

CapDEM TDP – Current DND Initiatives

Review

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1 INTRODUCTION

1.1 GENERAL

The Collaborative Capability Definition Engineering and Management Technology Demonstrator Program (CapDEM TDP) initiative is investigating Capability Engineering (CE) in order to improve an acquisition process (15+ years) that does not meet the rapid evolution of business requirements and technology, that does not support the new capability-based approach promoted by DND/CF and that is not adapted for the increasing complexity of acquisition and development. To that end, a new Capability Engineering Process (CEP) is required. The CEP will be based on:

- Best practices and standards issued from traditional Systems Engineering;
- Best practices in Systems-of-systems (SoS);
- Best practices in Simulation-based acquisition (SBA); and
- Tools and technologies facilitating data/information exchange and collaboration among engineers, scientists, users and managers at multiple distributed geographic-locations for the purpose of defining, develop and evaluate a capability.

1.2 OBJECTIVE

The purpose of this document is to provide the project team with a compendium of initiatives that are currently being undertaken in DND, and that may have relevance for CapDEM. Each of the initiatives is briefly described; the relevance to CapDEM is explained; the methodology and tools they are using is discussed; the points of contact are listed, and the results of their labours to date are enumerated, along with recommendations for how their work could be of use to CapDEM. Finally, the latter two portions of the document compare the initiatives and make suggestions as to how CapDEM might be able to gain leverage from the experiences already achieved by companion efforts. Recommendations are identified for the CapDEM TDP initiative on the potential initiatives that could form the basis for a concentration, from a nascent *Capability Engineering Process* perspective.

1.3 CONTEXT

The CapDEM initiative seeks to achieve the following objectives:

- Define and demonstrate Capability Engineering and a Canadian Collaborative Engineering process,
- Establish a Collaborative Engineering Environment (CEE), with an Integrated Synthetic Environment (ISE),
- Evaluate the process, CEE, and ISE in Canadian DND projects (three case studies), and
- Provide guidance to DND on the introduction and exploitation of CE within DND, including guidance on the business processes and organizational changes that would be required.

The purpose of this 'Current Initiatives' phase of CapDEM is to capture all of the endeavours that are currently underway across DND that might have an impact on the future development of the CapDEM initiative. Accordingly, the activities highlighted in this report are deemed to have the most immediate relevance to the "as-is" terrain that CapDEM will define as a baseline for future work. In addition to these activities, however, there are a number of other initiatives that, for one reason or another, are deemed to be more appropriate for closer examination at a future date. The initiatives are elaborated upon more fully in the latter part of this document, and include those in this illustration (see Figure 1 – Initiatives):

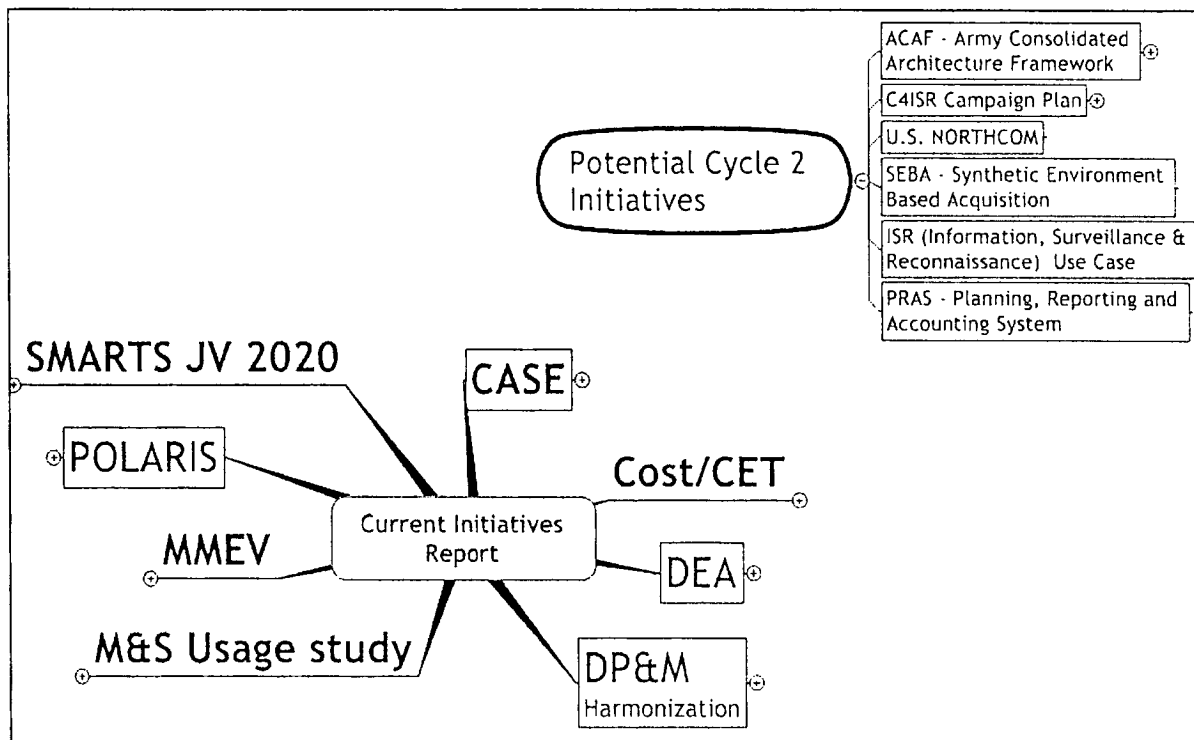


Figure 1 – Initiatives

1.4 APPROACH

The initiatives outlined in this document are the ones deemed to be of the greatest utility to the CapDEM TDP, by the Project Manager and the Deputy Exploitation Manager, at the outset of the project. It is the intention of the CapDEM TDP team to provide an update to the initiatives at the end of the first cycle to ensure that the azimuth remains true. It is certainly possible that some will be added and that others will be removed. It is also highly desirable that if other initiatives are identified that are of relevance to CapDEM and the CEP, that they be communicated to the CapDEM TDP members for review.

1.5 RAPID EXPLOITATION

As part of the initial phase of CapDEM, in envisioning how a CapDEM Exploitation Plan could be developed, a 'Beneficiary Communities Survey' was conducted. This directed survey was

aimed at all Senior Review Board (SRB) members to elicit their feedback on their level of CapDEM understanding and to increase buy-in to the CapDEM program and objectives.

The SRB in the case of CapDEM is made up of the Technology Demonstration Program oversight committee, and it is intended to provide guidance to the project. As for any SRB in DND, it 'assists in resolving issues and provides departmental review and oversight of the project. It is the vehicle used to ensure that Level One Advisors and other major stakeholders have input into the management of a project, and that program issues are recognized and given due consideration at the appropriate level.'

1.6 RECOMMENDATIONS FOR CAPDEM TDP

For the CapDEM initiative to succeed, it must rapidly develop methodologies that are continuously relevant for DND. This requires constant close collaboration with the key stakeholders and the development of a CEP, even if only of a conceptual nature, as quickly as possible. Accordingly, initiatives should be sought that display the following characteristics (these will be modified as CapDEM matures):

- Develop a 'strategic view' that is in context with the Canadian Joint Task List;
- Apply innovative developmental principles at every stage of the acquisition cycle;
- Are implemented within a 'capability process;'
- Implement an overall systems integration framework;
- Adopt an evolutionary approach to fielding that yields incremental capabilities;
- Maintain close collaboration between users and developers;
- Define clear organizational responsibilities;
- Give appropriate fiduciary advice so that spending approval can be achieved in a timely manner; and
- Conduct adequate change management and training programs to allow for the adoption of new ideas – in a continuous improvement / continuous learning environment.

2 CURRENT INITIATIVES

2.1 CASE- CANADIAN ADVANCED SYNTHETIC ENVIRONMENT

2.1.1 Description

The Canadian Advanced Synthetic Environment (CASE) project, that first saw life as an Air Force initiative, is in definition phase and is investigating the nature and use of Synthetic Environments (SE) to support mission training and rehearsal. The scope may include everything from training, testing, rehearsing and evaluating across the spectrum from joint exercises to the procurement of new equipment. The intent is to have elements of the project to consider the use of Synthetic Environments in mission analysis, thereby eventually developing more cost-effective models. There is also a strong desire to have the scope include support of Capability Based Planning.

CASE, which received Effective Project Approval (EPA) last year, will consist of three phases:

- a. Exercise "First Wave" (TTCP-led Fighter-centric SE re-enactment of Kosovo Air Campaign);
- b. Modelling a Griffon Mother ship; and,
- c. Exercise "War in a Box" (integrating Army, Navy and Air Force experimentation centres in SE focused constructive simulation exercise based on Force Planning Scenario 5).

There are four key elements to each of the phases:

- a. Concept Development and Experimentation,
- b. Requirements Definition using a prototyping environment,
- c. Operational Test and Evaluation via simulation, and
- d. Training and Mission Rehearsal, real-time in a synthetic environment.

2.1.2 Relevance to CapDEM and CEP

The CASE initiative is of importance to the CapDEM because of its aim to try and tie together modelling & simulation techniques, together with the latest CD&E and life cycle management ideas.

Accordingly, CASE aims to:

- a. Establish a Canadian Advanced Synthetic Environment consisting of:
 - 1) Legacy simulators and new simulators integrated to maximize their capabilities;
 - 2) A scenario generation capability with playback and embedded course of action analysis techniques;
 - 3) A model management system that allows for the tracking and effective utilization of current and future models;
 - 4) A telecommunications backbone that allows for distributed simulations to multiple users, both Canadian and Allied; and,
 - 5) Management tools for planning, and capturing the outcomes of simulations, thereby deriving lessons learned and review (learning) techniques.

- b. Establish routine use of CASE infrastructure, for Concept Development and Experimentation, Requirements Definition, Operational Test and Evaluation, Training and Mission Rehearsal; and,
- c. Transfer life cycle management of the CASE capability to Director General Aerospace Equipment Program Management (DGAEPM).

Therefore the obvious interest to CapDEM includes the CEE IPT work that is associated with tools and connectivity to CASE. Also, the ISE IPT, at least as it supports synthetic environment development, is of direct interest to Dr. R Brown (FFSE). Finally, CapDEM should monitor and lever, to the extent possible, the use of SE in a Force Planning Scenario (the NEO Operation) and the integration of the environmental CD&E organizations that are associated with Phase 3 ("War in a Box" – planned for Sept 05).

2.1.3 *Planning, Status and Major Tools Used*

The CASE project is in a very early stage of development. It is leveraging the tools (3.2) already in use at the Canadian Forces Experimentation Centre (CFEC), the Canadian Forces College (CFC), the Joint Command & Staff Training Centre (JCSTC) and elsewhere. As a "horizontal priority" of Strategy 2020, it will make greatest use of existing tools, endeavouring to lever them to create new or increased capabilities. Therefore, current tools include existing M&S technologies in use in DND.

2.1.4 *Organization and Resources (POC, OPI and so on)*

The principle points of contact are:

- a. Project Director: LCol R Thompson – Director Aerospace Requirements (DAR 7)
- b. Project Manager: Mr. F McLaren -Director Aerospace Equipment Program Management (DAEPM - R&CS 6).
- c. DRDC POC: Patrice Belanger – leading DRDC support efforts to CASE definition.

2.2 **COST/CET**

2.2.1 *Description*

Generally speaking, one of the greatest incentives toward integrating capability development generally, and certainly for Canada, in particular, is the incentive to reduce cost. This is especially true of the waste associated with duplicative efforts. The incentive to change old ways of doing business is enshrined in Defence Strategy 2020, especially in the 60 activities contained in the 'Change Initiatives and the Capability Programs' of the Change Agenda.

Within the ADM (Mat) organization, the Directorate Materiel Acquisition and Support Program (DMASP) directly supports CapDEM. To date, liaison has been preliminary, and it had focused on the four areas performance measurement, Integrated Project Teams, integration with industry and life cycle costing.

2.2.2 Relevance to CapDEM and CEP

Although the actual hard linkages are yet to be completely worked out, DMASP support is important to CapDEM in two potential areas:

- a. The addition of personnel who possess costing expertise to the Capability Engineering Team (CET) for work with JIIFC; and
- b. Secondly, it is also proposed to extend this costing expertise to CapDEM work associated with Cycle 2 activities, specifically, the 'Augmented ISR Use Case.'

DMASP work related to major services procurement and the 'total cost of ownership' are very promising for accurately capturing costs throughout the project life-cycle. Their models are currently being developed but should be closely tracked by CapDEM, as they will enhance the processes used by managers to capture in a much more timely manner everything from large bundled service contracts to the costs of disposal.

2.2.3 Planning, Status and Major Tools Used

There are a variety of tools and techniques in use for the four focus areas mentioned above.

- a. Performance Measurement - DND has used some type of performance measurement framework (PMF) for many years. Currently, the *pbviews* tool (Performance Business Views) is associated with training-related activities, while the Kaplan and Norton *Balanced Scorecard* is being considered for a holistic view of performance. Oracle has a tool called *Oracle BSC*, but it is unknown if this will be the preferred option. In addition, Cognos has a tool known as *Cognos Metric Manager* that is also being considered.
- b. Integrated Project Teams - IPTs are predicated within DND on the tenets of the Project Management Institute's *PMBOK* and the related tools. Tools such as *MS Project Manager Enterprise* and Primavera's *P3e* are also in broad use within DND.
- c. Integration with industry - In general, no Forces-wide tools are noted. Nevertheless, there are many local initiatives that are worth examination in CapDEM cycle II work. For example, Canadian Forces Support Training Group (CFSTG) in CFB Borden uses a Corporate Management Information System (CMIS) that vastly extends the financial reporting rigour mandated in the Financial Management and Accounting System (FMAS). It is a Sybase database with interfaces to all of the common training and financial tracking tools on the Base. It is very comparable to most ERP systems in use in large corporations and would provide an excellent financial tracking mechanism for follow-on CapDEM work.
- d. Life cycle costing - A variety of tools are in use; the most significant is probably the DND Materiel Acquisition and Support Information System - Complex Contracting (MASISCC). All of the tools are, of course, cost-centric in nature and include both cost and constraint models.

2.2.4 Organization and Resources

Within the four broad areas mentioned above, the points of contact are as follows:

- a. Performance Measurement - DMASP-2 (LCol Donaldson);
- b. IPTs and other DMASP Reforms - D Maddeley (DMASP 5-2);

- c. Guidance and assistance with integration with industry – D Maddeley; and
- d. Life cycle costing – project-centric (P Kincaid) and program-centric (M Thibeau).

2.3 DEA – INTEGRATED DEFENCE ENTERPRISE ARCHITECTURE

2.3.1 Description

Defence Enterprise Architecture arises from the need for strategic direction in Information Management (IM), especially to provide a holistic view that can be the basis for IM development. This Enterprise Architecture must meet the business and operational information requirements of the DND/CF. The DEA initiative is predicated upon the mandate for improvement contained in Defence Planning Guidance 2001, *Change Objective 8*. It requires that effective resource stewardship be provided using an Enterprise Architecture Framework to guide the DND/CF Enterprise Architecture (DEA) development. The aim is to better integrate all Management Information Systems (MIS).

2.3.2 Relevance to CapDEM and CEP

The essence of an Enterprise Architecture (EA) approach is to better align all current structures and methods to better realize future capabilities. DEA characterizes it as the management 101 systems approach (see Figure 2 - Aligning Future Capability Today).

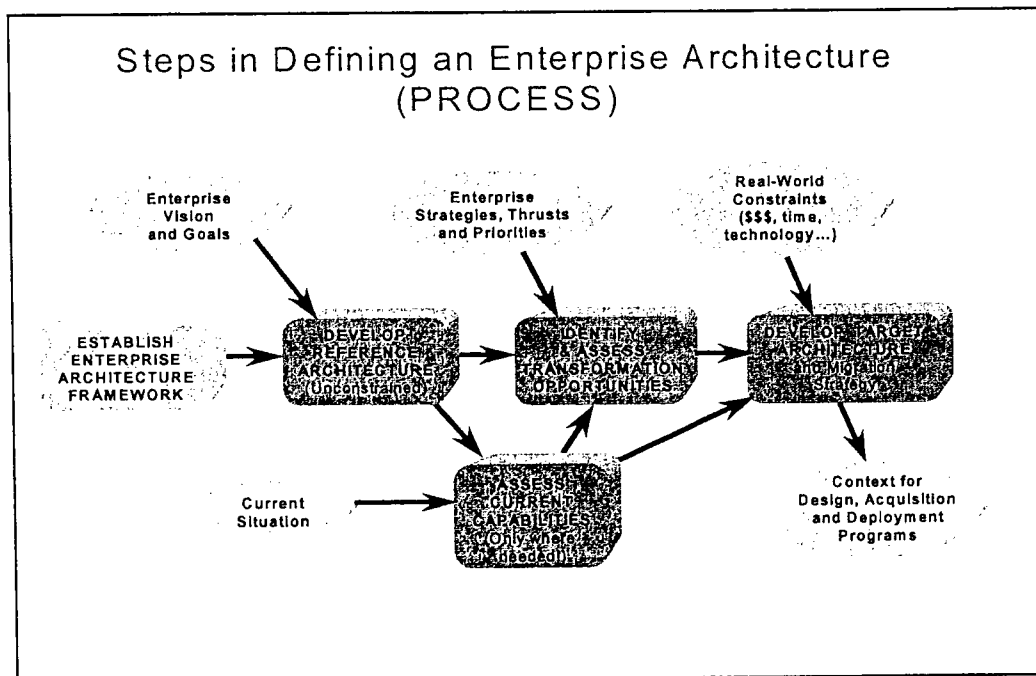


Figure 2 - Aligning Future Capability Today

DEA confronts many of the same tasks that CapDEM will have to address, especially from a 'model maturity' perspective. Initially, DEA made use of a Gartner study to articulate the five levels of 'Architectural Maturity.' These are:

1. Chaos Each large organization element within the enterprise does its own thing;
2. Reactive Organizations start to work together sensing value in working together;
3. Proactive Enterprise actively starts to manage the organizational elements;
4. Service Established architectural processes across the enterprise are manifest; and
5. Value Architecture is fully established and capable of being leveraged for decision-making. It is also actively managed.

There is probably nowhere in DND that demonstrates better the difficulties in attempting to implement a Forces-wide approach to IM development. This is not unique to DND, nor to any military; indeed most large organizations, both public and private, are experiencing the same challenges. The IT Governance Institute, for instance, asserts that nearly 90 percent of enterprises in the U.S. are at the first or second level of IT Governance maturity (as shown in Figure 3 - IM/IT Governance Maturity Model). Only six percent are at level 3 and three percent are at level 4. The basis upon which organizations 'climb the maturity ladder' is an enterprise-wide architecture, that allows for rational IM/IT development.

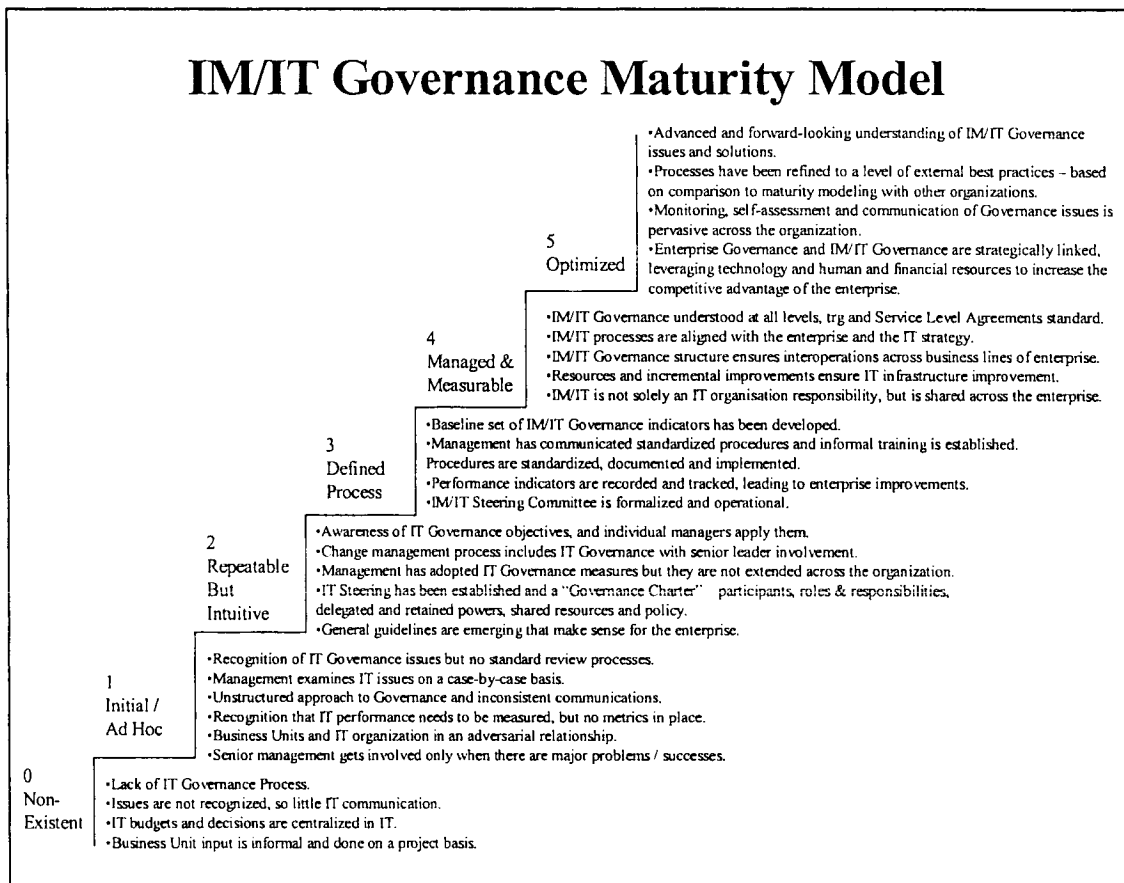


Figure 3 - IM/IT Governance Maturity Model

2.3.3 Planning, Status and Major Tools Used

Amid the plethora of architecture frameworks that are available today – Zachman, FEAF, TEAF, and so on, DEA has articulated a model that succinctly captures the DND reality. Similar to the DODAF v1, or EAFs in commercial use (and like the Business Transformation Enablement Program - BTEP supported by the Treasury Board Secretariat), it posits a framework that is made up of six major architectural elements: Defence Business Architecture, Operational, System, Technical, Information and Security Architectures.

The EA environment is gradually becoming a tool-rich one. DEA is certainly familiar with all of the contemporary tools that are useful in a military environment, among these, Computer Associates *BPWin-ERWin* suite, Popkins's *System Architect*, *Visible Advantage*, Proforma's *ProVision*, ViTech's *CORE*, the Computas *METIS* tool and many others. To date, they have not settled on a tool, but they seem to be tending toward *METIS*.

From a context perspective, the DEA initiative, like all EA related efforts in Canadian government today, will be influenced by Treasury Board's BTEP. BTEP encourages a "whole-of-government" approach - government as an enterprise; harmonized legislation, regulations & policies; and interoperable & integrated business and information systems. It is the latter tenets that must be a focus of DEA's efforts to integrate architectures across DND, as they must be compatible with the 'whole of government.'

2.3.4 Organization and Resources

About 20 people are involved in the DEA effort, mostly civilian analysts. Both CapDEM and DEA are engaged at the moment in developing a collaborative 'way ahead' to their mutual benefit. The principle contact from CapDEM's perspective is Major Andrew Wykurz.

2.4 DEFENCE PLANNING AND MANAGEMENT HARMONIZATION INITIATIVE

2.4.1 Defence Planning and Management (DP&M) Harmonization Initiative Description

The Harmonization Initiative is the result of a process initiated by Director General Strategic Planning (DGSP) and Director General Strategic Change (DGSC) personnel who desired to better integrate the documents and processes that support the DP&M planning activities. Challenges they identified included coherence, alignment, unpredictability, enterprise view, and communications. These issues are summarized in Figure 4 - DP&M: The Planning Problem.

It is in the face of the illustrated problems, the DP&M Harmonization effort is expected to help develop the following:

- a. A clear set of DND/CF priorities for any selected planning horizon;
- b. Harmonized planning within a DP&M Framework that aligns concept, process and output;
- c. Planners who have a full understanding of process interactions, and who can model the downstream impact of all decisions;
- d. Level 1s who understand and use the DP&M Framework for optimal decisions and resource allocation decisions;
- e. One coherent VCDS vision (cross service, cross time horizon and cross planning domain) that animates all internal and external planning;

f. A DP&M Framework that is adaptable and scalable.

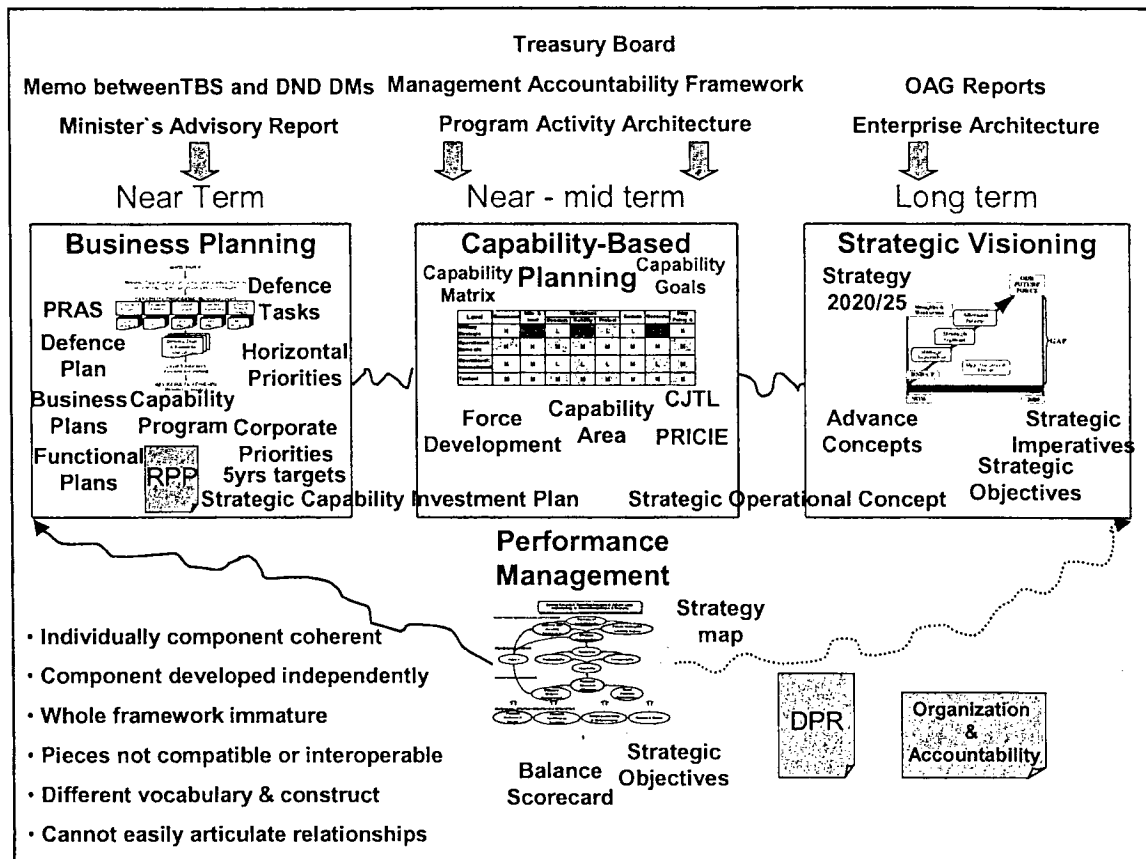


Figure 4 - DP&M: The Planning Problem

The aim is to allow the VCDS to use the harmonized planning structure for the 2005/06 planning cycle.

2.4.2 Relevance to CapDEM and CEP

One of the most recent developments to come out of the U.S. Joint Staff (J-8, Force Structure, Resources and Assessment) is the so-called Joint Capabilities Integration and development System (JCIDS), reputed to have come from Secretary Rumsfeld's frustration with the DoD Requirements System. The left side of Figure 5 - U.S. JCIDS Process shows the old service-driven, threat-based force-planning construct. Capabilities were often developed, validated, and approved as stand alone solutions, not as participating elements in an overarching system of systems. This fostered a "bottom-up, stovepiped" approach to acquisition decisions that were not coordinated with other components; nor linked to strategy. They rarely fostered interoperability. Rumsfeld instead, wanted (the right side of Figure 5) to set strategic direction at the Departmental level and have that direction articulated in a family of concepts and CONOPs that would inform the way the Services provide joint capabilities.

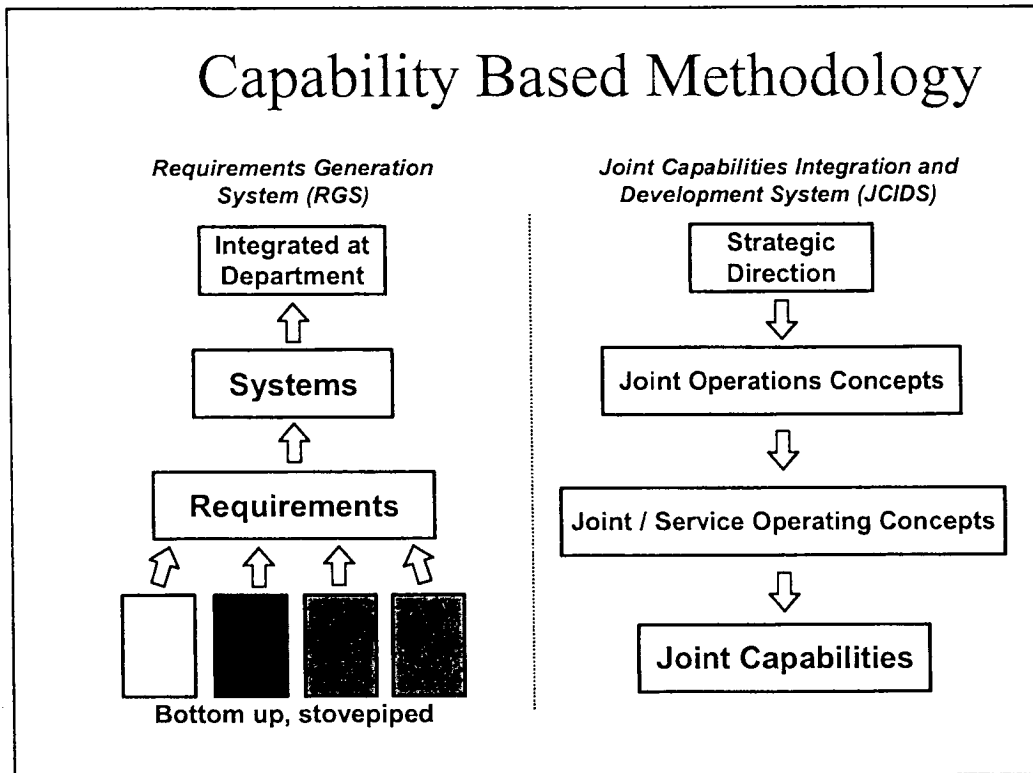


Figure 5 - U.S. JCIDS Process

While this model is clearly not directly analogous to the Canadian situation, many of its attributes are. By putting in place a DP&M framework that is seamless across service and planning domains, DND will solve many of the enormous cost issues inherent in having capabilities 'born' in a single service, and then modified to fit in a joint environment.

2.4.3 Planning, Status and Major Tools Used

The main tool in use at this incipient stage is that provided by the CapDEM (DRDC) support team, namely the CORE Workstation tool.

2.4.4 Organization and Resources

The DP&M Harmonization initiative is sponsored by the VCDS and includes two teams; a 'core' team of eight personnel, at the LCol/Maj/DND civilian level; and an 'extended' team of 27 personnel, eight of whom are also in the core team. The main points of contact are Ghislaine Dazé-Bélisle (DND) and Doug Hales (DRDC).

2.5 MODELLING & SIMULATION USAGE STUDY

2.5.1 Description

The Synthetic Environment Coordination Office (SECO) is leading a survey of Modelling & Simulation (M&S) usage within DND as part of its on-going work to develop and implement a

Simulation Support Plan (SSP) into the Defence Management System (DMS). The survey is initially oriented toward understanding the breadth of M&S usage within Capability Initiative Database (CID) listed projects.

This study has been undertaken because DND has excellent pockets of expertise in certain aspects of M&S; including physics based models, and training models. The individual environments have developed facilities specific to their needs; for instance, the CF Maritime Warfare Center in Halifax, the Army Experimentation Center in Kingston and others. A catalogue of models recently developed by the 'Network of Defence Partners in Science and Technology' was an impressive and wide-ranging one.

Nevertheless, DND is not incorporating advanced techniques such as Simulation Based Acquisition, or other simulation-based methodologies in a coordinated way. For example, there is no joint battle lab, no coordinated process for using synthetic environments to define and develop capabilities, nor any process for establishing standards for the federation of the models that currently exist. Probably most importantly, there is no data interchange standard.

Similarly, the promise of Simulation Based Acquisition (SBA) is becoming obvious, but there is no established process for realizing these goals. Generally, SBA is designed to achieve:

- a. Substantially reduce acquisition time, resources, and risk,
- b. Increase quality and supportability while reducing cost, and
- c. Enable vastly improved life-cycle management.

2.5.2 *Relevance to CapDEM and CEP*

In support of the SECO-led effort CapDEM has offered assistance in shaping this work and as such will gain additional insight on the nature of the CID-listed projects and their potential collaboration/overlap with CapDEM objectives. Additionally, projects that have suitable timelines may prove to be CapDEM Exploitation opportunities. This is like the Beneficiary Communities Survey, but posited more at the integrated "project" level.

Nevertheless, a sub-work package of the SECO survey will attempt to capture Capability-level projects by seeking project alignments with Canadian Joint Task List (CJTL) areas.

2.5.3 *Planning, Status and Major Tools Used*

The SECO work is a repository. Accordingly the main focus is upon the Modelling and Simulation Resource Repository (MSRR). In their integrative function, however, the SECO also encourages the use of Best Practices, and adherence to the High Level Architecture (IEEE 1516), the Defense Modeling and Simulation Office's (DMSO) Verification, Validation and Accreditation (VV&A) practices and IEEE 1278, 'Standard for Distributed Interactive Simulation.'

2.5.4 *Organization and Resources*

The url for the SECO is http://www.drdc-rddc.gc.ca/seco/index_e.html . The SECO is a Defence Research and Development Canada initiative located at Shirley's Bay. The main contacts are D.R. Elliott (DRDC - CFEC), P. Gauvin (DND SECO-2: Policy Standards, HLA) and L. Ozimek (DND SECO-3: Repository, VV&A, SEBA)

2.6 MMEV – MULTI-MISSION EFFECTS VEHICLE

2.6.1 Description

The Multi-Mission Effects Vehicle TD project will create a Multi-Mission Virtual Vehicle (MMVV), with multi-mission capabilities in a net-centric environment, using unmanned organic and tactical air and ground vehicles for remote target identification and engagement. The MMVV will be created in the existing Armoured Vehicle Test Bed (AVTB), and the virtual environment will be used to evaluate technologies, battlefield effectiveness of the multi-mission capability, and interoperability issues with U.S. forces. The major goals of the MMEV TD project are:

- a. Predict battlefield effectiveness of multi-mission capability in various scenarios, including operations in urban terrain;
- b. Assess the ability of a two and three-man crew to operate an MMEV;
- c. Determine effectiveness of individual advanced technologies;
- d. Help define the future army force framework using linked large-scale simulations;
- e. Identify cost, schedule, and risk drivers of the related future Army technologies; and
- f. Explore interoperability issues and technological implications with the U.S. Objective Force.

2.6.2 Relevance to CapDEM and CEP

Within this development, several experiments and simulations will be used to demonstrate the concept. One of the key events will be the so-called 'FAME Ex,' scheduled for June 2005 and involving a large mixture of participants including a substantial team from U.S. Army, General Dynamics Canada, etc.

- a. Provide CapDEM with an opportunity to collaborate with MMEV on their system-of-systems simulation event (EX FAME) being scheduled for June 2005 so as to support CapDEM definition of how Synthetic Environments can be used to support capability definition, engineering and management; and,
- b. Provide UAV model, and ISE support to the MMEV exercise.

2.6.3 Planning, Status and Major Tools Used

The MMEV is achieving the timeline originally set out. As for major tools, it will be evaluated using virtual experimentation. In addition, constructive evaluations will be done using Task Network Modelling, OneSAF, and JANUS.

2.6.4 Organization and Resources (POC, OPI and so on)

The MMEV project office can be contacted through the CFEC at DRDC and through the Armoured Vehicle Test Bed at NDHQ.

2.7 PLANNING, OPERATIONS, LOGISTICS & READINESS INFORMATION SYSTEM

2.7.1 POLARIS Description

The aim of POLARIS is to create a decision support environment for leaders at all levels that provides near real-time status, predictive analysis of alternate courses of action (COA) and quantitative risk assessment. This is aimed at addressing the current difficulties in achieving reliability, validity and timeliness of information with any consistency - a condition that introduces undesirable uncertainty to the decision cycle.

POLARIS intends to create this decision support environment through the selective application of enterprise project management software tools, requirements management tools, a quantitative risk analysis tool, and an integration engine. The result will be a unified decision support technical environment in which reliable, valid and timely information can provide predictive COA analysis and give quantitative assessments of risk, to the greatest extent possible. The chosen COA can then be implemented rapidly and thoroughly, the results being tracked throughout the affected elements of the organization.

2.7.2 Relevance to CapDEM and CEP

The vendor for the Army's POLARIS initiative is the *Project Management Centre, Inc.*, (PMC) in Ottawa. They have proposed that the major overlaps with CapDEM and POLARIS (what POLARIS can offer CapDEM) can be viewed as illustrated below (Figure 6 -POLARIS - CapDEM Relationship). Essentially, this revolves around the two domains of Program Management and Risk Analysis, as highlighted in the circle on the figure.

The validity of this proposed relationship is currently being investigated. It is pretty clear, however, that in the area of risk identification, quantification, and mitigation, CapDEM requires a tool or suite of tools that can assist in the definition phase. Certainly if the POLARIS link provides this 'portfolio of projects,' (what PMC calls 'Program Management') and risk analysis capability, it will be extremely useful.

2.7.3 Planning, Status and Major Tools Used

One of the great benefits of POLARIS initiative is that a great deal of the conceptual and developmental effort has already taken place; the Army is satisfied with the progress to date. The tools (except for PMConnex) are widely available commercially.

Moreover, the experiments in both capability development and managed readiness indicate the potential for a much broader application of the POLARIS methodology across DND. Both the conceptual and compute power exists to provide a unified joint readiness picture as well as to strategically align Capability Development across the Forces. Accordingly, the Army has already proposed that POLARIS could eventually provide an enterprise-wide solution for DND.

The principle tools are: Telelogic *DOORS*, RiskOutlook, PMConnex (a PMC tool), and Primavera Enterprise P3e.

2.7.4 Organization and Resources (POC, OPI and so on)

From the Project Management Centre, Dr. Philip O'Neill and from the Army Maj Nick Martyn.

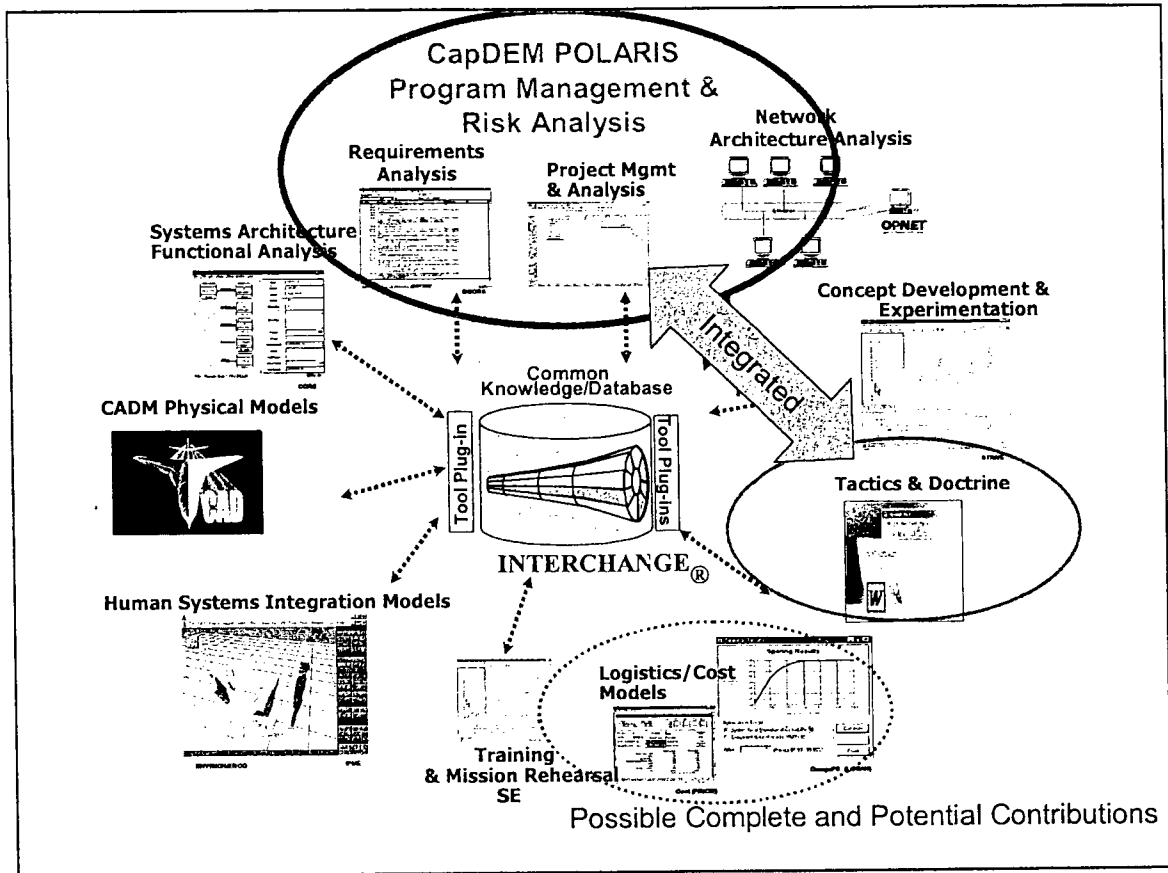


Figure 6 -POLARIS - CapDEM Relationship

2.8 SMARTS & JV 2020

2.8.1 Description

Work in the area of Simulation and Modelling in Acquisition, Rehearsal, Training and Support (SMARTS) has been going on in DND in various forms for a long time. This has allowed for the proficient use of models to assess the technical feasibility and human-machine interface dimensions of future military requirements and for accurate simulations of likely training and support scenarios to be created in very sophisticated environments. Joint Vision (JV 2020), meanwhile, in the broadest sense is an effort better operate in a joint manner and to capitalize, with Canada's allies, on the promise of the RMA.

SMARTS & JV 2020 is an overarching effort to establish an Modelling & Simulation and Synthetic Environment vision for the department and to establish ADM (Mat) in a leadership role. The companion document will be the DMASP-produced SE-based acquisition strategy and roadmap.

2.8.2 *Relevance to CapDEM and CEP*

To date the participation of the CapDEM IPT has been preliminary. CapDEM team members have participated in reviews of the SMARTS Joint Vision 2020, and have begun to map the proposed roadmap against the developing CapDEM Campaign Plan to seek suitable opportunities for CapDEM to support the initiative.

2.8.3 *Planning, Status and Major Tools Used*

The planning effort is incipient at this stage. To map the initiatives and seek commonalities, the CORE tool is being used.

2.8.4 *Organization and Resources (POC, OPI and so on)*

Various planning staffs are involved from VCDS to CFEC. ADM (Mat) is also represented by the Directorate Materiel Acquisition and Support Program - Mr K. Krukewich (DMASP 5-4).

The CapDEM POC is Jack Pagotto, the CapDEM PM.

3 COMPARATIVE ANALYSIS

3.1 DOCUMENTED RESULTS

The initiatives reviewed in this document have a wide variety of results to date. Many of them, including DP&M, the Exploitation Plan, M&S Usage and SMARTS-JV2020 are either immature from a modelling perspective, or are more methodology or repository oriented than tool oriented. These include FMAS, PRAS, PAA, the PMBoK, the MSRR, HLA, several IEEE standards, and many others.

On the other hand, the initiatives that treat the financial dimension of activities or that are concerned with the models and simulations that are currently in use in DND, have tools that are well known and very effective in the specific domain in which they have been implemented. These include Performance Business Views (*pbviews*), *Cognos Metric Manager*, Primavera P3e, MASISCC for life-cycle costing, the MA&S Desktop development, BPWin/ERWin, Popkin's System Architect, ProVision, CORE, METIS, Telelogic's *DOORS*, RiskOutlook, (the PM Centre's) PMConnex, Task Network Modelling, OneSAF, and JANUS (and all of the other models in use in the CFEC and elsewhere, for example, JCATS).

The broad challenge for CapDEM, of course, is to capture and glean lessons from all of the initiatives that are examined, now and in the future. The Capability Engineering Process that will be developed will make maximum use of these already tested and accepted standards, processes, collaborative techniques, and so on.

For the purposes of this preliminary examination, it is necessary to understand the processes that animate the use of these tools, and not necessarily the tools themselves. They are used, after all, in quite specific ways for the environment in which they are found. Therefore the most likely tool to be of the greatest benefit at this point in time is the one that has the greatest utility for continued CapDEM development.

3.2 SUMMARY OF TOOLS USED BY EACH INITIATIVE

	Description	CapDEM Link	Tool Linkage	OPI / POC
CASE	M&S tools that are currently in use – CF 18 MMT, Griffon simulator, JCATS and related tools.	Many links, the main one being their focus to shorten the CDE-to-fielding cycle.	M&S of all kinds	LCol R Thompson (DAR 7)
COST/CET	Tools generally focus on financial controls. PMF: <i>pbviews</i> , <i>Cognos Metric Manager</i>	All of the tools are designed to better allow managers to forecast, track and manage costs throughout the project	Performance, project management and cost.	PM - DMASP-2 LCol Donaldson IPTs & Integration - D Maddeley (DMASP 5-2)

	Description	CapDEM Link	Tool Linkage	OPI / POC
	<p><i>Manager.</i></p> <p>IPTs: PMBoK, P3e, MSPProject</p> <p>Integration: FMAS, PRAS, PAA, etc</p> <p>Life-Cycle: MASISCC MA&S Desktop</p>	<p>life cycle.</p> <p>Given the cost-reduction imperative of CapDEM (a 15+ year acquisition process that does not meet the rapid evolution of business requirements and technology, and that is not adapted for the increasing complexity of system of systems) the linkages to COST/CET tools are obvious.</p>		<p>Life-cycle - project: P Kincaid, program M Thibeau.</p>
DEA	<p>Architecture / System Engineering tools:</p> <p>BPWin/ERWin Popkin's System Architect, ProVision, CORE, METIS</p>	<p>The very essence of collaboration and cooperation as articulated in the CapDEM charter is predicated upon a unified underlying planning architecture. DEA's efforts, however, need to focus more on the 'business' level (away from 'strategic direction of IM') to ensure its relevance.</p>	<p>CORE is used by DRDC and thought to have great utility. All of the other tools are familiar to DRDC scientists.</p>	<p>DEA – Maj Andy Wykurz</p>
DP&M	<p>Focus of planning and management harmonization is to reduce costly redundancy.</p> <p>Many financial models/frameworks: PRAS, PAA, FMAS and so on. Also CORE Enterprise for initial models.</p>	<p>The main driver behind DP&M is to rationalize disparate and uncoordinated efforts that cost money. All of these financial tools are designed to help ameliorate that process. Given the cost-reduction imperative of CapDEM, the linkages are obvious.</p>	<p>CORE is used now by DRDC. All of the financial tools/frameworks will be of use for DP&M, COST/CET and others.</p>	<p>Doug Hales</p> <p>Ghislaine Dazé-Bélisle</p>

	Description	CapDEM Link	Tool Linkage	OPI / POC
M&S Usage	No tools at this stage, rather integrating methodologies. Methods: MSRR, HLA, IEEE 1278	High-level integration of all M&S use in DND. M&S will eventually extend to capability definition, especially as it concerns acquisition (Simulation Based Acquisition).	SBA methods will likely be of great interest to CapDEM in Cycle II and beyond.	D.R. Elliott (DRDC – CFEC), P. Gauvin (DND SECO-2: Policy Standards, HLA) and L. Ozimek (DND SECO-3: Repository, VV&A, SEBA)
MMEV	Task Network Modelling, OneSAF, and JANUS.	MMEV is one of the first tests of M&S to develop capability definition metrics. Its utility for CapDEM from an acquisition perspective is obvious.	MMEV will greatly assist in the CJTL capability- system linkages understanding.	CFEC and AVTB, NDHQ.
POLARIS	Telelogic <i>DOORS</i> , RiskOutlook, PMConnex, Primavera Enterprise P3e.	The suite of tools that POLARIS is using may enhance risk identification, quantification, and mitigation efforts. In addition, the ‘portfolio of projects,’ approach may be very useful.	DOORS is widely used in DND. Project tools like MSProject Enterprise and P3e are also well known.	From the Project Management Centre, Dr. Philip O’Neill and from the Army Maj Nick Martyn.
SMARTS – JV2020	CORE	The main linkage is ADM (Mat) desire to generate a SE-based acquisition strategy and roadmap.	Used by DRDC	DMASP - Mr K. Krukewich DRDC - Jack Pagotto.

Table 1 - Summary of Tools in Use in the Current Initiatives

3.3 TOOLS VS PROCESS

The decision about what particular tool or tools to use should be informed by ultimately achieving (like the DODAF efforts in the U.S.) a so-called ‘tool-agnostic’ environment for CapDEM. In other words, the aim at this stage should be to create a thorough and detailed understanding of the processes at work and then use whatever tool may be appropriate.

Over time, the tools will change and it may be appropriate to use other techniques. By having a detailed understanding of the processes at work, the inherent limitations of any particular tool may be avoided.

The focus, after all, is clearly upon interoperability. This can be achieved by first defining the processes at work and by standardizing the terminology that describes the information that is managed within the processes. Tools will be much less important provided there is a standard for exchanging data between the tools. This would allow the freedom for each project to select the appropriate tool set and still be able to exchange core model information in a meaningful way.

4 CONCLUSION

4.1 GENERAL

An effort has been made to demonstrate how initiatives track to the change objectives spelled out in Strategy 2020. There, the five capability areas (Command & Control, Conduct Operations, Sustain Forces, Generate Forces and Corporate Policy and Strategy) are matched against initiatives in the 'change agenda.' A rough portrayal of the mapping is illustrated at Current Initiatives v1.0.mmmap. This context will become increasingly important as the CapDEM is developed.

For now, it is enough to realize that all of the initiatives examined in this report can be directly tracked to change initiatives outlined in Strategy 2020. As CapDEM matures, the relationships will broaden and deepen across the change landscape of the defence community.

The initiatives examined in this report are those that are deemed to be of the greatest potential impact on the immediate development of the CapDEM initiative. Accordingly, the activities highlighted in this report are deemed to have the most immediate relevance to the "as-is" terrain that CapDEM will define as a baseline for future work. In addition to these activities, however, there are a number of other initiatives that, once they mature over the next several months, will be very valuable for follow-on examination. These are enumerated below.

4.2 CYCLE II OBSERVATIONS

Other initiatives that were notes for follow-on examination in Cycle II are also included in the MindMap (Current Initiatives v1.0.mmmap), and illustrated in Figure 6 -POLARIS - CapDEM Relationship, as 'Potential Cycle II Initiatives.' These efforts will need to be closely examined to determine if they are viable candidates for follow-on analysis. They include:

- a. **The Army Consolidated Architecture Framework**, generally inspired by IEEE 1471 (Recommended Practice for Architectural Description of Software-Intensive Systems), ISO/IEC 10746-1 (Open Distributed Processing - Reference Model), Minimum Architecture for Command and Control Information Systems (MACCIS), and DODAF v1 (formerly C4ISR AF, v2.0). The Army's approach is consistent with and can be mapped to the DEA and CapDEM TD approaches. It has included an examination of the following tools:
 - 1) Rational Requisite Pro, TeleLogic DOORS, Rational Development Suite, Vitech CORE, MS Visio, CA BPWin and ERWin, TeleLogic Tau, OpNet, MS PowerPoint, Rational ClearCase, Autotrol and Konfig CM.
 - 2) Of these, they chose the DoDAF OV1; UML; IDEF0; IDEF1X; OpNet; TeleLogic DOORS 6.0; CA ERWin/ERX 3.5.2; Visio 2002 Professional.
- b. **The C4ISR Campaign Plan**. This Director Joint Force Capabilities (DJFC) inspired activity aims at the Common Operating Picture. They have suggested a variety of tools and tool sets, which are generally aimed at joint C4ISR interoperability in Canada and combined interoperability with Canada's allies.
- c. **U.S. Northern Command** and all of the synchronization efforts that will be necessary for the new command's success. As the NORAD element of NORTHCOM adapts to the new

- U.S. security environment, a variety of new processes and supporting tools will be developed.
- d. **Synthetic Environment Based Acquisition.** Generally, SEBA uses the suite of tools found at the CF Experimentation Centre, but they are developing many new techniques as well.
 - e. **ISR Use Case.** This initiative is still in definition but will obviously use a variety of contemporary tools and many techniques common to the JIIFC, as well.
 - f. **Planning, Reporting and Accounting System (PRAS).** Treasury Board has mandated changes in the Program Activity Architecture (PAA) that have affected current reporting in DND. Some are inspired by the BTEP, but many are simply due to improvements in financial reporting that are increasingly being made as government-wide exigencies.

4.3 PRELIMINARY OBSERVATIONS AND RECOMMENDATIONS

There is no absence of interesting and relevant initiatives underway across DND that may have a contribution to make to the CapDEM initiative. This report has briefly examined of these initiatives and referred to eight others for future examination. Of the current activities, their relevance for CapDEM may be envisioned from the perspective of contribution as illustrated below:

Initiative	Contribute to CapDEM	Require from CapDEM	Relevance (worth effort?)	Comment
CASE	Process for shortening CDE to fielding cycle. CASE may provide M&S tools, collaborative techniques and requirements definition. CASE infrastructure may be useful for the CEP definition phase and options analysis.	Liaison	Yes. Especially telecommunications backbone development.	
COST/CET	Shorten acquisition and improve life cycle management. Provide costing models and associated expertise	Liaison	Yes	
DEA	Integrated DND architecture	Commitment - integration of efforts	Likely, provided 'high level,' not solely 'IM.'	DEA is likely to need CapDEM more than the opposite
DP&M	Rationalize conflicting planning priorities and	Commitment	Yes – CapDEM	DP&M needs CapDEM for

Initiative	Contribute to CapDEM	Require from CapDEM	Relevance (worth effort?)	Comment
	resource allocation		receives L1 visibility	independent, expert third party advice
M&S Usage	High-level integration of all M&S use in DND. Also SBA linkage is important	Liaison – commit if models are useful	Likely – if HLA and related methods useful for CapDEM	Taxonomy and process models may carry over to CapDEM
MMEV	Capability definition metrics	Liaison	Likely – if metrics are useful in CEP	
POLARIS	Tool suite – for risk identification, quantification, and mitigation	Liaison	Likely – if ‘portfolio of projects,’ is useful	
SMARTS – JV2020	Strategic view	Unknown	Unknown – SBA is the link	Early May to determine involvement

Table 2 - CapDEM Trade-offs

4.3.1 Next Steps

In the context of the analysis of the initiatives carried out in this report, it is clear that merely examining tools, without a clear appreciation of the context in which they are used, would be inappropriate. Similarly, it is difficult to clearly articulate for others what the promise of CapDEM is without some sort of model that demonstrates its characteristics.

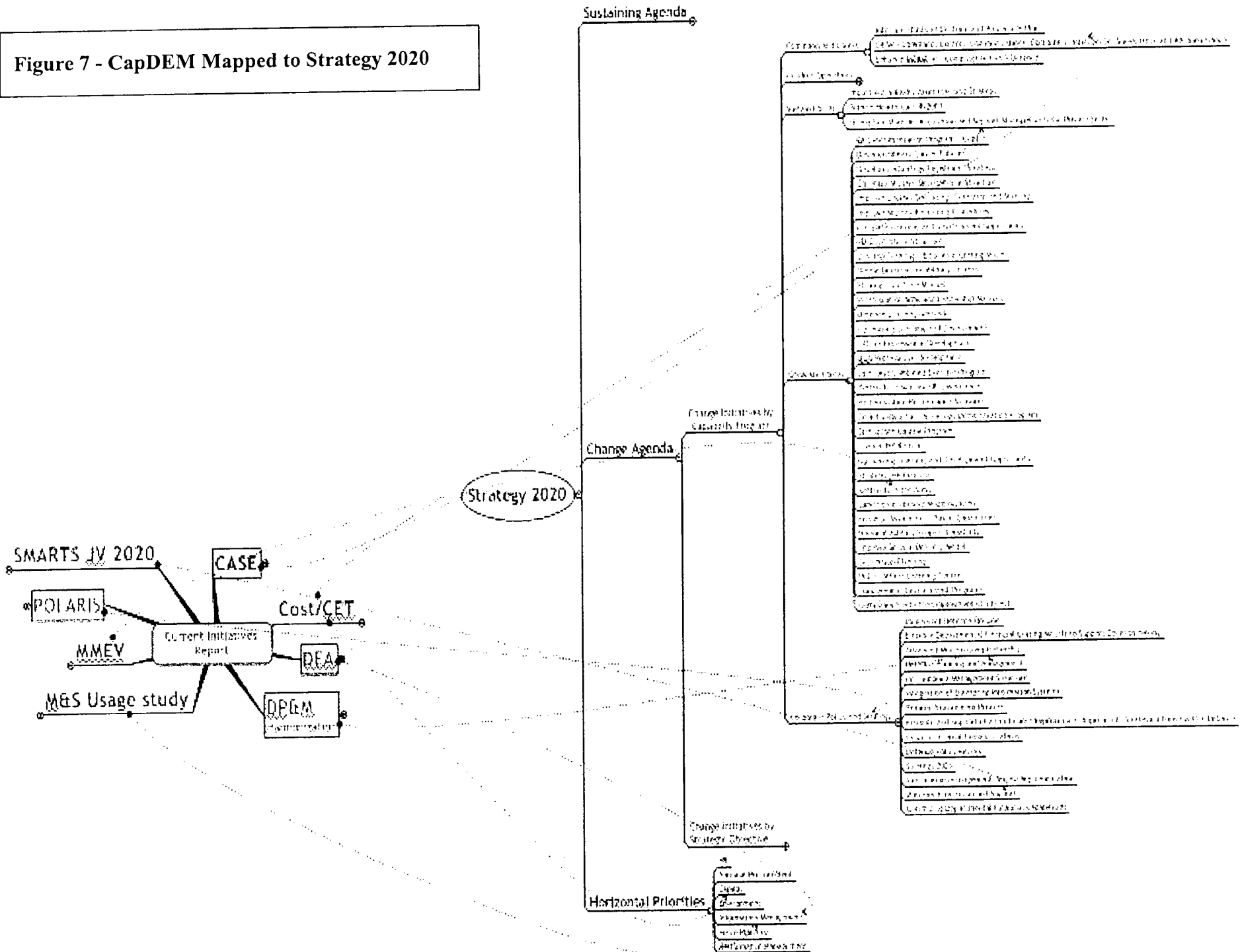
Accordingly, in addition to developing the liaison and commitment linkages with the other on-going initiatives raised above (and those for Cycle II), it would probably be very useful if the CapDEM team could create a methodology, and demonstrate it. This business model, that should include a taxonomy of all of the relevant systems and relationships, could be communicated to all of the other players who may be stakeholders for CapDEMs’ definition and development. The model should demonstrate, to the greatest degree possible, all of the known high-level processes that would animate Collaborative Capability Definition, Engineering and Management, and that would contribute to its evolutionary development.

As outlined at sections 1.4 and 1.5, collaboration and rapid exploitation are the critical elements of a successful Capability Engineering Process. It is highly desirable that information about any relevant initiative be communicated to the CapDEM TDP IPT.

List of Acronyms

BTEP	Business Transformation Enablement Program
CADM	Core Architecture Data Model
CapDEM TDP	Capability Definition Engineering and Management Technology Demonstrator Program
CASE	Canadian Advanced Synthetic Environment
CB	Cost Benefit (Analysis)
CBP	Capability Based Planning
CCB	Configuration Control Board
CEE	Collaborative Engineering Environment
CEP	Capability Engineering Process
CET	Collaborative Engineering Team
CFSTG	Canadian Forces Support Training Group
CID	Capability Initiative Database
CMIS	Corporate Management Information System
DARS	DoD Architecture Repository System
DEA	Defence Enterprise Architecture
DMS	Defence Management System
DODAF	Department of Defense Architecture Framework
DP&M	Defence Planning and Management System
EPA	Effective Project Approval
FEAF	Federal Enterprise Architecture Framework (U.S. Government)
FEAMS	Federal Enterprise Architecture Management System
ISE	Integrated Synthetic Environment
JCIDS	Joint Capabilities Integration and Development System
JCRB	Joint Capability Requirements Board
JCSTC	Joint Command & Staff Training Centre
JV2020	Joint Vision 2020
LTCP(E)	Long Term Capital Plan (Equipment)
MASISCC	Material Acquisition and Support Information System – Complex Contracting
MMEV	Multi-Mission Effects Vehicle
OMB	Office of Management and Budget
PMB	Program Management Board
PMF	Project Management Framework
POLARIS	Planning, Operations, Logistics and Readiness Information System
SBA	Simulation Based Acquisition
SCIP	Strategic Capability Investment Plan
SE	Systems Engineering
SMARTS	Simulation and Modelling in Acquisition, Rehearsal, Training and Support
SRB	Senior Review Board
SOS	System of Systems
SSP	Simulation Support Plan
TBS	Treasury Board Secretariat
TEAF	Treasury Enterprise Architecture Framework (U.S. Treasury)

Figure 7 - CapDEM Mapped to Strategy 2020



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The purpose of this document is to provide the project team with a compendium of initiatives that are currently being undertaken in DND, and that may have relevance for CapDEM. Each of the initiatives is briefly described; the relevance to CapDEM is explained; the methodology and tools they are using is discussed; the points of contact are listed, and the results of their labours to date are enumerated, along with recommendations for how their work could be of use to CapDEM. Finally, the latter two portions of the document compare the initiatives and make suggestions as to how CapDEM might be able to gain leverage from the experiences already achieved by companion efforts. Recommendations are identified for the CapDEM TDP initiative on the potential initiatives that could form the basis for a concentration, from a nascent Capability Engineering Process perspective.

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