A DATA COLLECTION FRAMEWORK FOR IT GOVERNANCE

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Abstract

IT projects continue to be canceled, delivered late and over budget, fail to deliver what was expected or deliver error-prone results. This state of affairs prevails today despite more than 30 years of evolution in the methods, techniques and tools of information technology, software engineering and project management. It is clear that software professionals and organizations have not adequately harnessed the bodies of knowledge required to avoid these project delivery pitfalls.

This paper presents a recently begun Canadian Government initiative to develop a non-proprietary and open data collection framework for information technology governance. The following topics are discussed: the underlying business model and the major guidelines for putting in place the infrastructure to implement this data collection framework.

1. CONTEXT

In its 1995 [1] and its 1996 [2] annual reports, the Auditor General of Canada identified a portfolio of large Government software development projects estimated at well over 5 billion dollars. Within this portfolio, the reports identified specific projects that displayed important cost overruns, others that were canceled after millions of dollars had been spent without any business benefits being delivered, some where scope had been reduced dramatically thus diminishing associated business benefits, and still others that showed strong signs of trouble by being re-estimated well beyond initial schedules or well over initial budget.

Among the causes identified for these problems are inadequate analysis of underlying business issues, inconsistent support from management and weak project sponsorship, inconsistent user involvement and acceptance, lack of ongoing monitoring of systems under development and lack of experience of project teams.

Like most large private or public organizations, the IT function of the Canadian Government, which mobilizes the work of roughly 8,000 IT professionals, is plagued by the elusive aspects of IT projects.

In the United States alone, a recent study [3] reveals that almost one out of three (31.1%) IT projects will be canceled before completion and more than half of them (52.7%) will overrun their original estimated costs by an average of 189%. This study further states that the typical US IT project delivers on average a meager 42% of the features and functions originally proposed and that only one out of six IT projects (16.2%) is completed on schedule and within budget.

The same study goes on to identify the probable causes of such a high failure rate. Among the probable causes most often identified by a focus group of executive managers, one finds incomplete requirements, lack of user involvement, unrealistic expectations, lack of planning and changing requirements and specifications. It is to be noted that in neither the Canadian reports nor the one from the United States do any of the identified causes refer directly to the technical know-how necessary to build IT systems. What these probable causes are referring to is rather the set of activities and tasks that is positioned before any technical work usually starts or tasks that are performed concurrently with the technical work.

The Treasury Board Secretariat of the Government of Canada (TBS) has been identified by the Auditor General of Canada as a key agent for introducing changes that address these

issues in the Canadian public service. As a direct result of the above findings, the TBS sponsored, in 1995, an inter-departmental workgroup to examine the problems and propose solutions. This workgroup concluded that there are industry best-practices that can be applied to increase the number of successes and reduce the number of runaway projects. The solutions needed to be organized and packaged so that they can be smoothly introduced and standardized within departments. The workgroup established four key business principles:

1. projects must be aligned with and support the business,
2. clear accountabilities must be established,
3. project managers must be developed and work within a corporate discipline,
4. project management decisions must be based on risk.

There is an inherent hierarchy in these principles, as depicted in Figure 1. The three bottom layers of this hierarchy describe the organizational environment needed to foster successful projects. These three layers lie outside the scope of individual projects. The top layer is the only one lying within the boundaries of the project. These recommendations were the object of a report published by the TBS in May, 1996 [4].

Figure 1 – Hierarchy of business principles

The next step was to refine this overall vision at the operational level, notably for the three bottom layers where governance plays a key role. Projects need to be governed by higher authorities and managed by the project teams. Decisive governance is needed to resolve the success or failure issues of executive management support, to oversee user involvement and to ensure that statements of requirements are clear. It is also needed to maintain business alignment, enforce accountabilities and exert corporate discipline.

The capability of executives to govern projects varies widely because of different corporate backgrounds, different levels of experience, different frequency of participation, different spans of authority, and the presence or absence of protocol and standards for the governance process. This initiative was specifically designed to raise the level of governance practice throughout the Canadian Government.

An outline of the initiative is presented in Figure 2. Governance guidelines and a measurement framework are derived from a streamlined vision of governance. The guidelines and the measurement framework then enable two courses of action: the setting of a benchmarking infrastructure and the implementation of the governance guidelines in each department.

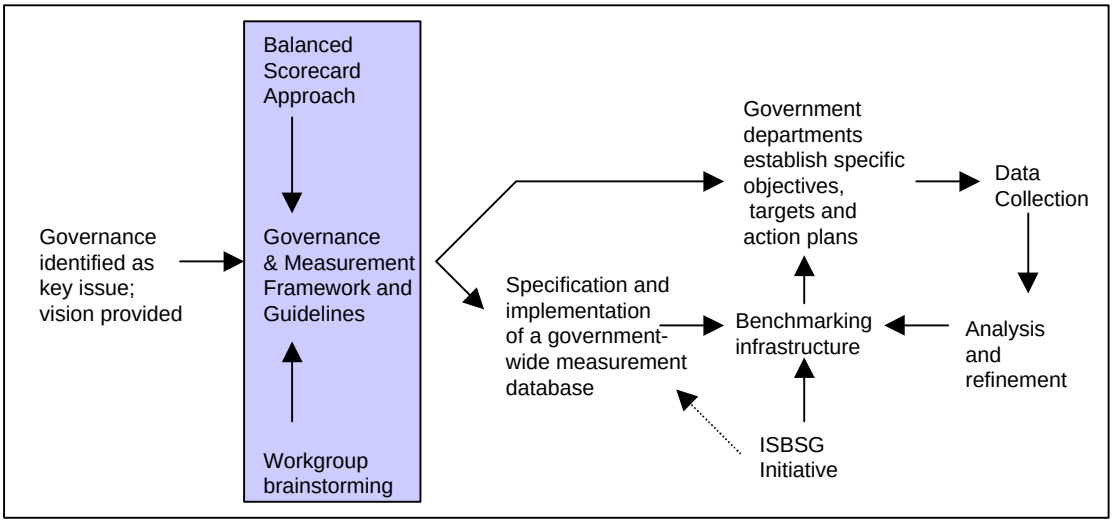

Figure 2 – Outline of the Canadian initiative for better IT governance, with the scope of the present paper shaded

action plans in each department. Since many departments do not have any governance data to start with, the process is initiated using the non-proprietary database of the International

The implementation of the governance guidelines entails the customization of objectives, measurements, targets and action plans to the specific constraints prevailing in each

collection is initiated, leading, through adequate analysis, to the refinement of the benchmarking infrastructure and the updating of the baseline.

measurement framework, as illustrated by the shaded box in Figure 2.

2. A MEASUREMENT RAMEWORK

Proper governance and control require adequate guidelines and measurements. This fact

Secretariat of Canada.

It was deemed necessary by the Treasury Board Secretariat that whatever data are to be

Furthermore, such collected data must support the measurement of both the IT processes and their business benefits in the client organizations.

[5] or the experimental framework for software engineering [6, 7], have been appearing in the

research activities and are usually focused on the software engineering processes or on the software products themselves.

Motorola [10] were either a) directly aimed at the planning and control aspects of individual IT projects, or b) focused on the improvement of IT processes. Such programs placed less

management.

The balanced scorecard developed by Kaplan and Norton [11] has been used in more recent

(GAO) of the United States [13] and in private industry [14]. These initiatives adopt a broad view of IT and specifically address governance issues.

ESI's work has elevated the performance program to the level of what they call the Software Producing Unit, looking at all the services and products delivered by an organizational entity. The GAO efforts looked at performance measurement from an investment point of view and approached these investments from a portfolio perspective.
In all three instances, the balanced scorecard is seen as a key enabler for linking performance objectives and measures to the overall strategy of an organization. It is strongly recommended as a tool to support the development and implementation of performance measurement in organizations. It also plays a significant role in prioritizing the improvement activities within organizations. The rigor afforded by the scorecard and its ability to synchronize measurement programs with corporate strategies was appealing to the Treasury Board Secretariat and it was selected as the main thrust for developing a measurement framework for IT governance.

2.1. Scope of the Canadian Initiative

The scope of this Canadian initiative, depicted in Figure 3, has been articulated around three key elements:

1. Organizational Entities;
2. Process Areas; and
3. IT services and products.

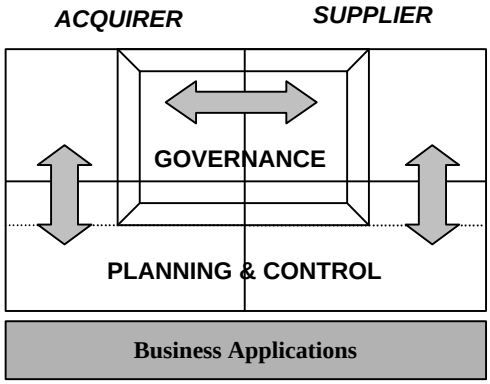

Figure 3 – Scope of the data collection framework

As defined by the ISO 12207 life cycle standard [15], the organizational entities covered by this framework include the acquirer and the supplier. These two organizations are defined as:

1. ***Acquirer***. The acquirer is the organization which is responsible for defining needs and managing the acquisition process. Within the context of this Canadian effort, the acquirer is also identified as the organizational entity responsible for investing in IT to satisfy a business requirement, a role devoted to the owner in ISO 12207;
2. ***Supplier***. The supplier is the organization which is responsible for providing the IT services and/or products requested by the acquirer. Supplier's processes are defined in the ISO 12207 standard for the development and maintenance of software.

Governance, within the context of this Canadian initiative, includes four process areas:
1. Policy and Standard Formulation;
2. Strategic Leadership;
3. Decision-Making; and
4. Oversight.

Two process areas clearly distinguish governance from "planning & control": policy and standard formulation and strategic leadership. The other two process areas, decision-making and oversight, are shared between governance and "planning & control", but they can be differentiated through their scope. Governance generally applies these process areas to a set of projects or to a portfolio of maintained applications whereas, "planning & control" applies them to individual projects or to individually maintained applications.

Furthermore, communications at the governance level will generally be characterized by emphasis on the "horizontal" and senior management type of dialog between the acquirer and the supplier, whereas "planning & control" is generally characterized by the "vertical" dialog within the acquirer and the supplier organization's hierarchy.

In large organizations, the range of IT services and products, as well as their related measurements, is wide and diverse. In order to limit its scope, the decision was made to examine only the IT services directly related to business applications. Business applications have been defined as the collection of software-intensive products supporting one or several functions in an organization by virtue of their direct interactions with the end-users. Technological infrastructure types of investments or system software (telecommunications, DBMS, etc.), for instance, are not addressed at this time.

2.2. Translating Vision into Governance Objectives

The balanced scorecard provided the rigor and guidance necessary to translate the vision into actions and to clearly articulate objectives to which measures can be attached.

The vision of the Treasury Board Secretariat, expressed above through four fundamental principles, albeit shared by most IT organizations in the Canadian Government, did not address explicitly maintenance activities. The literature and economic analyses [16, 17] clearly demonstrate that maintenance represents a significant portion of IT investments. An extension of the Canadian Government's EMF [4] for software maintenance was then developed using [16, 18, 19, 20].

Equipped with a complete vision statement, which was also supported by a series of best practices [15, 21, 22] and policy documents from the Government, the team could proceed to the translation of the vision into clear objectives. Based on Kaplan and Norton's balanced scorecard, a detailed view of the framework used to translate the vision into objectives, is depicted in Figure 4.

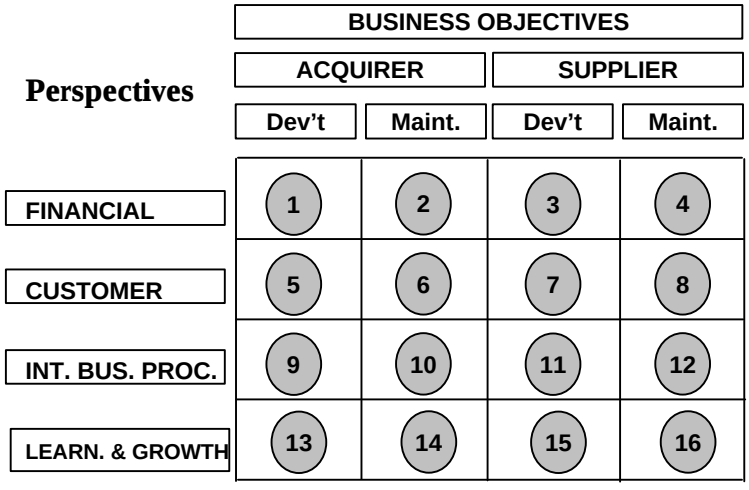

Figure 4 – Structure of the business objectives based on the scorecard approach

The implicit "vertical logic" of the scorecard is based on the assumption that each perspective represented by a row in the Figure 4 matrix shows causal relationships with the perspectives above it, based on its added value to the business. For instance, improvement in the "learning & growth" abilities of an organization leads to the improvement of some "internal business processes", which then leads to improvements to products or services as perceived by the "customer", which, in turn, leads to improvements in some key "financial" aspects of the organization.

The framework therefore supported the refinement of the Treasury Board Secretariat's vision into complementary and coherent business objectives linked by hypothesized causal relationships.

Some complexity was added to this framework by focusing on the governance process, ensuring that the acquirer's and supplier's objectives, as well as development and maintenance activities, were addressed in a coherent fashion. Figure 4 clearly shows how this complexity was dealt with by breaking down the objective components of the balanced scorecard into 16 subdivisions which had to be addressed. The setting of specific objectives would ensure that all aspects of the initial scope would be addressed as part of the process. The setting of specific objectives and the vertical "cause-and-effect" hypothesized relationships called for in the scorecard were achieved through expert brainstorming sessions with practitioners and managers.

The remaining elements of the scorecard could then easily be mapped to the objectives by following the "horizontal" logic of the scorecard which breaks down objectives into targets, measures and action plans. This process is depicted in Figure 5 below.

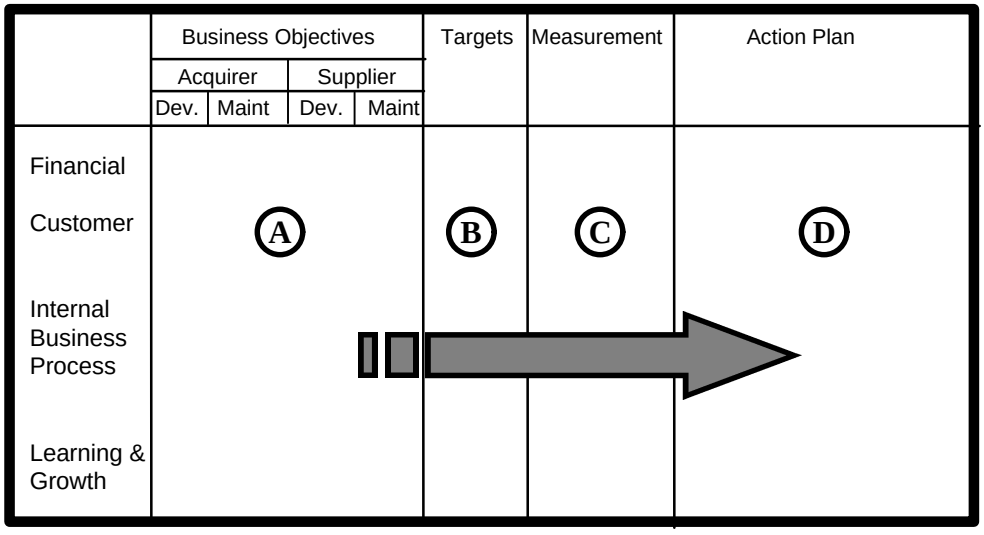

Figure 5 – "Horizontal logic" of the scorecard

With objectives and attached measurements established by the Treasury Board Secretariat's workgroup (Fig. 5 columns A and C), specific targets and action plans could then be completed by each department (Fig. 5. Columns B and D), taking into account each department's specific constraints.

2.3. Mitigating implementation risk

The fact that corporate measurement programs covering the IT function often fail has been documented [23]. The causes and associated risk factors have also been documented in large

organizations by Laframboise [23]. This study identified 52 risk factors specifically associated with the success of corporate IT measurement programs, classifying them into four categories: risk factors associated with the context of the measurement program, its organization, its components and its results. The scorecard approach outlined in this paper directly supports the mitigation of 12 of them, as illustrated in Table 1.

Category	Risk
Context	Authority level of measurement program management too low
	Poorly defined scope of measurement program
	Lack of support from senior management
	Lack of coherence of measurement program with business directions
	Poor credibility of expected benefits
	Poor alignment with middle management requirements
	Lack of involvement of senior management
	Lack of clarity of objectives and goals
Component	Poor understanding of the "why" and "how" by the organization
	Selection of measures not based on objectives
Results	Lack of clarity of benefits to targeted level of management
	Poor conformance of result usages with initial objectives

Table 1 – Mitigation of known risk supported by the scorecard

3. CONCLUSION AND FURTHER WORK

The balanced scorecard is proving to be a valuable tool for developing a measurement framework. Some lessons learned from the Canadian initiative are worth discussing:

Complete vision.

It is mandatory to have a fully defined vision of the organizational unit targeted by the scorecard. The maintenance aspects of the Government's vision are novel; they have forced extrapolations from the available material when the objectives were formulated.

Balanced scorecard perspectives.

The perspectives provided in the balanced scorecard are generally applicable, but do present some challenges when the vision is mapped into its constituent elements. The financial perspective is possibly the most difficult one to apply from a public-sector point of view. Governments, while concerned about their finances, do not necessarily operate under the principles commonly found in private-sector organizations. Returns on investment, internal rates of return and payback periods may not be applicable to legislation-driven IT investments. The GAO has avoided this issue by renaming the first perspective "strategic perspective".

Hypothesized causal relationships

The assumption that causal relationships link the objectives of the four perspectives of the scorecard is at the root of the "vertical logic" of this tool. As thorough, coherent and self-evident as a complete set of objectives might appear, it must always be borne in mind that, without careful measurement collection and analysis, those relationships will remain hypotheses. Viewed from a different angle, though, the scorecard can be seen as a rigorous and practical tool for planning and tracking empirical validation of these hypotheses in an orderly manner, and thus lay the groundwork for further improvements to the business model.

Further work

Based of the measurement framework presented in this paper, three areas of development will be pursued. First is the implementation of the framework throughout the Canadian public service. Second is the specification and the implementation of a government-wide measurement database supporting the framework. Third is the setting up of a benchmarking infrastructure, derived initially from non-proprietary industrial initiative [22] and then improved within departments as specific Canadian Government data become available.

4. ACKNOWLEDGMENTS

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