National Defence / Défense nationale

Chief Review Services / Chef - Service d'examen

CRS / CS Ex

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Analysis of Information Management Projects

December 2009

7050-46 (CRS)



Canada

Caveat

The analysis conclusions do not have the weight of an audit or formal evaluation. While sufficient to enable the development of recommendations for consideration by management, the assessments provided and conclusions rendered are not based on the rigorous inquiry or evidence required of an audit. Accordingly, this report represented a low level of assurance.

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List of Acronyms

ADM(IM)	Assistant Deputy Minister (Information Management)
CF	Canadian Forces
CID	Capability Investment Database
Civ	Civilian
CMP	Cryptographic Modernization Project
Con	Contractor
COTS	Commercial Off-the-Shelf
C/S	Cost/Schedule
CRS	Chief Review Services
DG	Director General
DGIMPD	Director General Information Management Project Delivery
Dir	Director
DISB	Defence Information Service Broker
DLN	Defence Learning Network
DND	Department of National Defence
DRP	Distribution Resource Planning
EPA	Effective Project Approval
FMS	Foreign Military Sales
FOC	Full Operational Capability
ID	Identification
IM	Information Management
JAG	Judge Advocate General
JCS (Air)	Joint Command System (Air)
LOE	Level of Effort
Mil	Military
MOTS	Military Off-the-Shelf
MSOC	Marine Security Operations Centers
OA	Option Analysis
PAG	Project Approval Guide
PDM	Project Delivery Management

PL	Project Leader
PMO	Project Management Office
PMSC	Protected Military Satellite Communication
PSR	Project Status Reports
SARR	Search and Recue Repeater
SARR FOBIV	SARR Follow-on Project #4
SofS	Surveillance of Space
SRB	Senior Review Board
T&M	Time and Material
VCDS	Vice Chief of the Defence Staff
XENA	Cross-Domain Exchange Network Architecture

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Introduction

Background

At the request of the Assistant Deputy Minister (Information Management) (ADM(IM)), Chief Review Services (CRS) conducted an analysis of information management (IM) projects. This analysis provides management with information to assist in determining which projects would benefit from additional follow-up.

By examining lessons learned and findings from past audits and risk analyses,[1] CRS has developed criteria and a scoring methodology to identify projects that warrant further follow-up. This methodology could be further developed to facilitate a continuous performance monitoring capability of the IM capital program.

Objective

To conduct an analysis of IM capital projects to assist management in determining projects that would benefit from additional follow-up and to assist ADM(IM) in improving project monitoring.

Scope

One hundred IM projects amounting to $8.3 billion extracted from the Capability Investment Database (CID) in December 2008.

Methodology

Source of Data. The main sources of data were as follows:

- CID;
- Director General Information Management Project Delivery (DGIMPD) Project Delivery Management (PDM) Dashboard;
- IM Monthly Project Status Reports (PSR); and
- A CRS survey completed by IM project managers.

[1] Risk Analysis of Capital Projects (http://www.crs-csex.forces.gc.ca/reports-rapports/2007/114P0714-eng.asp), April 2007.

CRS Analysis Process of IM Projects

A three-step process was followed to conduct the analysis on the 100 IM projects listed in the CID. The results of each step are summarized in Table 1. A detailed description of the methodology is provided at Annex A.

Step 1 (100 Projects). Projects in identification (ID) or close-out phase were scoped out, as well as those with a value of less than $5.0 million or where ADM(IM) was not the implementor.

Step 2 (29 Projects). Projects were measured against 13 criteria to determine the 10 IM projects that required further analysis;

1. Project materiality
2. Project phase
3. Project interdependency
4. Project interoperability
5. Effective Project Approval (EPA) and Full Operational Capability (FOC) time gap
6. Milestone
7. Risk assessment
8. Date CID last updated
9. Contracting strategy
10. Sourcing strategy
11. Inclusion in PDM dashboard
12. Lessons identified
13. Senior Review Board (SRB) frequency

Step	Number of Projects	Project Value ($ billions)
Step 1	100	$8.3
Step 2	29	$2.6
Step 3	10	$1.7

Table 1. Risk Analysis Steps.
Of the 100 projects worth $8.3 billion, 10 projects would benefit from further review.

Step 3 (10 Projects). A set of 11 criteria was applied to rank the remaining 10 IM projects in order of follow-up priority; as well, some of the criteria were assessed through a CRS survey administered to project managers:

1. Project amount spent
2. Project Management Office (PMO) position
3. PMO composition
4. Performance risk trend
5. Project leader rank
6. Definition cost link to sourcing/contract strategy
7. Cost/schedule linkage to scope change
8. Business case or cost option analysis
9. Gateway management
10. Independent review and resolution
11. Contract terms of payment

A more detailed description of the criteria in Steps 2 and 3 is provided at Annex B.

Results of CRS Analysis

Step 2 Results. None of the projects received the maximum score of 39 in Step 2.[2] The results ranged from a project high of 29 to a low of 18. Only those 10 projects with a score between 29 and 25 were selected for further analysis. The specific results for Step 2 may be found at Annexes C and D.

The Step 2 score results were compared to the projects listed in the ADM(IM) PDM dashboard. Only two of the top 10 projects, identified by CRS and listed at Annex C, were among these projects requiring attention in the IM PDM dashboard.[3] This difference is due to the qualitative nature of the 14 performance measures in the PDM dashboard versus the quantitative nature of CRS' performance criteria.

Step 3 Results. CRS then applied 11 different criteria to those top 10 projects listed at Annex C to rank them in the order of follow-up priority. With a maximum possible score of 33, the scoring results ranged from a project high of 25 to a low of 18.[4] The specific results of each criterion are provided at Annexes E and F. These 10 projects listed at Annex E would benefit most from further review.

ADM(IM) Project Monitoring and Oversight

IM Project Monitoring. For IM projects that have been assigned project management resources good oversight practices were observed. DGIMPD produced a monthly PDM dashboard that included 38 IM projects of which most were in the implementation phase.[5] The dashboard summarizes the results of applying 14 criteria taken directly from the monthly PSRs.[6] Five of the criteria (scope, time, cost, procurement and business transformation) are given greater weight given their significance in determining the performance status of a project.

The PSR contains valuable project management information that allows for sound project oversight. The following information that is contained in the PSR should also be held in the CID monthly progress report, a Vice Chief of the Defence Staff (VCDS) project reporting system that tracks the capital equipment program:

- Requirements and scope change histories;
- Budget item breakdown, including planned and actual;
- Business transformation deliverables, activities and issues;

[2] The score for each of the 13 criteria in Step 2 ranges from 1 to 3 for a maximum total of 39 as portrayed in Annex D. A threshold of 25 or higher was used for those projects that required further analysis.
[3] The two projects requiring attention in the PDM dashboard were flagged as "warning" or "needing intervention."
[4] The score for each of the 11 criteria in Step 3 also ranges from 1 to 3 as portrayed in Annex F.
[5] DGIMPD PDM Portfolio Dashboard, April 2009.
[6] The monthly PSRs completed by the IM project managers.

- Three types of risk assessments, including project, interdependencies and contribution;
- Human resource assignment, vacancy and issue charts;
- System problem report tracking, including new, outstanding and closed; and
- Senior management commitment issues and in-service readiness deliverables.

As DGIMPD is only responsible for IM projects in the definition and implementation phases, monthly PSRs are not generated for those projects in the ID or option analysis (OA) phase. Therefore, there is a significant number of projects early in their life cycle that are not included in the PDM dashboard, making it difficult to provide oversight of IM projects at all phases. Projects in the ID stage were not in the dashboard. These represent 27 projects with a value amounting to $2.7 billion and 21 projects that were early in the ID stage without a cost estimate. To improve oversight of all IM projects consideration should be given to applying the criteria in Table 2 to those projects in the ID and OA phase.

Criteria	Project Phase	
	ID	OA
Scope	X	X
Time	X	X
Cost	X	X
Project Risks	X	X
Human Resources	X	X
Communications		X
Senior Management Commitment	X	X

Table 2. PSR Criteria. This information should be available for projects in the ID or OA phase for PSRs and inclusion in the IM PDM dashboard.

Performance Measurement. To improve overall performance measurement, several criteria in the PDM dashboard could benefit from quantifiable measures. Of the 14 criteria applied by DGIMPD, 7 criteria could be quantified by applying the following metrics:

- **Time:** Key milestone variance thresholds;
- **Cost:** Planned/actual variance thresholds and Cost Performance Index/Schedule Performance Index;
- **Procurement:** Contract value escalation thresholds;
- **Project Risks:** Provide thresholds of number of risks at each level;
- **Dependency Risks:** Provide thresholds of number of risks at each level;
- **Contribution Risks:** Provide thresholds of number of risks at each level; and
- **Human Resources:** Provide number of human resources in various employment categories (i.e., consultants, military and civilian).

Project Status Report Shortfalls. Certain information contained in the CID monthly progress reports should also be included in the monthly PSRs. The VCDS issued direction in October 2004 for all capital projects to include the information listed below. To avoid the duplication of effort of entering information in two reports, the PSR could simply cross-refer to the CID for the information listed below:

- Lessons learned summary throughout the project life;
- Procurement/sourcing strategy, including contract values and amendments; and
- Industrial and Regional Benefits.

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Annex A—Analysis Methodology

Step 1. Three population attributes (e.g., project phase, materiality and project implementor) were applied to the baseline population of 100 projects worth $8.3 billion that were extracted from the CID as IM-managed projects. The three attributes are as follows (see Figure 1):

- **Project Phase.** Projects in the ID and closed-out phase were scoped out. There were 11 projects in the closed-out phase worth $414 million that were excluded. As only limited information was available for 50 ID phase projects, these projects were also scoped out, i.e.:
  - 29 worth $2.6 billion, and
  - 21 for which a cost estimate was unavailable.[7]

- **Project Materiality.** Projects with a value less than $5 million were not included for the purpose of the analysis due to the relative immateriality of these projects. Four IM projects that amounted to $2.0 million were excluded on this basis.

- **Implementor.** Six projects where ADM(IM) was not the implementor were also scoped out.[8] These projects have an estimated value of $2.6 billion. After scoping out these projects, 29 IM projects worth $2.6 billion remained for further analysis.[9]

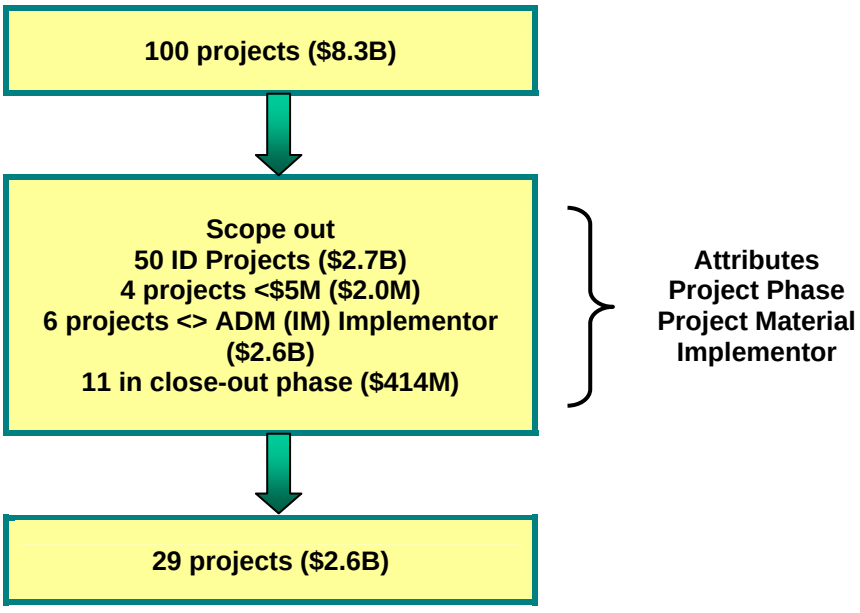

Figure 1. Project Population Baseline. The use of three population attributes reduced the population from 100 projects valued at $8.3 billion to 29 projects worth $2.6 billion.

[7] These are projects with no cost estimate or early in the ID phase.
[8] These six projects were combat systems implemented by Assistant Deputy Minister (Materiel).
[9] This baseline of 29 projects was reconciled with a list compiled by ADM(IM) staff.

Step 2. The application of 13 criteria in this step reduced the population from 29 to 10 projects (see Figure 2). The maximum possible score was 39. Those 10 projects with the highest scores were considered for Step 3 of the analysis. A detailed description of the criteria for Step 2 may be found in Annex B.

Step 3. In this step, 11 criteria were applied, some of which were assessed by way of a CRS survey completed by the project managers. This step sorted the remaining 10 projects for further follow-up (see Figure 2). None of the projects received the highest possible score of 33 for Step 3. A detailed description of the criteria for Step 3 may be found at Annex B.

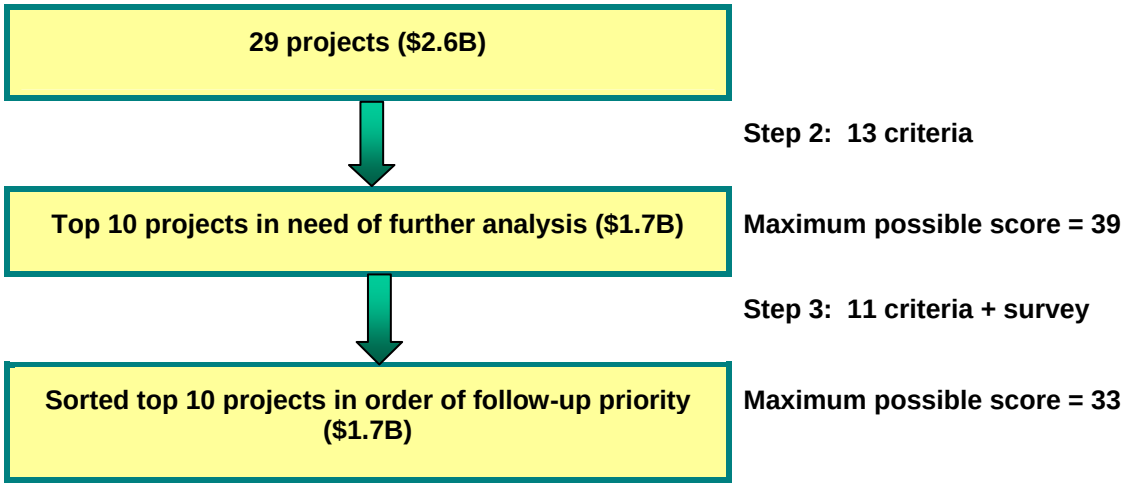

Figure 2. Analysis Steps 2 and 3. Step 2, with 13 criteria, reduced the population from 29 to 10 projects. Step 3, with 11 criteria and a survey completed by project managers, sorted the remaining 10 projects in order of follow-up priority. Note that the maximum possible score for Step 2 was 39 and the maximum score for Step 3 was 33.

Annex B—Step 2 and 3 Criteria Definition

Step 2—13 Criteria Applied to 29 Projects

Project Materiality. Higher-value projects have a greater financial impact on the Department and were scored accordingly. The median IM project value was $27 million.

Project Phase. More weight was given to projects in earlier project phases such as OA and definition. The earlier phases of a project are generally associated with greater uncertainty and risk and were scored accordingly.

Project Interdependency. If interdependent projects fall behind schedule, or have integration issues, it will have an adverse impact on the associated IM capital project. Projects with a higher number of interdependent projects were considered to be higher risk. The average number of project interdependencies was five.

Project Interoperability. Project risk is increased when interoperability is required with either United States or North Atlantic Treaty Organisation allies as interfaces with allied systems or requirements could change during the life of the project. Information systems needed for joint Canadian Forces (CF) operations were also considered higher risk.

EPA and FOC Time Gap. Information technological change occurs very rapidly. If the project implementation time is longer than average, the risk that technology becomes obsolete increases. The average time between EPA and FOC was 41 months.

Milestone Met. Milestone slippage is a strong indicator of the potential for delayed acquisition of a capability and increasing project management costs. Those projects with a low percentage of milestones met as scheduled were considered higher risk. On average, projects had met 67 percent of their milestones.

Risk Assessment. The PMO's overall risk assessment includes both internal and external risk factors to the project. Scoring for this criterion was proportional to the assessed project risk.

Date CID Last Updated. If the CID had not been updated recently, this was one indicator of poor project management. These projects were considered higher risk as the most recent project information is not available to enable sound decision making by senior management. The median time for projects to update the CID was one month.

Contracting Strategy. Developmental projects were considered to be the highest risk and were scored accordingly. In contrast, Military-Off-the-Shelf (MOTS)/Commercial Off-the-Shelf (COTS) products are proven deliverables as long as they are not customized.

Sourcing Strategy. Sole-source procurement can result in higher costs to the Department, not only during acquisition but throughout the IM system life cycle support. Projects with competitively tendered contracts were considered lower risk.

Inclusion in PDM Dashboard. Projects which are included in the PDM dashboard will benefit from the shared resources and management oversight. Those projects not in the PDM dashboard were given a higher-risk score.

Lessons Identified. Lessons learned benefit other projects in the identification of project risk. Since October 2004, it was mandatory for all capital projects to enter lessons learned in the CID.[10] As there are more lessons learned in later stages of a project, this was taken into consideration in the scoring.

SRB Frequency. Projects should be providing accurate information for senior management decision-making in a timely manner. As per the Project Approval Guide (PAG), SRB frequency should be at least once per year. Projects had an SRB frequency median of 14 months.

Step 3—11 Criteria Applied to 10 Projects to Rank in Order of Follow-Up Priority

Project Amount Spent. The scoring for this criterion was higher for the projects with a larger amount of unspent funds. An audit or review of a project early in its life had more potential for improvement. On average the projects had spent 23 percent of the total project value.

PMO Positions. Projects with less than the median staffing levels were considered more risky as there may be insufficient human resources to provide appropriate oversight. The median project office vacancy rate was 19 percent.

PMO Composition. A high proportion of military positions or consultants introduce the risk of staff turnover, employer-employee relationships and lack of knowledge transfer. The median composition of the project offices were 16 percent military, 34 percent Department of National Defence (DND) civilian and 41 percent consultants.

[10] 3136-1 (DICPPC 6-2) 25 October 2004.

ANNEX B

Performance Risk Trend. An increase in the project's performance risk over the life of the project could translate into schedule, technical or cost issues that may be attributed to an overly optimistic original risk assessment. A one-year trend was examined to determine if performance had declined or improved and was scored accordingly.

Project Leader Rank. Under-ranked project leaders for higher-risk projects may not have experience levels to provide adequate oversight. In contrast, over-ranked project leaders for low-risk projects may result in excess workload by senior managers. Scoring was based on the appropriate rank of the project leader in relation to project risk and value.

Definition Cost Link to Sourcing/Contract Strategy. Low definition phase costs could lead to higher risks in competitively tendered and developmental projects. On the other hand, high definition costs for sole-source COTS/MOTS deliverables could demonstrate poor value for money in the definition phase. Projects with significantly higher or lower than average definition costs in relation to the sourcing/contracting strategy were given a higher score.

Cost/Schedule Linkage to Scope Change. Cost or schedule changes should be a result of scope changes. A project cost increase with no associated scope increase indicates less value for money. Likewise, schedule slippage with no scope change indicates that the product may be delivered late. To accommodate this delay, the Department may have to take on additional project management costs as well as incremental costs for an interim combat capability. Projects with increases in cost and schedule slippage with no scope change were considered higher risk.

Business Case or Cost Option Analysis. Within a business case, the benefits of related options should be quantified. When a quantified analysis is completed, it is more likely that the best option will be chosen. Cost option analysis is mandatory in the project OA phase.[11] Projects without a business case or cost OA were considered higher risk.

Gateway Management. For IM capital projects, it is suggested by the PAG[12] that this approach should be considered for higher-risk projects or when the project implementor cannot commit to the final end product as a result of rapidly changing technology issues. Projects with gated criteria for funding of separate phases were considered lower risk.

[11] Project Approval Guide, Chapter 4, 4-38.
[12] Project Approval Guide, Chapter 2, 2-22.

ANNEX B

Independent Review and Resolution. Independent reviews are conducted to ensure the overall health of the project is adequate and appropriate. Higher risk was attributed to those projects without an independent review or those projects that had yet to resolve issues that were raised in a review.

Contract Terms of Payment. Cost plus, time and material terms of payment are higher risk than firm fixed prices or actual prices. Projects with higher-risk terms of payment were scored accordingly.

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Annex C—Step 2 Analysis Results (29 IM Projects)

Project #	Phase	Score	Project Title	Project Value
00000806	Definition	29	Marine Security Operations Centres (MSOC)	.....
00003667	Implementation	28	Surveillance of Space (SofS)	.....
00002398	Implementation	27	Joint Command System (Air) (JCS (Air))	.....
00000749	Definition	25	Cryptographic Modernization Project (CMP)	.....
00000789	OA	26	Cross-domain Exchange Network Architecture (XENA)	.....
00000551	Implementation	26	SARSAT SARR Follow-On Project #4 (SARR FOPIV)	.....
00000224	Implementation	25	Defence Information Services Broker (DISB)	.....
00002803	Implementation	25	Protected Military Satellite Communication (PMSC)	.....
00000788	Definition	25	Defence Learning Network (DLN)	.....
00000761	Implementation	25	Distribution Resource Planning (DRP)	.....
00000624	Definition	24	Joint Information and Intelligence Fusion Capability	.....
00000098	OA	24	IT Service Management	.....
00001407	Definition	24	Secure Mobile Environment—Portable Electronic Device	.....
00001102	OA	24	Enterprise Identity Management Services Infrastructure	.....
00001229	OA	24	Collaborative Operations Planning System	.....
00001073	OA	23	Enterprise Information Security Environment	.....
00002802	Implementation	23	UHF Military Satellite Communications Terminals	.....
00001095	Implementation	23	Cryptographic Modernization Link Encryption	.....
00001200	OA	22	CF Weather and Oceanographic Service	.....
00000079	Implementation	23	Search and Rescue Repeater Redesign (SARR 2000)	.....
00000177	Implementation	23	Defence Enterprise Server Upgrade	.....

ANNEX C

Project #	Phase	Score	Project Title	Project Value
00000758	Implementation	23	JAG Comprehensive Information Management Project	.....
00002272	Implementation	22	Materiel Acquisition and Support Information System	.....
00000625	Implementation	22	Polar Epsilon Joint Space-Based Wide Area Surveillance	.....
00002768	Implementation	22	Integrated Information Environment Directory Services	.....
00000438	Implementation	21	Joint Space Support Project	.....
00002800	Implementation	20	Canadian Forces Health Information System	.....
00000074	Implementation	20	Air Force Integrated Information and Learning Environment	.....
00000775	Implementation	19	Cryptographic Modernization Project Secure Voice	.....

Table 3. Step 2 Results. The maximum possible score was 39.

Annex D—Step 2 Analysis Criteria Scoring

Ser	Criteria	Range	Score	Numbers of Projects
1	Project Materiality	<= $30M	1	16
		>= $30M and <= $100M	2	8
		>$100M	3	5
2	Project Phase	Implementation	1	19
		Definition	2	4
		OA	3	6
3	Project Interdependency	<3 projects	1	6
		>= 3 and<= 9 projects	2	13
		>9 projects	3	10
4	Project Interoperability	Stand Alone	1	8
		Joint	2	10
		Allied	3	11
5	EPA and FOC Time Gap	<= 32 months	1	9
		Between 32 and 52 months	2	9
		>52 months	3	11
6	Milestone Met	>85% met	1	9
		Between 49% and 85% met	2	11
		<49% met	3	9
7	Risk Assessment	Low risk	1	10
		Medium risk	2	17
		High risk	3	2
8	Date CID last updated	<= 1 month	1	18
		Between 1 and 3 months	2	6
		>3 months	3	5
9	Contracting Strategy	Foreign Military Sales (FMS)	1	3
		Competitive or N/A	2	18
		Sole Source	3	8
10	Sourcing Strategy	MOTS/COTS	1	13
		MOTS/Development/Others	2	12
		Modified COTS Development	3	4
11	Inclusion in PDM Dashboard	Yes	1	27
		No	3	2

ANNEX D

Ser	Criteria	Range	Score	Numbers of Projects
12	Lessons Identified	Yes for project in OA phase, lesson learned for definition and implementation phase	1	15
		No for project in OA phase, lesson learned for definition and implementation phase	3	14
13	SRB Frequency	<= 12 months	1	11
		>12 months and <= 18 months	2	8
		>18 months	3	10

Table 4. Step 2 Criteria Scoring. The maximum possible score was 3 per criteria—a total of 39. The minimum score is 13. The three highlighted serials (5, 11 and 12) had different criteria from the CRS Risk Analysis of Capital Projects.

Annex E—Step 3 Analysis Results (Top 10 IM Projects)

Ser	Project #	Project Acronym	Project Value	Spent (Vote 5)	Project Phase	Total Score
1	789	XENA	.....	0%	OA	25
2	2803	PMSC	.....	62%	Implementation	25
3	551	SARR FOPIV	.....	4%	Implementation	24
4	2398	JCS (Air)	.....	52%	Implementation	23
5	806	MSOC	.....	12%	Definition	22
6	761	DRP	.....	53%	Implementation	22
7	3667	SofS	.....	34%	Implementation	19
8	749	CMP	.....	6%	Definition	19
9	788	DLN	.....	11%	Definition	19
10	224	DISB	.....	82%	Implementation	18

Table 5. Step 3 Results. The maximum possible score was 3 per criteria—a total of 33. The highlighted serials (5 and 8) were the only two projects in the DGIMPD PDM dashboard that have inferior performance due to the qualitative nature of the dashboard criteria.

Annex F—Step 3 Analysis Criteria Scoring

Ser	Criteria	Range	Score	Numbers of Projects
1	Project Spent	>75% of project value	1	1
		>25% and <= 75% of project value	2	4
		<25% of project value	3	5
2	PMO Positions Filled	>85%	1	4
		>75% and <= 85%	2	3
		<85%	3	3
3	Military (Mil), Civilian (Civ) and Contractor (Con) Ratio	Mil >= 20% & Civ >= 40% & Con <40% PMO positions	1	3
		10% <Mil <20% & 20% <Civ >40% & 40% <Con <60% PMO positions	2	5
		Mil <10% & Civ <20% & Con >60% PMO positions	3	2
4	Performance Risk Trend	Risk mitigated	1	4
		Same	2	5
		Increase in risk	3	1
5	Project Leader Rank (Risk Based)	Appropriate Dir PL low risk <$100M or DG PL medium risk <$100M	1	6
		Over-ranked DG PL low risk <$100M	2	2
		Under-ranked Dir PL medium risk <$100M or DG PL medium risk >$100M	3	2
6	Definition cost link to sourcing/contract strategy	Def >11% Competitive, Development or 7% <Def <11% Sole Source, Development or Def <7% FMS/MOTS/COTS	1	4
		Def >11% Sole Source, MOTS/COTS; Others; Competitive	2	5
		Def <7% Development, Competitive, MOTS/COTS	3	1
7	Business case or cost OA	Sound business case with metrics	1	2
		Business case without metrics	2	1
		No business case	3	7
8	Cost/Schedule change linkage to scope	C/S change links to scope	1	3
		C/S no change, scope decrease–capability loss	2	1
		C/S change, no scope change	3	6
9	Gateway management linkage to risk level	Funded gates with high risk or no funded gates with low risk	1	6
		No funded gates with medium risk	2	4
		No funded gates with high risk	3	0
10	Independent Review and Resolution	3rd party review and resolved	1	2
		Review within DND and resolved	2	2
		No review	3	6

ANNEX F

Ser	Criteria	Range	Score	Numbers of Projects
11	Contract terms of payment	Fixed price/Milestone	1	5
		Ceiling award fee / ceiling price	2	2
		Per diem rate (T&M)/LOE /cost plus	3	3

Table 6. Step 3 Criteria Scoring. The highest possible score was 3 per project—a total of 33. Serials 2, 3, 7, 8, 9 10 and 11 were done by a survey of project managers. Serial 4, 5, 7, 9 10, 11 were different criteria from the 2007 CRS Risk Analysis of Capital Projects.