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AGILE PRACTICES IN THE MANAGEMENT OF DND CIS PROJECTS

INTRODUCTION

Canada's Department of National Defense established a new investment plan in 2018 to achieve the vision of Canada's defense policy. This new policy will modernize and position the Canadian Armed Forces (CAF) to simultaneously execute the various core missions defined in the new policy. Defense modernization involves the completion of over 200 projects of more than \$5 million for a total of \$164 billion in investment over a 20-year period.¹ Transformational changes in DND/CAF is often achieved through large projects that are often prioritized and funded to address critical issues. Since Information Technology (IT) is an enabler to increased productivity, these approved projects generally involve technology modernization to achieve the institutional business objectives. Due to their CIS components, these large projects are at greater risk of exceeding the established timelines. It is not uncommon at DND/CAF for a project to last over ten years from the identification phase to the closure phase. Unlike infrastructure projects, information technology projects are more sensitive to the time factor. In the field of information technology, a period of ten years is an eternity. During the last ten years, hosting services have evolved from dedicated physical infrastructure to hyper-virtualization and cloud computing, software has evolved from desktop to Software as a Service (SaaS) and mobile services have evolved from 3G to 5G increasing the required bandwidth dramatically. Due to these rapid changes and the projects timeframe at DND/CAF, there is an important risk to the relevance of the content delivered. In the field of CIS in general, the lack of clear objectives as well as a poor evaluation of technologies may

¹ Canada, Department of National Defence, "Defence Investment Plan 2018," accessed 23 April 2022, <https://www.canada.ca/content/dam/dnd-mdn/documents/reports/2018/defence-investment-plan-fra.pdf>.

result in the cancellation or delay of projects.² An example of this effect is the delivery of the CAF Joint Battlespace Management Capability (JBMC) system initiated in 2002 and completed in 2019 at a cost of \$62 millions.³ The project delivered in 2019 a product with requirement revised in 2009. The final product automated integration activities but failed to fully automate the fusion of information. Major IT or CIS transformation projects such as JBMC aim to replace systems that have been outdated for a long time and involve major changes to business processes and technologies. In this context, the definition of deliverables a decade prior the implementation of the “Full Operational Capability” may result in the delivery of irrelevant content to the end user.

Project management within the federal government is strictly governed by the policies established by the Treasury Board Secretary (TBS) to ensure the proper management of public funds. However, it is important to explore possible improvements to current processes within the constraints imposed by the TBS. This paper propose the introduction of Agile practices in the management of CIS projects at DND to improve the relevance of content delivered by the projects. The first section introduces the concept of Agile project management, its principles and practices. The second section presents the justifications to integrate Agile practices specifically to the management of DND CIS project. The third section will expose CIS project risk factors and how Agile practices can mitigate those risks to improve the relevance of content. Finally, the last section will

² Kweku Ewusi-Mensah, "Critical Issues in Abandoned Information Systems Development Projects," *Communications of the ACM* 40, no. 9 (1997), 75.

³ Canada, Department of National Defence, “JBMC: Project Completion Report,” Project – c.000624, Capability Investment Database (DWAN).

demonstrate how Agile practices can contribute to success factors and improve DND CIS content delivery.

AGILE PROJECT MANAGEMENT

The Agile Manifesto

Traditional project management follows a linear process that requires pre-defined deliverables. The project plan is generally revised on the basis of performance results at milestone reviews. This method of project management was not efficient in the field of software development. At the end of the 90s during an era of transition between procedural and object-oriented languages, the scale of the software codes made the planning of software projects an impossible task. The Agile Manifesto was therefore written in 2001 to optimize software development projects. The Agile Manifesto is based on 4 values: individuals and interactions before processes and tools; working software before full documentation; collaboration with the client before contract negotiation; and reacting to change instead of sticking to the plan.⁴ In order to put these values into practice, the manifesto promotes 12 principles:

1. “Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

⁴ Kent Beck et al., "Manifesto for Agile Software Development," (2001).

4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.”⁵

Established at first in response to the emergence of increasingly complex software development, the adoption of the Agile method has been extended to other fields. Some aspects of the Agile method are especially implemented for innovation projects where

⁵ Ibid.

traditional project management practices are not appropriate.⁶ Traditional project management applied to innovation projects can lead to downstream issues, including the reimplementation of some of the work, customer dissatisfaction, and the possibility that an advanced project is outdated in relation to technological advancements. A quantitative study has shown that projects that adopt Agile method practices have a higher rate of success and efficiency compared to traditional project management.⁷ It is also important to note that Agile project management combined with an Agile corporate culture tends to positively influence the success of a CIS project team.⁸

Agile methods are increasingly used in the CIS sector because of their benefits in enabling a project team to react to unpredictable and changing requirements in this field. However, according to the some studies, the results of success and failure of CIS projects are not consistent and require a diligent approach on how to properly apply Agile methodologies.⁹ There is therefore not only an Agile method, but Agile methods or practices of Agile methodologies since it is possible to select the circumstances and activities that are conducive to these practices.

Practices of the Agile Methodology

The first fundamental practice of the Agile method is the sharing of the “vision”. This differs from the traditional project definition method which outlines the purpose and scope at the beginning of the project. This concept enables the project team to always

⁶ Edivandro C. Conforto et al., "Can Agile Project Management be Adopted by Industries Other than Software Development?" *Project Management Journal* 45, no. 3 (2014), 27.

⁷ Pedro Serrador and P. K. Jeffrey, "Does Agile work?—A quantitative analysis of agile project success." *International journal of project management* 33, no. 5 (2015): 1047.

⁸ Dothang Truong and Thawatchai Jitbaipoon, "How can Agile Methodologies be used to Enhance the Success of Information Technology Projects?" *International Journal of Information Technology Project Management (IJITPM)* 7, no. 2 (2016), 12.

⁹ Ibid, 11.

focus on the value brought to the organization. The concept of "vision" requires the use of visual tools, which leads to another practice of the Agile method, the use of planning tools and simple communication processes. This allows for a high degree of interaction between team members and active collaboration with clients and project stakeholders. The team can focus on the fundamental problems and the challenges that it will have to face during the project. This practice enable the team to clearly identify the key aspects of the project that bring value to the organization.

The Agile methodology is well known for its iterative planning instead of horizontal planning. Iterative planning repeats the planning cycle several times during the project life. Iterative development allows rapid and continuous delivery of parts of the final product. This method also allows for continuous end user feedback to respond to changing requirements, needs, risks and new technologies.

Iterative planning also requires the involvement of the project team members in the planning and control of activities. This self-management involves that team members are responsible to develop the project plan and participate to the monitoring activities. Participation in project planning and control helps improve interaction and effective communication among project team members. This commitment also allows the professional development of members and their ability to adapt to a complex project environment.

Finally, in iterative planning, project plan activities are updated more frequently. In this practice, the plan should be updated at the end of each iteration unlike traditional project management where the plan is often only revised after a milestone or after the conclusion of a phase.

Table 1 -- Project Management Practices Using Agile Methods

Agile Practices
Product vision
Simple planning and communication tools
Iterative planning
Self-management of teams in defining the project plan and developing
Self-management of teams in monitoring the plan and updating activities
Monitoring of the plan and updating of activities at each iteration
Iterative implementation
Close collaboration with the end user

Source: Edivandro C. Conforto et al, “Can Agile Project Management Be Adopted by Industries Other than Software Development?,” *Project Management Journal*, 45 (3), 27.

Table 1 summarizes these 6 practices used for innovation projects in various sectors

where we have added two other practices that are inherent to the Agile method: iterative implementation; and close collaboration with the end user.

DND CIS PROJECT ENVIRONEMENT

Projects in the public institutions

Bureaucracy, incompetence and lack of accountability are often the identified causes for the lack of efficiency in public institutions.¹⁰ In 2018, the average completion time of a DND project from the identification phase to the closure phase was 16 years.¹¹ The Treasury Board Secretary and DND have invested efforts to review the policies in order to streamline processes while increasing accountability. An elaborate governance structure and project approval directives exist within the department to promote the success of projects. Despite these rigorous policies and governance, a study in 2015 has

¹⁰ Hachimi Sanni Yaya and Hachimi Sanni, *Rationalité Politique Et Management De La Complexité: Essai D'Un Modèle Explicatif De L'Inefficiency Des Entreprises Publiques* (Faculté des sciences de l'administration de l'Université Laval, 2003), 23.

¹¹ M. Mitchell, “We cannot solve our problems with the same thinking we used when we created them: A new approach to identification and options analysis for DND projects” (Master of Defence Studies Thesis, Canadian Forces College, 2018), 4.

revealed that 63% of projects are delivered with delays.¹² The proliferation of processes and project documentation was noted as a concern.¹³ Given DND's ambitious new investment plan, DND's Project Approval Directive (PAD)¹⁴ was updated in 2019 following streamlining recommendations from independent studies. The policy changes aim to strike a balance between processes that ensure the proper management of public funds and processes that enable effective project management. This new project directive is also consistent with the Treasury Board's update of its investment planning and management policy¹⁵ and in line with the directive on the management of projects and programmes¹⁶, both released in 2019. This demonstrates the willingness to resolve the issues related to the success of the projects within the government and at DND.

CIS Projects in public institutions

In the public sector, information and communication systems projects are seen as catalysts for transformational change. However, the majority of information system developments result in project cancellation¹⁷ and the failure rate is around 50%.^{18,19,20} These projects are often of great complexity increasing the levels of risks and

¹² Canadian Global Affairs Institute, "2015 Status Report on Major Defence Equipment Procurements," accessed 23 April 2022, https://www.cgai.ca/2015_status_report_on_major_defence_equipment_procurements.

¹³ Ibid.

¹⁴ Canada, Department of National Defence. "Project Approval Directive," V 1.1, 2019.

¹⁵ Canada, "Policy on the Planning and Management of Investments," accessed 21 April 2022, <https://www.tbs-sct.canada.ca/pol/doc-eng.aspx?id=32593§ion=html>.

¹⁶ Canada, "Directive on the Management of Projects and Programmes," accessed 21 April 2022, <https://www.tbs-sct.canada.ca/pol/doc-eng.aspx?id=32594§ion=html>.

¹⁷ Shaun Goldfinch, "Pessimism, Computer Failure, and Information Systems Development in the Public Sector," *Public Administration Review* 67, no. 5 (2007), 917.

¹⁸ M. S. Sandeep and M. N. Ravishankar, "The Continuity of Underperforming ICT Projects in the Public Sector," *Information & Management* 51, no. 6 (2014), 700.

¹⁹ David Rubinstein, "Standish Group Report: There's Less Development Chaos Today," *Software Development Times* 1 (2007), 1.

²⁰ K. El Emam and A. G. Koru, "A Replicated Survey of IT Software Project Failures," *IEEE Software* 25, no. 5 (2008), 88.

uncertainties. The organizational culture of public service has also a greater tolerance for projects with uncertain results.²¹ In the Canadian federal government, there are many examples of failed CIS projects. Shared Service Canada (SSC) commissioned Bell Canada and CGI in 2013 to implement a single email system for the 43 federal government organizations and these 550,000 user accounts.²² This project was to be completed by 31 March 2015 at the cost of \$82 million and result in annual savings of \$56 million.²³ After more than \$100 million and nine years since the mandate was announced, the project has stalled with several major departments still not migrated to this new service. SSC, Bell Canada and CGI all underestimated the complexity and scope of existing systems. Another widely publicized example is the implementation of the new Phoenix payroll system by Public Services and Procurement Canada. What began with a \$5.7 million tender award to IBM in 2011 to modernize the federal payroll system has incurred \$1.2 billion in expenditures and is estimated that 2.2 billion in total expenditure will be necessary to correct the current issues.²⁴

Governance of DND CIS Projects

The diagram of Figure 1 illustrate DND's project matrix a subset of the overall project governance structure. The project sponsor represents the Level 1 organization that owns the requirements and for which the project product or service will be delivered. The

²¹ Sandeep, "The Continuity of Underperforming ICT Projects in the Public Sector," , 710

²² Canada, Shared Services Canada, "Email Transformation Initiative," accessed 23 April 2022, <https://www.canada.ca/en/shared-services/corporate/transparency/access-information-privacy/publications/privacy-impact-assessments-summary-email-transformation-initiative.html>.

²³ Canada, Office of the Auditor General of Canada, "2015 Fall Reports of the Auditor General of Canada – Report – Information Technology Shared Services," accessed 23 April 2022, https://www.oag-bvg.gc.ca/internet/English/parl_oag_201602_04_e_41061.html.

²⁴ Canada, Canada Senate, "The Phoenix pay problem – Working toward a solution," accessed 23 April 2022, https://sencanada.ca/content/sen/committee/421/NFFN/Reports/NFFN_Phoenix_Report_32_WEB_e.pdf.

sponsor designates a project director who ensures that the operational requirements are established. The project director acts as the functional authority throughout the project and will seek the approval of the sponsor for any decision affecting the costs or capacities delivered. The project director is the one who prepares and submits the project approval documents as well as the high level mandatory requirements.

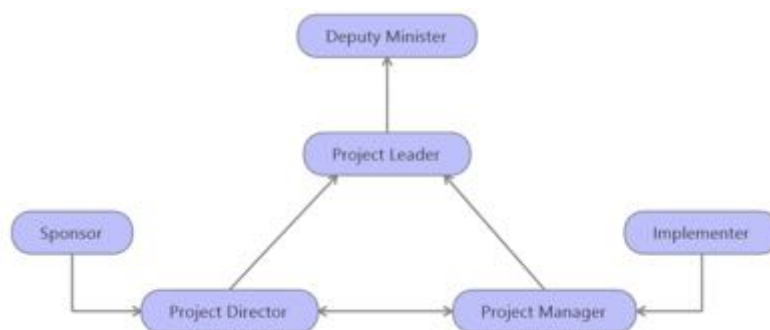


Figure 1: DND's Project Matrix.

Source: Canada, Department of National Defence, "Project Approval Course," Chief of Programme, Jan 2020, 22.

To the right of the diagram at Figure 1 we find the implementer, the organization carrying out the project. For the CIS projects, this level 1 organization will be the Assistant Deputy Minister (Information Management) (ADM(IM)). The ADM(IM) group responsible for communication systems at DND is comprised of 3,339 personnel with 1,823 public servants and 1,516 military members²⁵ with the majority located in the National Capital Region (NCR). The implementer will appoint a project manager within its level 2 organization of the Director General Information Management Project Delivery (DGIMPD). The project manager will be responsible for managing all activities of the

²⁵ Canada, Ministerial Transition Material: Department of National Defence, March 2020, accessed 20 April 2022, <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/transition-materials/defence-101/2020/03/defence-101/adm-im.html>.

project team including costs, timelines and definition of requirements while remaining aligned with the high level mandatory requirements defined by the project director. The project manager and project director will present the status of the project to stakeholders and the project leader on a quarterly basis at the Senior Review Board (SRB) meetings. The frequency of these project governance meetings may be more frequent in accordance with the complexity of the project. Large IT projects are often assessed as high risk in the project approval process and subject to additional monitoring and approvals. From the beginning of the project, a plan of the project checkpoints must be drawn up with the decisions that will have to be made at each of these checkpoints. The project leader will make the decisions in case of disagreement between the stakeholders or between the project manager and the project director. The project leader is also the person responsible and accountable for the project to the “deputy minister for the successful delivery of the SOR within budget and on schedule”.²⁶

Constraints of the CIS project environment at DND

The DND/CAF IT environment is unique and cannot be easily compared to other public or private organizations. This uniqueness is due to the very nature of the DND/CAF mandate, the interoperability requirements, the classifications of the various environments and the requirement to deploy some of these capabilities. It is relevant to expose some of the specificities of DND CIS systems to understand the challenges of the stakeholders.

As DGIMPD is responsible for most CIS project implementation, other ADM(IM) units are responsible for the Operation and Maintenance (O&M) of the delivered systems.

²⁶ Canada, Department of National Defence, “Project Approval Course,” Chief of Programme, Jan 2020, 17.

ADM(IM) supports at least 37 national DND CIS networks²⁷ which in turn include thousands of users, workstations and hundreds of servers for each of these networks. This illustrates the complexity of supporting DND CIS with DND accounting for about 85% of the government classified footprint (based on cryptographic distribution). The vast majority of public or private organization only have one or two networks to support. Within DND, each one of these 37 networks may be virtually or physically separated with standards and security policies specific to each network. This context further complicates the collection of information for each project that aim to increase the interoperability with most systems. The CAF has a mandate to work with civilian authorities, NORAD, NATO, UN, United States and our other allies. The coordination of activities at the strategic, operational and tactical level to enable Command and Control (C2) translate directly into complex interoperability requirements. The interoperability of the various communication systems (computers, telephones, satellites, radios, etc...) between the elements is critical to the support of operations from the Unclassified to the Top Secret level. The current CIS capabilities have sometimes been delivered by projects and sometimes evolved organically to respond to urgent operational requirements. ADM(IM) support units have filled the gaps between capabilities with O&M resources or with minor projects. This organic growth performed by supporting organizations have sometimes not been documented to the standard of a major capital project. Other times, the organic growth took place in isolation without complying with institutional standards. Finally, the

²⁷ Canada, Department of National Defence, "DND/CAF Communication and Information Systems (CIS) Authority Assignments," Strategic Joint Staff, Nov 2017.

technical knowledge of these systems are often contained within a sub-unit documentation or rely on the corporate knowledge of the members of these sub-units.

We also observe personnel constraints affecting the DND CIS project environment. For the last decade, the public service has not been in a position to attract the most qualified CIS personnel. The digital transformation that has been taking place for the last 20 years had the effect of attracting the qualified talent to the private industry. In this context of labour shortage and DND establishment limitations, it is not feasible to assemble a project team without contracting professional services. While contractors allow the sourcing of specifically qualified personnel for each project, the contracting and the security clearance process can take up to 24 months. In addition, public servants labour mobility and military members posting cycles contributes to the lack of continuity. These specific internal and external environmental constraints directly affects DND CIS projects. The combination of lack of qualified labour, delays in contracting, delays in security clearance and the high turnover rate of permanent employees while evolving in a highly complex information system environment is affecting the success of DND CIS projects.

As described in this section, it is important to acknowledge the lower success rate of projects in public administrations, lower success rate of CIS projects, the highly complex DND CIS environment and the unique labour challenges. These conditions justify the use of distinct project management practices for DND CIS projects and the Agile method has been developed to address similar challenges.

RISK FACTORS OF CIS PROJECTS

In general, project failures are due to: the ambiguous definition of the project; poor decision making; inadequate coordination; inadequate communication; and lack of stakeholder engagement.²⁸ Several studies have been conducted to look more specifically into the factors influencing the failures of CIS projects. An early study of the public sector's CIS project failures categorized eight different risk factors²⁹ as listed in Table 2.

Table 2 -- Failure factors of CIS projects

Factor	Description
Information	Information and data inadequacies
Technical	Problems with IT such as incompatibility across agencies
People	Lack of staff with sufficient training, skills or inclination to handle or
Management	Lack of management skills, knowledge and training
Process	Processes are inadequate to integrate community or channel relevant
Cultural	Clashes with national/local culture
Structural	Information system clashes with organizational and/or management
Strategic	Information system coordinated across different agencies or divisions
Political	Political infighting derails projects
Environmental	Factors outside the organization disrupt project

Source: Shaun Goldfinch, "Pessimism, Computer Failure, and Information Systems Development in the Public Sector," *Public Administration Review* 67, no. 5 (2007), 919.

Strategic, structural, technical, information, people and process factors are intrinsic to the field of CIS. Indeed, the constant digitization of all aspects of work generates the need to make organizational and process changes. These changes often involve multiple sub-organizations and can create structural and strategic issues when uncoordinated. The problems related to the collection of information are found in two of the factors, namely "information" which highlights the lack of data and "process" which concerns the inadequate mechanisms to collect this information. Secondly, the lack of

²⁸ Larson, Erik W., & C.F. Gray, *Management de projet (2e éd.)* (Montréal : Chenelière/McGraw-Hill, 2013), 535.

²⁹ Richard Heeks and Subhash Bhatnagar, "Understanding Success and Failure in Information Age," in *Reinventing the Government in the Information Age*, 1999), 50.

skilled computer workers, given the demand for these skills in the market, is a constant problem. Finally, because of the interconnectivity of networks, any change in technology can also lead to interoperability issues between systems within the organization or with external partners. The projects in the field of CIS contains an inherently higher risks than traditional projects due to their complexity, uncertainty and the existence of numerous evolving standards. Another study of major Greek public service CIS projects assessed 21 risk factors.³⁰ From this study we can extract the following risk factors that have over 30% of relative frequencies in the CIS projects assessed: “Vague project implementation plan”, “Problematic - obsolete technical specifications”, “Insufficient IS personnel”, “Vague project scope”, “An inappropriate project team and insufficient user involvement”, “A lack of interoperability with existing or under development IS infrastructure”, and “A lack of process & organizational structure design – lack of proper change management”. These risk factors have also been identified in other studies in the literature and we can observe a convergence towards the same risk factors.^{31,32}

These risk factors are the same that are impeding DND’s CIS projects today. IT is important to highlight that DND performs very little in-house CIS development and the majority of projects consist of the integration and configuration of various commercial technologies offered by large companies. Some projects also depend on technologies from the US military-industrial complex such as Thales, General Dynamics or Lockheed

³⁰ Euripidis Loukis and Yannis Charalabidis, "Why do E-Government Projects Fail? Risk Factors of Large Information Systems Projects in the Greek Public Sector: An International Comparison," in *E-Government Services Design, Adoption, and Evaluation* (IGI Global, 2013), 66.

³¹ Roy Schmidt et al., "Identifying Software Project Risks: An International Delphi Study," *Journal of Management Information Systems* 17, no. 4 (2001), 15.

³² Hazel Taylor, Edward Artman and Jill Palzkill Woelfer, "Information Technology Project Risk Management: Bridging the Gap between Research and Practice," *Journal of Information Technology* 27, no. 1 (2012), 23.

Martin. Canada is privileged to have access to the majority of restricted access American military products. In this context, it sometimes happens that the project manager selects the technology deployed in advance, especially when the needs identified include interoperability with our allies. This need is based on the processing time of the various requests to have access to the technology and the implementation of acquisition contracts. In these cases where the technology used is already defined, the project manager's group is still responsible for the relevance of the implementation, which includes the integration, configuration, training and support of the implemented solution.

The challenge is to integrate Agile method practices into existing processes to mitigate or eliminate some of these risks. To address the risk factors of “Problematic - obsolete technical specifications” and “Vague project scope” it is possible to leverage the new Treasury Board directives on the management of projects and programmes that mandates the development and maintenance of a benefits realization plan. In Agile terminology, this is about sharing the “vision”. The enforcement of this practice will maintain the vision of the product, mitigate political and strategic failure factors and contribute to meeting the strategic objectives. Maintaining this plan over the life of the project despite the changes in requirements and technology will ensure the validity of deliverables. This benefits realization plan should include a mechanism for measuring the benefits or added value of the project at its closure as well.

The size and complexity of DND CIS project amplifies the risk of a “Vague project implementation plan” and a “A lack of interoperability with existing or under development IS infrastructure”. These two risks can be eliminated again with an Agile iterative implementation while involving the end user and maintaining a flexible approach

to deliver value to the organisation. As large IT projects are often identified as high risk they are subjects to more scrutiny and approval of changes. These additional constraints limit projects managers on the modifications of elements of projects that require a high level of approval and could potentially add additional delays or jeopardize the project. This is the Agile value of “reacting to change instead of sticking to the plan” must be part of the core DND CIS project principles. As stated by the second principle of the Agile Manifesto we must “welcome changing requirements, even late in development”.³³ A change of plan that will introduce delays must not be seen as a synonym of failure and emphasis must be on the business and operational value brought by the project.

³³ Kent Beck et al., "Manifesto for Agile Software Development," (2001).

CIS PROJECTS SUCCESS

There is no consensus on a universal project definition of success.³⁴ The measures of success of a project are dependent on its singularity, its size and its complexity. The success criteria will therefore be different from one project to another.³⁵ In practice the criteria for success often come down to whether the project met timelines, budget and deliverable specifications, in other words the emphasis is on the successful implementation of the project deliverables.³⁶

Table 3 – Project Success Criteria

Project Success Criteria
End-user satisfaction
Supplier satisfaction
Project team satisfaction
Other stakeholder's satisfaction
Performance in terms of time, cost,
Meeting user requirements
Project achieves its purpose
Customer satisfaction
Reoccurring business
Self-defined criteria

Source: Ralf Müller and Rodney Turner, "The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project," *European Management Journal* 25, no. 4 (2007), 301.

Some projects will deepen their analysis to assess other criteria related to the organizational success of the implementation such as the impact on organizational processes, the level of acceptance and the achievement of strategic objectives.³⁷ As listed in Table 3, the inclusion of implementation, organizational and technical success criteria

³⁴ Laurie McLeod, Bill Doolin and Stephen G. MacDonell, "A Perspective-Based Understanding of Project Success," *Project Management Journal* 43, no. 5 (2012), 82.

³⁵ Ralf Müller, and T. Rodney, "The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project," *European Management Journal* 25, no. 4, 306.

³⁶ Kirsten M. Rosacker and David L. Olson, "Public Sector Information System Critical Success Factors," *Transforming Government* 2, no. 1 (2008), 62.

³⁷ Eskander Howsawi et al., "The Four-Level Project Success Framework: Application and Assessment," *Organisational Project Management* 1, no. 1 (2014), 5.

allows a holistic approach to assess success. “End user satisfaction” and “Meeting user requirement” at the time of product delivery are two of these ten success criteria. The final products delivered in DND’s CIS projects are often customized to the specific evolving requirements linked to technologies, allies, threats and priorities. Although key performance indicators are used to monitor a project, they are not an indication of success after the end of a project. In high complexity projects, customer satisfaction is an important criterion.³⁸ This is why the end user or operator satisfaction must be considered an integral part of achieving the strategic objectives of the CIS project. The project client who represents the user community is the project sponsor, normally at the executive level. While the project sponsor is briefed on the progress of the project during the SRBs, he is not able to fully predict the operators’ satisfaction. Using the basic criteria of budget, time and scope alone can limit the ability to assess the true success of a project. Indeed, a project could have achieved all project objectives but create an end-user dissatisfaction. In such a context, the organization jeopardizes its full potential to fully exploit the value of the product delivered. This is why delivering a product that meets all stakeholders end user’s need and ensuring end user satisfaction are essential to the success of a project.³⁹

Table 4 presents the main success factors extracted from studies performed by the Standish Group following an analysis of IT and software development projects. These success factor are element that support the implementation of a project and are different from success criteria that are used to measure the accomplishments of a project. In addition to the user satisfaction being part of the definition of a successful project, user

³⁸ Ralf Müller, and T. Rodney, "The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project," *European Management Journal* 25, no. 4, 306.

³⁹ Ibid.

involvement is a factor of success second only to the management support. User satisfaction and user involvement are interdependent and critical in effectively applying Agile practices to project management. Therefore, DND should establish in the project documentation a matrix organizational structure that will allow the designation of operators and support personnel assigned to the projects. Although their involvement could be sporadic over time, this structure will formalize their responsibilities, reporting structure and their tasks. In terms of content relevance success criteria, this contribution will contribute to achieving the validity of deliverables, the technical performance of deliverables, end-user satisfaction and meeting user needs.

Table 4 – Factors of Project Success

Factors of Success	Points
Executive management	20
User involvement	15
Optimization	15
Skilled resources	13
Project management	12
Agile process	10
Clear business objectives	6
Emotional maturity	5
Execution	3
Tools and infrastructure	1

Source: Standish Group, "Chaos Manifesto 2013," *The Standish Group International* (2013), 3.

Some of the factors of success are common to project management such as the support of executive members, the project management knowledge of the manager and clearly defined objectives. Other factors are more specific to the IT domain, such as user participation or a flexible project process. Agile management practices are meant to allow the greatest flexibility in the delivery of a solution. The PAD already allows flexible project management with what is defined as Cyclical Projects that is “particularly well suited for Information Management (IM) or Information Technology (IT) enabled

projects”.⁴⁰ Unfortunately, most DND CIS projects use the standard or multi-phased approaches defined in the PAD. Those approaches do not provide the same flexibility or what is defined in Agile methods as iterative planning and execution. Therefore, all DND CIS projects must be planned with cyclical project management as defined in the Project Approval Directive. This will allow for iterative execution and planning for the definition and implementation phases of the project contributing to the success factor of flexibility and optimization to achieve the success criteria for the validity of the deliverables and the technical performance of the deliverables.

Since its inception, Agile practices have been adopted by organizations outside of the software development environment. When these practices were implemented in large organizations such as Daimler-Chrysler or Nokia, although these practices met a specific need, the challenge was to integrate these practices into existing processes.⁴¹ Public organizations are experiencing the same challenges in addition to bureaucracy and more restrictive policies to ensure good stewardship of public funds. A study on the adoption of Agile methods in the public sector has shown that the legislation in place, problems of document management as well as technology issues are prevalent.⁴² The same study suggests that the human factor is the main obstacle, which includes the culture, training, communication and motivation of participants to adopt Agile method practices. It therefore becomes important for a public organization to plan and identify these potential obstacles before undertaking such a change. Resistance to change by a critical mass of

⁴⁰ Canada, Department of National Defence, “Project Approval Directive,” V 1.1, 2019, 43.

⁴¹ M. Lindvall et al., “Agile Software Development in Large Organizations,” *Computer (Long Beach, Calif.)* 37, no. 12 (2004), 28.

⁴² Jouko Nuottila, Kirsi Aaltonen and Jaakko Kujala, “Challenges of Adopting Agile Methods in a Public Organization,” *International Journal of Information Systems and Project Management* 4, no. 3 (2022), 80.

public servants for a new activity is recognized internally to contribute to its failure. Agile methods require a dynamic, ambitious and enthusiastic team to face new challenges. This is why the institutionalisation of Agile project management training for all ADM(IM) project office employees is essential to the success of this paradigm change. Setting the same standard in project management for all employees and sharing the vision of project management will contribute to the success factors of participation, skills and support. This training will empower all project team members to understand and lead in Agile method practices such as the use of simple planning and communication tools or the responsibilities and activity of self-managing teams in an implementation.

CONCLUSION

This paper presented the possibility of adopting Agile project management practices to improve the content relevance of Department of National Defence CIS projects. The concept of Agile project management, its principles and practices were presented as well as its applicability CIS projects. The DND CIS project environment was described to justify the integration of Agile practices given the challenges of this specific environment. The CIS project risk factors affecting project success and the relevance of content as well as the proposed Agile practices to mitigate those risk were presented. Finally, Agile practices that contributes to success factors and project success were exposed. Through this paper, four recommendations were proposed to realistically introduce Agile method practices at DND while respecting current policies:

- A benefits realization plan must be incorporated and updated during the project life until the project closure to effectively measure the value added to the organisation.

- The approved cyclical project management approach must be used for all CIS project with an effort to deliver user content at each iteration.
- The establishment of a project matrix organizational structure that will designate end users and support staff assigned to the projects.
- Institutionalize Agile project management training for all ADM(IM) project office employees and personnel involved in CIS projects.

These four measures are objectively achievable within DND with a medium level of effort and management support. While these measures will not solve all CIS project management issues at DND, they will increase the content relevance of projects and position the organization for the future.

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