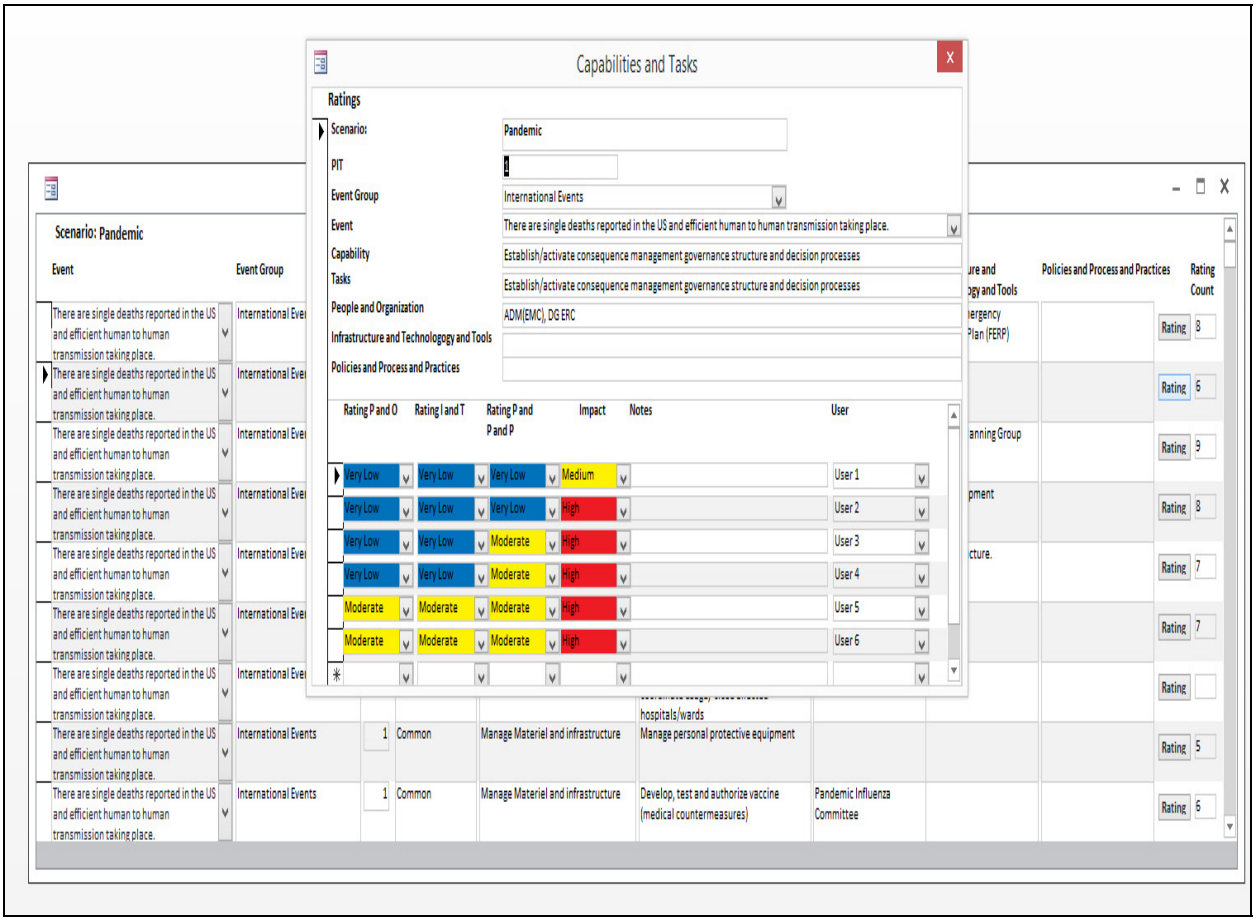


Figure 13 - Rate Tasks

To rate a task, the user must identify themselves then rate the selected task by using the pull down menu's. During the TTX, users used pencil and paper to rate the tasks.

4.3.1.1.3.5 Produce Reports

The following are visuals of the automatically generated reports from the prototype CAMS (figures 14 and 15).

Figure 14 - Produce Reports – Graph View

Capability Group	Capability	Task	PO	IT	PPP	Overall	Impact
Common	Assess risk	Assess Risk					
Common	Assess risk	Balance Investment and allocate resources according to priorities (across EM stages and capabilities)					
Common	Assess Risk	Conduct rapid assessment - identify, characterize and evaluate (specific) risks					
Common	Assess risk	Establish/oversee employment of risk framework					
Common	Conduct strategic planning	Develop and publish national Health Portfolio Public Safety/Security strategy					
Common	Identify, characterize and assess longer term (e.g. social/reputational and environmental) risk (s)	Identify and track long term health effects					
Common	Identify, characterize and assess longer term (e.g. social/reputational and environmental) risk (s)	Restore community trust					
Common	Manage communications	Develop and maintain public outreach program i.e. public education & awareness					
Common	Manage communications	Develop tailored/targeted public education & awareness program					
Common	Manage Communications	Notify internal authorities and partners					
Common	Manage Communications	Public Communications and Alerting					
Common	Manage communications	Re-establish community trust					
Common	Manage data, information and intelligence	Determine information requirements/reporting thresholds (Indicators & Warning levels)					
Common	Manage data, information and intelligence	Develop information and intelligence vertical and horizontal sharing protocols (i.e. within GC, with P/T/M, with private partners and with global community)					
Common	Manage data, information and intelligence	Develop ontologies, information and intelligence sharing protocols					
Common	Manage data, information and intelligence	Establish information and intelligence collect priorities					
Common	Manage data, information and intelligence	Establish SME communities and IT networks					
Common	Manage data, information, intelligence and knowledge	Access/exploit specialist expertise					
Common	Manage data, information, intelligence and knowledge	Manage data, information, intelligence and knowledge					
Common	Manage data, information, intelligence and knowledge	Share information with peers and partners. Manage data					
Common	Manage Human Resources	Address and administer compensation					
Common	Manage Human Resources	Augment information collection, analysis and EOC staffs					
Common	Manage Human Resources	Demobilize surge/sustain resources (including deactivation of volunteers as required)					

Figure 15 - Produce Reports- Dashboard View

5 Conclusion

This report was conducted as part of a larger targeted investment project in order to document and describe the evolution and design objectives of the Capability Assessment Management System (CAMS).

The CAMS application contains may features and functions that were not in the original version of the FSSMS. The FSSMS database architecture focused on deriving gap descriptions from task lists, while the CAMS links gaps to capability elements (PPT: People and Organization; Policy, Processes and Procedures; Infrastructure, Technologies, and Tools) that are related to tasks and capability requirements. This results in greater emphasis being placed on characterizing the type of capability gaps at the task level. For instance, improving the capability to "manage data, information networks and knowledge" might depend on the specific emergency management pillar (prepare/mitigate, prevent, respond, recover), which can change over the course of an event. There is also the question of which capabilities, tasks and elements might be a concern, based on the results of a capability assessment that would help focus attention on the need for a balanced versus more targeted investment approach. This highlights the importance of designing a framework that allows for the elicitation of expert opinion from a wide range of SMEs (management, operations, policy, science and technology, etc.), reflecting a holistic approach to the various stages of a scenario.

The development of CAMS provides a comprehensive, unified and tailorable framework that takes into account many dimensions of a scenario in terms of mapping it along a continuum of response. Structured analytical techniques can be used to analyze capability gaps across the emergency management pillars, better determine the implications across organizations, and understand where to focus planning, programs and investment decisions. Like FSSMS, CAMS uses the principle of cataloguing, where each domain will have its sub-set of scenarios. The idea is that when planners have assessed a number of scenarios from various domains, they can then start to analyse the implications across domains, organizations and capabilities.

The CAMS application, like all decision support tools, is only effective as the information to which it was programmed to prioritize capability gaps. In this vein, while it is becoming a mature solution, the scenarios, capabilities and task lists need to be designed (and reviewed) by SMEs prior to rating. Clearly, it is not a substitute for critical thinking, and should be used with other complementary analytical tools and techniques. This would be consistent international security risk management principles and guidelines.

6 Appendix A

6.1.1.1 IM/IT related requirements

6.1.1.1.1 Identification of possible appoaches

On startup of the project to automate AHRA and Capability Assessment, contractors researched and reviewed available technology options and tested to confirm viability and applicability.

Options Identified for CAMS included:

- Use of MS Access
- Use of SharePoint, MS SQL and InfoPath
- Use of ASP.Net and MS SQL in a SharePoint Window

With the DRDC/CSS spiral development approach risk associated with development projects has been mitigated with the use of MS Access to prototype applications.

Cost associated with prototyping in this manner are controlled and well understood, business process and requirements are better defined as a result of the prototyping and in the end this approach facilitates and removes significant risk and effort during production development. Prior to production development target architecture analysis can be conducted to determine the best architecture to implement an application.

Below is a visual of the spiral process.

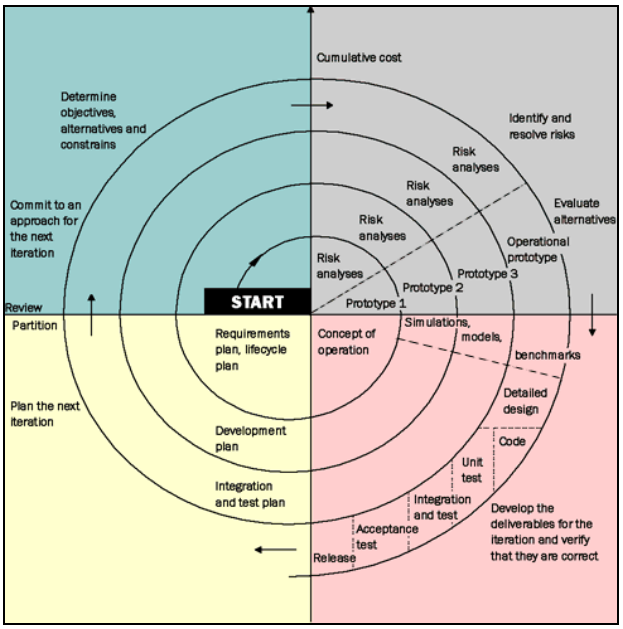


Figure 16 - Spiral Development Process

6.1.1.1.2 Exploration of possible approaches

For production implementation of CAMS, two approached we considered. The fundamental technical design requirements included:

- Application Supportability (Low overall cost of ownership)
- Application must handle multi-level data relationships.

6.1.1.1.2.1 General

1. Advantages gained thru automation should include:
    a. Increased throughput or productivity.
    b. Improved quality or increased predictability of quality.
    c. Improved robustness (consistency), of processes or product.
    d. Increased consistency of output.
    e. Reduced direct human labor costs and expenses.
2. Collaboration can be described as follows
    a. Collaboration is working with each other to do a task.
    b. It is a recursive process where two or more people or organizations work together to realize shared goals
    c. Teams that work collaboratively can obtain greater resources, recognition and reward when facing competition for finite resources
3. Knowledge Management is:
    a. Knowledge management (KM) comprises a range of strategies and practices used in an organisation to identify, create, represent, distribute, and enable adoption of insights and experiences.
    b. Such insights and experiences comprise knowledge, either embodied in individuals or embedded in organisations as processes or practices

4. Information Management is:
    a. The collection and management of information from one or more sources and the distribution of that information to one or more audiences.
    b. Involves those who have a stake in, or a right to that information.
    c. Organization of and control over the planning, structure and organisation, controlling, processing, evaluating and reporting of information activities.

6.1.1.1.2.2 Integrated Architecture

An integrated Architecture involves hardware and software assets working tightly coupled to support end users application needs. Integration is not "out of the box" and usually requires the skill of integration specialists.

Making assets available for re-use is a major objective of an integrated architecture. The following assets must be able to work together to deliver the need of the AHRA/CAMS automation project.

1. Technology Infrastructure
2. Access Controls
3. Document Management
4. Knowledge Management
5. Development Environments
6. Standards
7. Skill Sets
8. Data Architecture
9. Business Intelligence

6.1.1.1.2.3 Target Infrastructure Architecture

1. The current target infrastructure is a model Microsoft infrastructure
    a. Office Enterprise 2010
    b. SharePoint 2010
    c. Windows Servers with IIS
    d. MS SQL

2. DRDC CSS application consistency in presentation and remote partner / user access requirements support SharePoint as the required application interface.

6.1.1.1.2.4 Asset Positioning

1. MS SQL
    a. Suitable for Most Multi-User DBMS Needs
    b. Is also the SharePoint back end DBMS
2. SharePoint
    a. Workgroup Focus (Small or Large, In House or Multi – Organizational)
    b. Workgroup Multi-User Simple Apps
    c. Simple Spreadsheet Like Lists
    d. Discussion boards

    e. Workgroup Calendars
    f. Work Flow Applications
    g. Centralized / Corporate Document / Knowledge Management and Work Flow
3. Info Path on SharePoint
    a. Use for Browser Based Forms Only
    b. One Form Per Forms Library
    c. One Form Per List
    d. No Support for Document Libraries
    e. Keep Forms Simple So Data Collected Can be Surfaced in Forms Library (Fields in List Equivalent) and be Passed on to BI tools

6.1.1.1.2.5 InfoPath – MS SQL Testing Notes

1. Info Path for Complex App / Data Base Integration on SharePoint
    a. Use of InfoPath forms In Forms Library, Not Suitable for Complex Applications.
    b. Does Not Support Parent Child Implementations involving Multiple SharePoint List or Library Browser based Forms
    c. SQL Connected Forms
        i. Require Significant Investment
        ii. Multi-Disciplined Team to Develop and Implement and Support,
        iii. Has an Increased Data Path,
        iv. Potential for Data Duplication
        v. Significant Change Impact.
2. Notes on Data Base Design for InfoPath Using MS SQL Server Studio
    a. Must keep it real simple (Data type limitations http://msdn.microsoft.com/en-us/library/ff621599(v=office.14).aspx)
    b. Involves creating a data base, creating tables and primary keys, fields and relationships, queries
    c. Involves set up relative to authentication
    d. Involves design relative to data access controls/roles/security
    e. Comment - SharePoint, InfoPath and SQL have more features apart than when integrated. Goes to getting three systems to agree on something hence features which may be desirable in a specific environment are not supported in the integrated environment
3. Notes on Info Path / Data Base Integration
    a. Design and Deploy Info Path Form
        i. Involves creating a new info path form using the Web Service Template
        ii. Includes creating the data connection to the web service. Many data connection may be involved
        iii. Includes creating a data connection library on the SharePoint site
        iv. Includes Creating a form library to store the form on the SharePoint site
        v. Includes converting InfoPath data connection to a data connection file which is stored on the SharePoint Data connection Library
        vi. Includes having the SharePoint Farm Administrator Approve the Form
    b. Comments
        i. A single Data Connection library can be used to store all the applications data connections
        ii. Each InfoPath form requires its own form library
        iii. Update function implementation requires passing parameters (not magic) and process documentation is poor to non-existent on web
        iv. Once connection file is stored in data connection library it is not modifiable.
        v. Testing and change implementation requires all above steps (save for creation of libraries) to be taken so there is an impact end to end on the time frame to produce a form

vi. SharePoint Site Admin privileges are required for the developer SharePoint farm admin approves these forms.

6.1.1.1.2.6 Change Request Scenario – Info Path – MS SQL

1. Add field to MS SQL table, Web Service and IP Form
    a. Add field to MS SQL table using SQL Designer
    b. Amend Web Services (Record Locking Controls Implemented in Web Services by Developer)
    c. Re-create Info Path Form (due to data connection recreation)
    d. If form data were saved to form library by users then there would be some conversion issues as well. (Likely these function would have to be disabled)
    e. Notes: As complex a procedure as creating all from scratch.

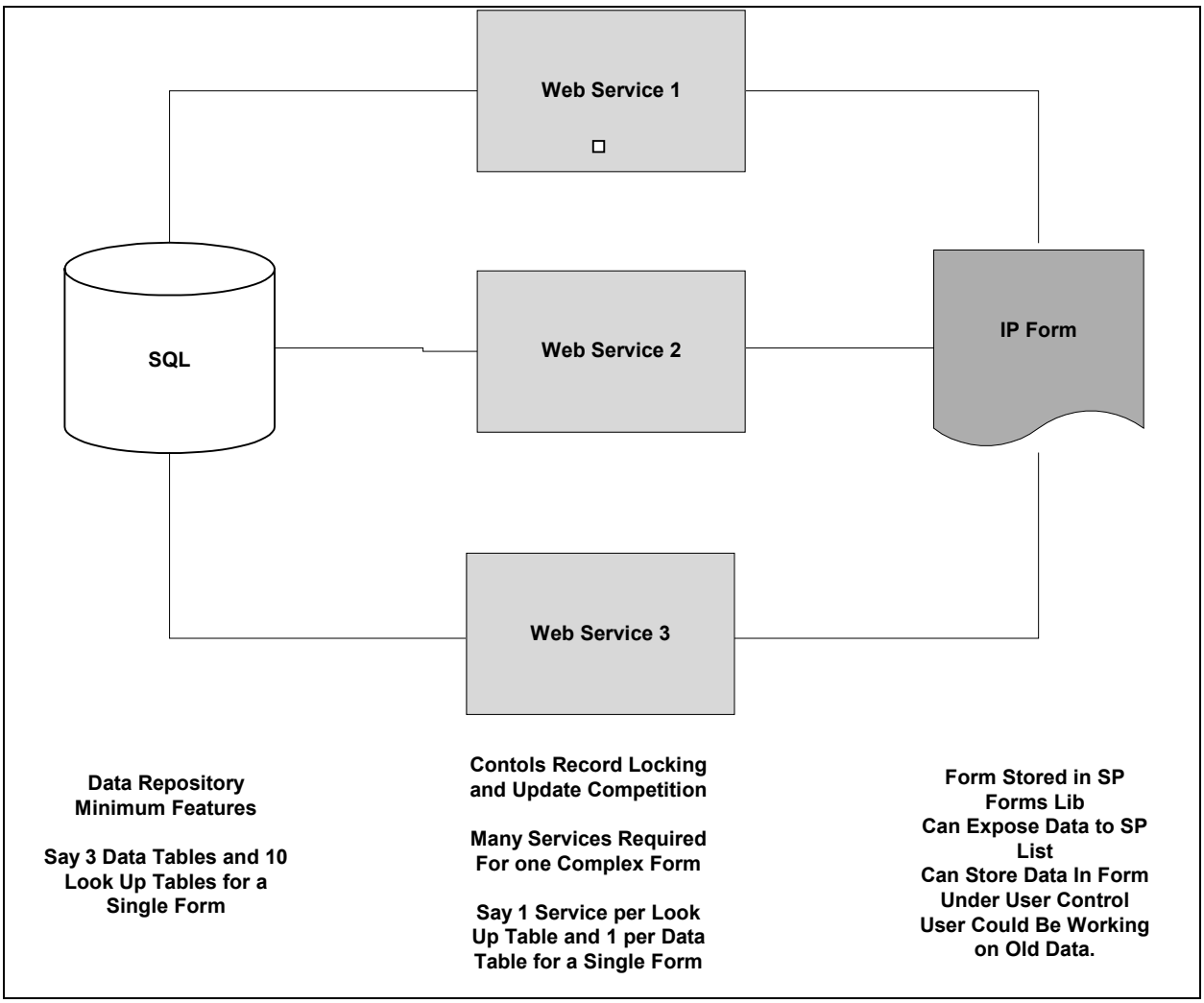


Figure 17 - Info Path / MS SQL Integration

6.1.1.1.2.7 CAMS (Complex) Application Requirements

1. Well Designed DBMS
    a. Relationships via Foreign Keys
    b. Advanced Field Types Flexibility
    c. Scalability
2. Well Designed Application
    a. Tight Relationship With MS SQL (Short Data Path Length)
    b. Web Based Deployment
    c. SharePoint Integration
    d. Minimized Change Impact
    e. Optimized User Experience
        i. Master Slave Forms
        ii. Minimal Paging
        iii. Record Edits “in Place”
        iv. Multi Data Source Integration
        v. Minimum Screen Real Estate Used
        vi. Complex Calculations and Controls Available

6.1.1.1.2.8 Best of Bread Approach – The Right Tools for the Right Job

The following is the recommend Architecture for AHRA/CAMS

1. Infrastructure
    a. Windows Server, IIS , SharePoint, MS SQL, SharePoint Client Object Model
2. Integrated Application Deployment (Development Environment)
    a. Visual Studio and SharePoint Client Object Model for Complex Apps
    b. InfoPath for Simple Browser Based Forms in Libraries (not to be used for SQL integration)
    c. SharePoint Project Sites / List Apps
3. AHRA Scenario Library
    a. InfoPath Form
    b. Surfaced Data
    c. Work Flow
    d. Low Complexity
4. ARHA Scenario Rating Forms Library
    a. InfoPath Form
    b. Surfaced Data (SP)
    c. Work Flow
    d. Low Complexity
5. CAMS
    a. MS SQL DBMS
    b. Visual Studio / SharePoint Client Object Model

c. Medium Complexity
d. Reporting Via SQL Reports

7 Appendix B

7.1.1 Development and Testing

7.1.1.1 CAMS Data Model

The CAMS data model represented below shows that for a Scenario there can be many associated events and for and event there can be many associated capabilities and tasks and for a task there can be many associated ratings. The Ratings table is the child of the Capabilities and Tasks table which is parent to ratings and child to events. Similarly the Events table is child to the Scenario table which is parent to the events table.

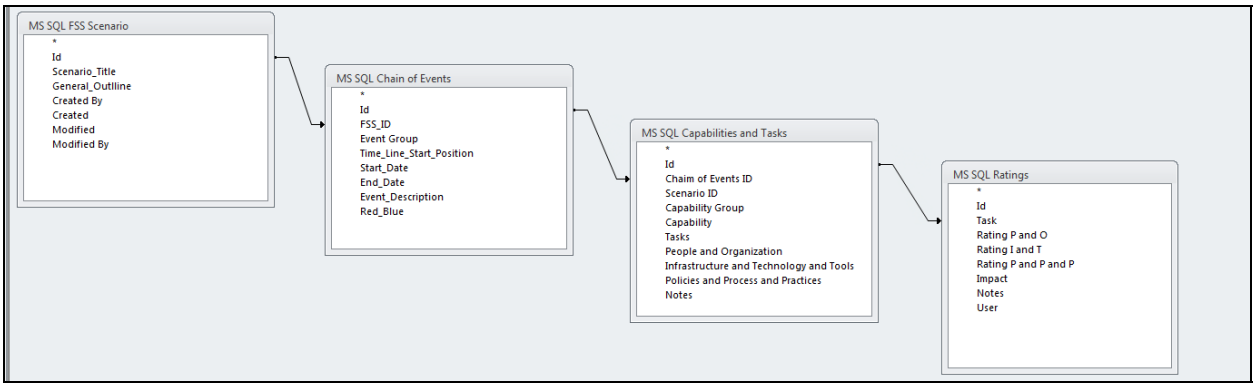


Figure 18 - CAMS Data Model Visual

Scenario Table	**Format**
Id	int
Scenario_Title	varchar(250)
General_Outlline	varchar(MAX)
[Created By]	varchar(250)
Created	datetime
Modified	datetime
[Modified By]	varchar(250)
Chain of Events Table	**Format**
Id	int
FSS_ID	int
[Event Group]	int
Time_Line_Start_Position	int
Start_Date	datetime
End_Date	datetime
Event_Description	varchar(250)
Duration	int
Red_Blue	varchar(250)

Capability and Tasks Table	**Format**
Id	int
[Chaim of Events ID]	int
[Scenario ID]	int
[Capability Group]	int
[Capability Group2]	varchar(250)
Capability	varchar(250)
Tasks	varchar(250)
[People and Organization]	varchar(250)
[Infrastructure and Technology and Tools]	varchar(250)
[Policies and Process and Practices]	varchar(250)
Notes	varchar(MAX)
Rating Table	**Format**
Id	int
Task	int
[Rating P and O]	int
[Rating I and T]	int
[Rating P and P and P]	int
Impact	int
Notes	varchar(MAX)
[User]	int

7.1.1.2 Application Developemnt Tools

The application development tools are:

- Visual Studio 2012
- Ajax Tool Kit
- SharePoint Client Object Model 2013

7.1.1.3 Application Interface Design

The application interface design was developed with purpose of minimizing communications with remote servers for data. For any selected scenario all related data gets pre-loaded to all form or grid views to give the user the fastest possible response time when working with a scenario.

The interface incorporates standard navigation buttons as well as standard insert, update, delete, select and cancel hyperlinks in the form and grid views used.

The CAMS application is inserted in to a SharePoint Page on the AHRA site to allow for common look and feel as well as co-location with AHRA.

7.1.1.4 User Access Controls

User access permissions are inherited from the AHRA SharePoint user group. A user may create and edit their own scenarios and may view other scenarios. The Scenario owner is the Scenario Facilitator.

Rating Users may create ratings for a scenario for which they have been given privilege to do so by the Scenario Owner.

8 References

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