CANADIAN FORCES COLLEGE / COLLÈGE DES FORCES CANADIENNES
CSC 30 / CCEM 30

EXERCISE/EXERCICE

NEW HORIZONS

Cyclical Project Management for Information Technology Projects

By / par Maj Ning Lew

30 April 2004

Abstract

Information technology (IT) projects are observed to fail more than non-IT projects. Characteristically, IT projects must deal with fast-changing technologies and integration problems. It is proposed that the *cyclical approach* to project management be the default for IT projects in DND. The idea behind the cyclical approach is that you build a little, field a little, build a bit more, field a bit more. This iterative style makes it more likely for a project to meet the four criteria for success: cost, time, performance, and customer relations. More significantly, its superior flexibility and risk management ability alleviate problems with fast-changing technologies and integration. Although the cyclical approach entails greater administrative overhead, it provides a better chance of success than the conventional approach to project management, and is particularly well suited to IT projects. Therefore, the cyclical approach should become the default approach for IT projects in DND.

Why is it that bridges are normally built on-time, on-budget and do not fall down, whereas software never comes in on-time or on-budget?

-Alfred Spector, President, Transarc Corp, 1986[1]

The challenges of project management are well known in industry and are equally prevalent in the Department of National Defence (DND) as in many other large organisations. The primary goal of project management is to satisfy demands on the classic trio of cost, time, and performance.[2] Can you build what you want, do it on time and within budget. Typically, constraints on any two of these objectives can be achieved at the expense of the third. In the case of construction projects, modern technologies and well-established estimating techniques often permit all three objectives to be achieved. Unfortunately, in the case of projects with a significant software or information technology (IT) component, sometimes none of these three objectives is met. The rate of failure of IT projects is disproportionately high when compared to non-IT projects.[3]

Even with the modern project management techniques available today, IT projects remain challenged. Is there a way of improving the odds of an IT project succeeding? The thesis of this paper is that a cyclical approach to project management provides a better chance of success than the conventional approach for IT projects and should therefore be the default approach within

[1] As cited in Standish Group Report, *Chaos* (West Yarmouth, Mass: Standish Group, 1995), 1.

[2] Harold Kerzner, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 7th ed.* (New York: John Wiley & Sons Inc., 2001), 5.

[3] Standish Group, *Chaos* (West Yarmouth, Mass: Standish Group, 1995), 1.

DND for IT projects. By *success* is meant the completion of a project on time, within budget, achieving the level of performance promised, and maintaining good customer relations.[4]

To demonstrate this point, the following outline will be used in this paper. We will first look at the problem of high failure rate of IT projects. As distinct from non-IT projects, IT projects tend to share common problems regarding integration and fast-changing technologies. This distinctiveness can be partially addressed by the approach chosen for project management. We will first review the traditional approach to project management and then introduce the *cyclical approach*, in which an initial capability is fielded quickly and then developed incrementally. It will be shown that a cyclical approach makes it more likely for a project to meet the four criteria for success: *cost*, *time*, *performance*, and *customer relations*. More importantly, it will be shown that the cyclical approach is better suited to IT projects because of its superiority in two important factors for success: *flexibility* and *risk management.* Therefore, the cyclical approach should become the default approach for IT projects in DND.

As stated in the outline, let us first gain an appreciation for "the problem": the disproportionately higher risk of failure of IT projects. In their famous *Chaos* report of 1995, the U.S.-based consulting company, Standish Group, published the results of their survey of IT executive managers from 365 companies and organisations across the United States.[5] The report provided a snapshot of project success statistics and categorized reasons for failure of IT projects. With success defined as "on-time, on-budget with all features and functions as

[4] Kerzner adds this fourth criterion for success in recognition that it can be possible to satisfy the classic trio of time, cost, and performance, but alienate the client and not have any customers.

[5] The Standish Group, *Chaos* (West Yarmouth, Mass.: Standish Group, 1995).

originally specified," only 16 percent of projects succeeded.[6] The average cost overrun was 189 percent; the average time overrun, 222 percent. Thirty-one percent of projects were cancelled outright. Amongst the top reasons for failure cited by survey participants were incomplete or changing requirements, lack of user input, lack of executive support, and unrealistic expectations.[7]

When the Chaos report was first published, it caused considerable stir in the IT world. The report confirmed to individual organisations that their unsuccessful experiences with IT projects were actually commonplace across the industry. Examples can even be found within the government of Canada. A recent news article chastised the government for its handling of the Canadian Automated Air Traffic System project, which was "dumped into the lap of Nav Canada as part of the privatization of Canada's air navigation service in 1996" and which is now "11 years overdue and approaching $1 billion in costs, 50 percent more than budgeted."[8] Another example comes from within National Defence. As recently as March 2004, it was revealed that DND is still investigating what to do with the $70 million Very Long-Range Communication System that was finally delivered two years ago.[9] The Auditor General's report revealed that the system was already obsolete at time of delivery because the department decided that it preferred the leased commercial system that had been used in the interim and whose upgrades had kept

---

[6] *Ibid*.

[7] *Ibid*.

[8] Ian MacLeod, "Flying Blind," *Ottawa Citizen*, 13 March 2004, B1; and "How government mismanages high tech projects," *Ottawa Citizen*, 14 March 2004, A4.

[9] Stephen Thorne, "Bulk of $174m military communications system in storage." *Halifax Herald*, 11 March 2004.

pace with technology.[10] Looking at more recent versions of the Chaos report, it is evident that the problem with IT projects persists today, even if to a somewhat lesser extent. In attempting to analyse the problem, a question remains as to whether or not there is anything truly unique or characteristic about IT projects.

The uniqueness of IT projects is recognised in the Enhanced Management Framework from the Treasury Board of Canada Secretariat. "Significant changes in the project management environment" such as "decentralization of the management of information technology; the transformation of the way the government does its business; and rapid technological evolution"[11] are identified as contributing factors to the difficulties inherent to IT projects.

Whereas all projects, IT and non-IT, may face such common difficulties as "managing industrial relations" or "dealing with personalities and egos," a British-based study showed that certain problems were more characteristic of IT projects than of non-IT projects.[12] These included "mastering rapidly changing technologies," "harnessing technical innovation," and "controlling complexity of interconnections." This study, based on feedback from 1500 IT project managers over the 2002-2003 period, shows that there is indeed a strong perception that IT projects have distinctive demands. Any project management method that is capable of handling these distinctive demands will therefore improve the probability of success. Prior to comparing project management methods, we will review the basic phases in traditional project management.

---

[10] Office of the Auditor General. *April 2002 Report*. [Report on-line]; available from http://ww.oag-bvg.gc.ca/domino/reports.nsf/html/0208ce.html; Internet; accessed 22 March 2004.

[11] Treasury Board of Canada Secretariat. *An Enhanced Framework for the Management of Information Technology Projects*. (Ottawa: Public Works and Government Services Canada, 1998), s.2.

[12] Chris Sauer and Christine Cuthbertson, "The State of IT Project Management in the UK 2002-2003," *Computer Weekly*. Online from http://www.cw360ms.com/pmsurveyresults/surveyresults.pdf. Accessed 12 April 2004, 57.

Using the terminology of the U.S.-based Project Management Institute, the term *project management* is defined as "application of knowledge, skills, tools, and techniques to project activities to meet project requirements."[13] To facilitate management, a project is divided into *phases* marked by a key deliverable at the end of each phase.[14] The traditional phases of a project are Initiation, Concept, Development, Implementation, and Closeout.[15] DND uses phases called Problem Identification, Options Analysis, Definition, Implementation, and Closeout.[16] For both DND and the Project Management Institute, the premise is that each of these phases is executed only once in the lifetime of the project. Because each phase is executed only once, it is extremely important that requirements are clearly captured and solidified before proceeding with implementation. For large or complex projects, the definition phase alone may take several years.[17] Here is where the cyclical approach to project management differs strongly from the traditional approach.

The term *cyclical* used in context of project management is not a formal term in either the Project Management Institute or in DND, however its current use in the department is understood to imply a number of characteristics and features about the way a project is managed. Its origins come from the U.S. Department of Defense (DoD) concept of *evolutionary acquisition,* which is described as a strategy for a project to "develop and field a core capability

[13] Project Management Institute, *A Guide to the Project Management Body of Knowledge* (Newtown Square, Pennsylvania: PMI, 2000), 6.

[14] *Ibid,* 11.

[15] Project Management Institute, *Guide to the Project Management Body of Knowledge,* Chap 2.

[16] Department of National Defence, A-AD-125-000/FP-001 *Defence Management System Manual* (Ottawa: DND Canada, 1997), 7A-38.

[17] Based on personal observation of the author during his employment at National Defence Headquarters.

with the intent to develop and field additional capabilities in successive increments."[18] We build a little, field a little, build a bit more, field a bit more. Treasury Board recognises evolutionary acquisition as an "innovative approach for helping to resolve procurement-related issues."[19] Cyclical project management also includes what the Defence Management System (DMS) Manual now refers to as *evolutionary development* in which a project is "parceled into phases[20] and cycles with a useable functionality delivered at the end of each cycle."[21]

Because the official literature does not describe very much more, the cyclical approach will now be further described according to the manner in which it was adopted by a specific project, Project G2469, the Canadian Forces Command System (CFCS) project. A project intended for cyclical project management must be capable of being divided into "phases" with certain properties. The most important property is that Phase 1 constitute a core capability of the project, such that if no further phases were to be authorised, or if subsequent phases were delayed because of budgetary constraints, the department would still be left with a useable standalone capability. Each subsequent phase is a set of one or more capabilities such that the phase builds upon earlier phases and also leaves the department with useable functionality in the event that future phases are unfunded or the rest of the project is cancelled. The cyclical aspect enters here: a typical cycle consists of two "half-phases": the implementation of one phase and the definition of the next phase.

---

[18] U.S. Department of Defense, AFI 63-123 "Evolutionary Acquisition for C2 Systems" (Washington: Department of the Air Force, 2000), 2.

[19] Treasury Board of Canada Secretariat, An Enhanced Framework ..., s.4.3.2.

[20] Regrettably, the word "phase" has two different meanings in this DND manual. The dominant usage is as in the terms Identification Phase, Definition Phase, etc. The use in the above quote is only in context of cyclical projects.

[21] *DMS Manual*..., 7A-54.

The relationship between phases and cycles is shown graphically in Figure 1. This example is for a project that has three phases. Time progresses to the right.

	Cycle 1	**Cycle 2**	**Cycle 3**	**Cycle 4**
Phase 1	Definition	Implementation		
Phase 2		Definition	Implementation	
Phase 3			Definition	Implementation

Fig. 1. *The relationship between phases and cycles*.

A *phase* is a distinct set of activities or sub-projects; a *cycle* is the implementation portion of one phase along with the definition portion of the subsequent phase. Example: Cycle 2 = Phase 1 Implementation + Phase 2 Definition. A cycle typically lasts 12-18 months.[22]

The term *cyclical project management* may be confused with other similar terms. DoD explicitly notes that the cyclical approach differs from *Pre-Planned Product Improvement* in that "future increments [phases] are not definitively planned ... until the current increment is [being implemented]."[23] Cyclical project management should also not be confused with *spiral development*, which is one process that can be employed within a phase.[24]

With the subdivision of a project into phases and cycles, the management and administrative burden is increased somewhat, because the Defence Management System requires

[22] For completeness, it is worth noting that the *in-service support* phase comes after the implementation phase, however it is often not discussed with cyclical management because in-service support is not generally the responsibility of the project office. Upon implementation, that portion of the system that is implemented is handed over to the customer's in-service support organisation for routine operation and maintenance. The project office does continue to liaise with the in-service support organisation to ensure that subsequent deliveries are compatible with what was earlier delivered, and may also retain or share configuration control if appropriate.

[23] U.S. Department of Defense, AFI 63-123..., 2.

[24] *Ibid*, 3.

that each cycle be treated essentially as a mini-project with two sub-phases. Under a cyclical approach, the funds that are approved for the entire project become an overall funding *envelope* from which funds are subsequently authorised but only for a given cycle. Separate expenditure authority needs to be sought for each cycle. All the project-related paperwork such as Synopsis Sheets and Risk Assessments need to be submitted for each cycle. Poor performance by a project manager will result in denial of expenditure authority for subsequent cycles. Designing a project for cyclical project management allows the department the flexibility of terminating financing at any time, leaving the project to complete only the current cycle, which by design must leave the department with a useable system. The end result is high visibility within the department for each phase of the project and therefore greater control on cost and direction.

Despite the additional management and administrative overhead required to take a cyclical approach, it will be shown that the probability of success is greater than when using a non-cyclical approach to an IT project. This will be shown in relation to the four criteria for a successful project: cost, time, performance, and customer relations. In addition to these four criteria, we will also discuss two important success factors: flexibility, and risk management (Figure 2).

While these last two factors by themselves do not constitute success of a project, they aid greatly in achieving success. In addition to being a principle of war, flexibility is an important factor in an IT project. Technologies now advance so quickly that a different technical solution may become available by the time requirements analysis is completed or even during the execution of the project. IT project management must display flexibility.

Risk management has also become a very important part of project management. This is evident in noting that the 1996 edition of the PMI Guide did not list it as a primary demand of

project management, but the 2000 edition did.[25] Although the importance of risk management may be obvious for large projects, it is important to show why it is necessary for IT projects. From the results of their surveys, the British study team of Sauer and Cuthbertson noted that any project that results in a "new or radically redesigned business process/task" carries risk.[26] Users may be uncomfortable with the new system and will naturally be resistant to change their ways. Because many IT projects use new technologies, integrate systems, and change the way in which an enterprise conducts its business, the importance of risk management cannot be overlooked.

Four criteria for success	Cost: Ability to stay within budget
	Time: Ability to complete on time
	Performance: Ability to deliver the performance promised
	Customer relations: Ability to maintain good customer relations
Two factors for success	Flexibility: Ability to accommodate changes in the project
	Risk Management: Ability to manage risk

Fig. 2. *Criteria and factors for success.*

Let us start with the first of the four criteria for success: ability to stay within budget. It can be argued that increased management and administration associated with cyclical projects add unnecessarily to the cost. It is also possible that subdividing a project into phases reduces the possibility of savings from bulk procurements. Designing the project to have clean "off-ramps" at the end of each cycle, ensuring that what is delivered to that point can be used without further development, may also add to the cost. These are all good arguments, however under the

[25] Project Management Institute. *A Guide to the Project Management Body of Knowledge*. (Sylva, North Carolina: PMI Publishing, 1996).

[26] Chris Sauer and Christine Cuthbertson, "The State of IT Project Management in the UK"..., 61.

Defence Management System, there is very strong cost control on cyclical projects. Funds are released only one cycle at a time. If the project manager shows any trend towards exceeding the budget, further funding may be suspended or the project manager changed. The cyclical design also creates a tendency for the project staff to tackle the problem in smaller, more realistic modules, thereby improving chances for success while risking a smaller amount of money. What is most important to consider is the cost at completion. If the project is cancelled, it will not matter that certain components were obtained at a good price. Cyclical projects are more likely to complete because of superior relations between the project management office and the customer, as will be discussed as the fourth criterion. Overall, because of the modularity of cyclical projects, the pressure to adhere to budget for each cycle, and the improved customer relations, cyclical projects are more likely to be within budget for the project overall.

The second criterion for success is the ability to complete on time. Cyclical projects are designed to deliver a core capability very early, however is it possible for a non-cyclical project to deliver the entire product more quickly? It could be argued that for small, straightforward projects, it should be faster to execute the project as a single item. Breaking the project into phases and building in the off-ramps for a clean emergency exit would take time, and it would also increase the complexity of contracting. Can a project with many phases be completed faster than a project with only one phase? Let us consider more complex projects.

As discussed earlier, when using a non-cyclical approach, it is necessary to have all requirements completely defined before proceeding with any implementation. But if the project is complex, a comprehensive and detailed study may take such a long time that by the time it is completed, the client has seen newer technologies and has changed or increased the requirements. The modified requirements would result in delaying implementation even longer.

Similarly, to design a comprehensive all-encompassing solution might take so long that a newer technology may arrive in the interim, causing a complete re-design of the entire solution and further delay.

The shorter timeframes of the cyclical approach, compared to a typical multi-year project, force the project manager to structure the project in smaller tasks, which makes it easier to estimate the duration of tasks. The cycles themselves also provide clear cut-off dates and high visibility as to the progress or evolution of the end product. Overall, then, a cyclical approach not only provides better schedule control, it can deliver a complete solution in a more timely fashion than using a non-cyclical approach. The final result is a project that succeeds in completing on time.

The third criterion for success is the ability to deliver the performance promised. We use the words "performance promised" because the performance *desired* may not be technically feasible. For the purposes of discussing this criterion, the key to satisfying performance objectives lies in the ability to manage *scope*. Scope is defined as "the sum of products and services to be provided as a project."[27] It can be argued that a non-cyclical project using a well-written Project Charter will control scope regardless of the management approach. Additional documents, formal or informal, could be used to clarify the bounds of "what's in and what's out." But to show why a cyclical project is better at managing scope, we will take the example of the Canadian Forces Command System (CFCS) project.[28] This example will illustrate how the common counter-arguments were shown by auditors to be not valid.

[27] PMI, PMBOK..., 1996, 170.

[28] Example is from personal experience of the author.

CFCS was the first cyclical project in the department and therefore not well understood.[29] With two cycles successfully implemented, the project office submitted paperwork for the next cycle. A suspicion was then raised to the effect that there was no end in sight as to the scope of the project. It was argued that there appeared to be no limit on what functionality could be demanded and therefore on what funds could be requested. The appearance of items in one phase that were similar to items in a previous phase gave the impression that either the original requirement had not been satisfied or that it would never be fully satisfied. The Statement of Operational Requirement (SOR) did not appear to be adequate to control the scope.

An independent review was ordered through Chief of Review Services. The stated thrust of the review was "to determine if the [SOR] was sufficient for an Evolutionary Acquisition approach and that steps were taken to assure the operational suitability and effectiveness of the delivered capabilities" thus capturing the dual concepts of scope and performance.[30] The final report made it very clear that the current SOR was adequate and that performance was satisfying user requirements.[31] The overarching SOR and overarching Concept of Operations document for the project as a whole were never intended to have the level of detail as the SOR and Concept of Operations document for each individual phase.

Compared to non-cyclical projects, whose principal documents are often not updated throughout their lifetime, cyclical projects have documents that describe the scope to a much greater level of detail because they are also produced for each cycle and are prepared collectively by the project office and the customer or by one party with the concurrence of the other.

---

[29] At the time of its inception, the CFCS project was originally named the Joint Command, Control and Intelligence System (JC2IS) project, with the same project number, G2469.

[30] Chief of Review Services, *Joint Command Control Intelligence System (JC2IS)*, file 7050-17 (CRS), April 2001.

[31] *Ibid*, 5 and 9.

Therefore, the cyclical approach is actually much more effective at managing scope. The comparatively short cycle times, the requirement to produce documentation for each cycle, and the required involvement of the customer result in a strong ability to deliver the performance promised.

The fourth criterion for success is the ability to maintain good customer relations. There are numerous ways in which a non-cyclical project can attempt to maintain good relations. It can be argued that good communication between the project management office and the customer is sufficient to maintain good relations. One could also try giving the customer a large discount on the price. However, it will be shown that cyclical projects inherently foster good communication and help manage expectations resulting in increased customer satisfaction and therefore good customer relations.

One of the main features of cyclical projects is the ability to quickly field a basic capability. When using a cyclical approach, it is not necessary to have all aspects of all requirements finalised, nor is it necessary to design a big-bang solution to the point of perfection. The customer understands that what is being delivered might only be part of the solution, and that it will be the best that is feasible at the time. Should newer technologies become available, they can be incorporated into subsequent phases. The key is that the initial capability delivered gives the customer an opportunity to evaluate it, provide early feedback, and refine the requirements as appropriate. The result is "continual evolution of a system toward fulfilling the overarching operational requirements."[32]

By being involved, at a minimum, with each implementation phase, the customer has a natural opportunity to discuss with the staff and change the direction of future cycles. This compares favourably to non-cyclical projects where there may be significant lag time between

[32] U.S. DoD, AFI 63-123, 2.

identification of a deficiency and the delivery of a solution, and likely minimal or no opportunity to modify the solution once it is delivered. To take a simple example from the CFCS project, the early CFCS workstations had a sophisticated Unix-based e-mail package. Because users were more familiar with what they had on their everyday desktops, CFCS workstations in subsequent cycles were delivered with Microsoft Outlook instead, and the earlier workstations were changed accordingly.

Having a core capability from which to start discussion enables the customer to share expectations, achieve a higher level of satisfaction, and provide timely feedback to the project. This relationship becomes natural and from

perfection in either of these activities; rather, it is prudent to allow for changes or deficiencies. Said Sun Tzu, "It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him."[34]

Even without considering the personality of the project manager, a cyclical approach is inherently more flexible than a non-cyclical approach. In general, the shorter the cycle time, the more flexible the project. For its evolutionary acquisition strategy, DoD aims for a cycle time of 18 months or less.[35] The practice for the CFCS project and for the Air Force Command and Control Information System project, the second cyclical project in DND, was to have a cycle time somewhere between 14 and 24 months. As shown earlier, having cycles can also obviate the need to have flawless requirements analysis if changes can be accommodated in a subsequent phase.

The U.S. Air Force instruction on evolutionary acquisition notes that "[a cyclical approach] allows a [project] to quickly respond to changing conditions by allowing each [phase] to accommodate the following three activities: (1) develop new capabilities ..., (2) insert new technologies ... resulting from experimentation, and (3) refine current capabilities based on user feedback, testing or experimentation."[36] The built-in flexibility of the cyclical approach is therefore attractive, despite the additional administrative burden.

As an example of *inability* to accommodate change, recall that DND did not make use of the system delivered by the VLRCS project, because its technology was already surpassed by the interim leased system. In his report, the Auditor-General noted that if VLRCS had been a

---

[34] Sun Tzu, *Art of War*...., 114.

[35] U.S., DoD, AFI 63-123, 2.

[36] *Ibid.*

cyclical project, the requirements would have been revisited sooner, money would have been released only in phases, the requirement could have been revalidated in light of the interim commercial solution, and the department could have possibly avoided expenditure or at least made plans for integration of the two systems, in advance of system delivery. Finally, the report cited CFCS as a positive example because of its phased approach and evolutionary procurement.[37]

The cyclical approach to project management is better able to cope with changing requirements, new technologies, and user feedback, all of which are common concerns for IT projects. Its iterative nature gives it flexibility that would be difficult to achieve in a conventional project. Its ability to accommodate change also reduces risk, which brings us to our second success factor.

The ability to manage risk is crucial to every project, however project management approaches can differ in the handling of risk. The Project Management Institute provides risk management processes and techniques that are helpful in any project, whether IT or not.[38] Risk management is theoretically independent of project management, and therefore it should not matter what approach is being used. However, the DMS Manual specifically cites "evolutionary development" [cyclical project management] and "gateway management"[39] as the two implementation methodologies for risk reduction in high-risk projects. "This approach should be

[37] Office of the Auditor General. *April 2002 Report*....

[38] PMI, PMBOK..., 1996, 111.

[39] A-AD-125, ..., 7A-54. "Gateway management" involves the setting of milestones with off-ramps for each major stage.

considered when the project implementor cannot commit to the final end product as a result of rapidly changing technology issues."[40]

The formal use of definition studies in each cycle greatly aids in reducing risk. As far back as 1965, Treasury Board observed, "One way in which confidence may be restored in estimates of costs for development projects might be to leave decisions on funding and undertaking hardware development until thorough feasibility and project definition studies have been completed."[41] Under a cyclical approach, if it is determined that there is simply no feasible solution for a particular requirement, the requirement can be deferred to a subsequent phase, pending further investigation. The customer accepts that his immediate need may not be satisfied, however, under the cyclical approach, it is not forgotten or deleted. Such an approach with deferrals essentially creates a very low risk (almost "no-risk") project, in that all activities that succeed in making it to the implementation phase are known or proven to be feasible. Effective use of the definition phase was a hallmark of the CFCS project. Though the approach may have seemed cautious or conservative, the CFCS project was still able to lead the department technologically in security features for classified networks.[42]

It is true that a non-cyclical project can also undertake definition studies to reduce risk. However, if the results are discouraging, the only options are to try another study (which might delay the rest of the project), negotiate a reduction in the user requirement, cancel the requirement, or attempt implementation anyway and risk failure. With a cyclical project, there is the ability to defer the requirement to another phase, so that the rest of the project can proceed,

---

[40] *Ibid.*

[41] As cited in Palmiro Campagna, *Requiem for a Giant: A.V. Roe Canada and the Avro Arrow* (Toronto: Dundurn, 2003), 130.

[42] Observation is from personal experience of the author.

and the requirement will be revisited with the benefit of technology that is 18 months newer. The requirements faced by IT projects are often at the forefront of technological possibility, therefore it would not be uncommon to discover that many of the customer's requirements cannot be properly satisfied with the available technologies. Therefore, the cyclical approach is very well suited to IT projects; more so than a non-cyclical approach. Furthermore, its ability to manage risk, by having a formal definition aspect to each cycle, is extremely valuable, particularly in risk-averse organisations such as DND.

Although the ability to manage risk and the ability to accommodate change do not define success of a project, these two success factors contribute greatly to a project's ability to meet the goals for cost, time, performance, and customer relations, from which success is defined. The cyclical approach to project management enjoys an advantage in both flexibility and risk management, making it especially suitable for IT projects. The improvement in the success of IT projects is highly relevant to DND in light of the fact that the Director General for Strategic Planning has listed "C4ISR" [Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance] as one of the department's "Top 15 Projects in Next 15 Years."[43] Many of the other projects in the department's Strategic Capability Investment Plan will also have significant IT components, reinforcing the value of the cyclical management approach for its improved flexibility and risk management capabilities.

The "Knowledge-based Command and Sense" portion of the Strategic Capability Investment Plan represents $4 billion over the next fifteen years.[44] Using Standish Group's 31 percent failure statistic presented earlier in this paper, one could crudely estimate a $1.2 billion

[43] MGen Doug Dempster, "The CF in the Domestic and International Strategic Environment," PowerPoint presentation to the Conference of Defence Associations, 22 November 2003.

[44] *Ibid.*

loss in IT projects. Small measures taken to improve the probability of success could provide dramatic savings when applied system-wide. Adopting the cyclical approach to IT project management could be one such measure.

The cyclical approach is superior to the conventional approach in the four critical areas of cost control, schedule control, matingscopde orupefor mcm

nag met usiedfor buyting

arget m

BIBLIOGRAPHY

Barthelemy, Robert R. and Reda, Helmut H. "Nontraditional Approaches to Military Project Management." In *Military Project Management Handbook,* ed. David I. Cleland, James M. Gallagher, and Ronald S. Whitehead, 15.1 – 15.21. New York: McGraw-Hill Inc.,1993.

Bertrand, R. "Information Technology Project Management: Recommendations for Change." Toronto: Canadian Forces College Command and Staff Course Paper, 1995.

Boehm, Barry W. *Software Risk Management: Principles and Practices*. New York: IEEE, 1991.

Campagna, Palmiro. *Requiem for a Giant: A.V. Roe Canada and the Avro Arrow*. Toronto: Dundurn, 2003.

Canada. Department of National Defence. A-AD-125-000/FP-001 *Defence Management System Manual*. Ottawa: DND Canada, 1997

Canada. Office of the Auditor General. *April 2002 Report*. Report on-line; available from http://ww.oag-bvg.gc.ca/domino/reports.nsf/html/0208ce.html; Internet; accessed 22 March 2004.

Canada. Treasury Board of Canada Secretariat. *An Enhanced Framework for the Management of Information Technology Projects*. Ottawa: Public Works and Government Services Canada, 1998.

Chief of Review Services. *Joint Command Control Intelligence System.* National Defence Headquarters: file 7050-17 (CRS), April 2001.

Dempster, MGen Doug. "The CF in the Domestic and International Strategic Environment," PowerPoint presentation to the Conference of Defence Associations, 22 November 2003.

Dobbins, James. H. "Critical Success Factors in DoD Program Management." In *Military Project Management Handbook,* ed. David I. Cleland, James M. Gallagher, and Ronald S. Whitehead, 17.1 – 17.18. New York: McGraw-Hill Inc.,1993.

Kerzner, Harold. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 7th ed.* New York: John Wiley & Sons Inc., 2001.

MacLeod, Ian. "Flying Blind." *Ottawa Citizen*, 13 March 2004.

MacLeod, Ian. "How government mismanages high tech projects." *Ottawa Citizen*, 14 March 2004.

Mann, Charles C. "Why Software is So Bad," *Technology Review.* July/August 2002: 32-38.

Project Management Institute. *A Guide to the Project Management Body of Knowledge*. Sylva, North Carolina: PMI Publishing, 1996.

Project Management Institute. *A Guide to the Project Management Body of Knowledge*. Newtown Square, Pennsylvania: PMI, 2000.

Sauer, Chris and Cuthbertson, Christine. "The State of IT Project Management in the UK 2002-2003," Computer Weekly. Online from http://www.cw360ms.com/ pmsurveyresults/surveyresults.pdf. Accessed 12 April 2004.

Standish Group. *Chaos*. West Yarmouth, Mass: Standish Group, 1995. Online from http://www.scs.carleton.ca/~beau/PM/Standish-Report.html. Accessed 21 March 2004.

Standish Group. "Latest Standish Group CHAOS Report Shows Project Success Rates Have Improved by 50%," Press release, 25 March 2004. Online from http://www.standishgroup.com/press/article.php?id=2. Accessed 12 April 2004.

Sun, Tzu. *The Art of War*. trans. and ed. Samuel B. Griffith. London: Oxford University Press, 1963.

Thorne, Stephen. "Bulk of $174m military communications system in storage." *Halifax Herald*, 11 March 2004.

United States. Department of the Air Force. Air Force Instruction 63-123 Evolutionary Acquisition for C2 Systems. Washington: USAF, 2000. Document on-line; available from http://afpubs.hq.usaf.mil; Internet; accessed 21 March 2004.