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INFORMATION TECHNOLOGY INVESTMENT MANAGEMENT: A FRAMEWORK FOR STATE GOVERNMENT

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Abstract:

This paper proposes a framework for the development of an Information Technology Investment Management process for state government. Drawing from experience in the Federal sector and the development of an ITIM process in a mid-Atlantic State, the paper describes a framework that represents best in class solution that unifies business strategic planning with the selection, control, and evaluating of public sector IT investments. The paper concludes with suggestions for future research in the area of public sector IT investment management.

Keywords: IT investment, IS strategy, technology enactment, strategic alignment, Government IS

Introduction

Information technology investment management (ITIM) traces its roots to the 1952 work of Harry Markowitz on Portfolio Selection (1952). Markowitz proposed a new theory of financial investing, now referred to as Modern Portfolio Theory (MPT), based on a portfolio of investments balanced by a number of factors, with expected return, diversification, and risk being primary. Markowitz suggested that, over time, a portfolio with the proper balance of investments provided a higher return to the investor than simply evaluating each investment on its own merits.

In 1981, Warren McFarlan (1981) applied the concepts of MPT to information systems. Portfolio management focuses on the strategic business goals of the organization and aggregate performance of the portfolio components rather than simply one or two projects. Fitzpatrick (2005) points out that it is rare for a business initiative to show a positive financial return from the start, but that portfolio management is a notable exception and, in his study of the field, he had difficulty finding an implementation that was considered a failure. Portfolio management consistently shows positive impacts on information technology (IT) investments by concentrating on selecting high business value projects and concurrently focusing on the elimination or avoidance of high risk, low return and duplicative projects.

While ITIM and portfolio management continued to be studied and evolved in the private sector throughout the 1990's, little work was done in the public sector. Much of the research, model development, and theory in the private sector was focused on economic performance; however, economic factors such as profitability and competitive advantage are not relevant factors in the public sector. Research in developing IT investment models in the public sector that reflects the unique public sector factors has been lacking. There are several reasons for this lack of research:

- A lack of funding and sponsorship of research in the public sector as it relates to public sector model and theory development;
- A lack of incentives in the public sector for participation in data collection;
- The perception that investment decisions are driven solely by political considerations and the intractability of that process; and
- Broad and significant differences between different public entities in IT investment approach.

In 1994, the Government Accountability Office (GAO) released a report entitled “Improving Mission Performance Through Strategic Information Management: Learning from Leading Organizations” (1994). This report described the select, control, and evaluate processes that are now the common factors in ITIM. In part due to the proven effectiveness of ITIM and portfolio management in the private sector, when Congress passed the Clinger-Cohen Act of 1996 it mandated the adoption of an investment approach to IT projects in all Federal agencies. Most agencies began this process with some version of portfolio management focused on selecting and controlling IT projects.

In 2004, the GAO issued a final framework for Federal agency ITIM ("Information Technology Investment Management A Framework for Assessing and Improving Process Maturity," 2004). This framework incorporated changes and recommendations from a 2000 exposure draft of the document. The 2004 document reflects current best practices in ITIM and provides both an operational guideline for implementing ITIM and a progressive maturity model which provides direction on assessing and improving agency ITIM performance. This framework is the current directive under which federal agencies implement ITIM. The Commonwealth of Virginia will adopt this framework and make modifications to support the operations of the Commonwealth and its agencies.

The GAO ITIM model involves three phases: select, control, and evaluate. Although each phase accomplishes specific objectives, the ITIM process is a continual, interdependent management effort. Information from one phase supports the activities in the other two phases.

Within state government, there is a pervasive belief that the services that are provided by state government and supported by information technology cannot be measured or evaluated because of the nature of the services provided and that an effort to develop and implement a rational ITIM standard will fail. Various reasons are given for this view of ITIM:

- A large percentage of the funding for State agencies does not come from State funds.
- Some State agencies are a part of a larger network outside of the Commonwealth.
- State agencies provide opportunities and services for citizens and it is more important to serve the needs of the citizens than to account for expenditures.
- It is to the potential benefit of all citizens that government exists to accomplish missions that serve smaller “specialized populations” where it might not be cost effective to do so.
- Cost effective measures utilized successfully by private industry are not congruent with accomplishing non-cost effective missions of government.

An alternate explanation for the resistance to ITIM rests in the history and traditions of some states. From a historical perspective, agencies in some states have enjoyed a significant degree of autonomy with little centralized oversight. Many agencies receive funding directly from sources other than the State Legislature and some agencies have independent governing boards reflecting this history of independence. In order for ITIM to be successful, agencies will be required to give up some autonomy and control over their IT expenditures and investments and many agencies are reluctant to do so.

As the demands and expectations of citizens for services and information from State government have grown, the expenditure of funds on technology has continued to expand and a significant portion of the expenditures are hidden, unaccounted for, or never evaluated in terms of the business value derived from the expenditure. For state government organizations committed to improving strategic planning processes and outcomes, a critical component of strategic planning is deciding how IT can best support the execution of strategic business plans. IT investments are costly and it is important to fund those IT initiatives that best support the strategic goals and objectives defined by the business strategic planning process. An ITIM process provides an integrated approach to the identification (pre-selection), selection, control, and evaluation of IT investments across the investment lifecycle. The ITIM framework in the Commonwealth is based on:

- The recognition that the business strategic planning process drives technology investment strategies;
- The concept that technology investments support and add value to the business of state government; and,
- The premise that technology investments should be prioritized, executed, and measured based on the benefits related to achieving business strategic goals and objectives.

ITIM uses structured processes to minimize risks and maximize return on IT investments. The ITIM framework identifies the processes and required steps to assure IT investments are well thought-out, cost effective, and support business plans.

ITIM Framework

IT investments are the hardware, software, and related systems, operated by an organization to support the flow or processing of information in support of business activities. IT investments include hardware and software assets, projects, services, and procurements.

An asset is a product of a completed IT project or procurement. IT related contracts are also assets. Operations and maintenance (O&M) are activities associated with assuring that an existing asset continues to support an identified business need. O&M activities preserve existing functionality and assets in contrast to projects and procurements that create new assets or functionality. O&M expenditures in and of themselves are not considered investments; however, O&M expenditures do support an underlying asset.

A project is a temporary endeavor undertaken to create a unique asset, service, or result.

A service facilitates a business activity. A service is intangible, perishable, and does not result in the creation of a tangible asset which distinguishes a service from a project or procurement

A procurement is the process of acquiring an IT asset through the use of a purchasing mechanism. The procurement process is distinguished by the fact that the process culminates in the acquisition of a physical good.

At the highest level, the ITIM process is a circular or repeatable flow of technology investments through four sequential phases. Identification of business needs and potential investments occurs in the Pre-Select Phase. Potential investments as well as existing investments are evaluated, scored, ranked, and chosen for investment in the Select Phase. Selected investments are monitored in the Control Phase. In the Evaluate Phase, operational investments are assessed against performance measures and lessons learned are identified and documented to assist with future development and operational optimization. The flow of IT investment information moving through each phase is shown in Figure 1.

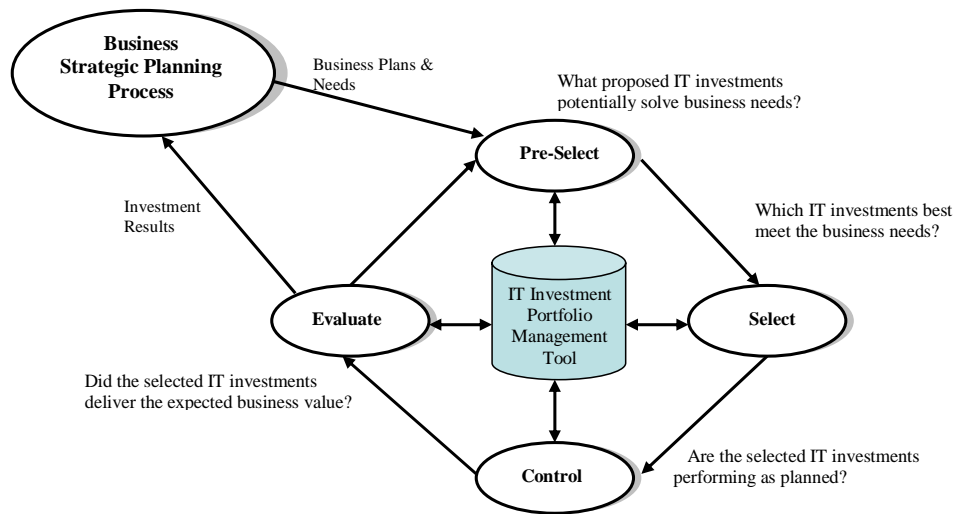


Figure 1. ITIM process overview

Pre-Select Phase

In the ITIM Pre-Select Phase the IT components of agency business needs are identified, analyzed, and documented. Potential technology solutions (investments) are also identified and evaluated in light of strategic plans. The Pre-Select Phase allows an organization to begin the process of defining business objectives, associated costs, and performance measures that result in making an investment case for meeting a business need. Pre-Select Phase activities are performed sequentially in order to complete this phase successfully. Completion of the Pre-Select Phase answers the question “What proposed IT investments potentially solve business needs?” and consists of the following activities:

Analyze Business Need – An organization must analyze its mission, long term goals, and current operations to identify business needs that are not adequately satisfied. After completing the initial analysis, the organization must determine if information technology can solve or contribute to the solution of the performance gap by fulfilling the business need.

Analyze Investment - The focus of the Analyze Investment Activity is on the analysis of the elements of risks of a proposed solution or investment relative to its estimated costs.

Develop Investment Case - The Develop Investment Case Activity combines the outputs from the Analyze Business Need Activity and the Analyze Investment Activity and provides the information necessary to evaluate a potential investment in the ITIM Select Phase.

Select Phase

The purpose of the Select Phase is to decide from among the investments identified in the Pre-Select Phase and other investments previously selected into the investment portfolio, which investments best support an organization's mission, strategic goals, and mandates. Completion of the Select Phase answers the question "What IT investments best meet the business needs?" and consists of the following activities:

Investment Case Evaluation, Scoring, and Approval - The Investment Case for every proposed investment is evaluated, scored, and approved or rejected by the organization.

Maintain Investment Portfolio - The Maintain Investment Portfolio Activity updates information about investments currently in the investment portfolio.

Investment Portfolio Analysis and Investment Ranking - The Investment Portfolio Analysis and Investment Ranking Activity incorporates newly approved investments into the investment portfolio and re-ranks the portfolio.

Portfolio Selection - The Investment Portfolio Analysis and the Agency Investment Portfolio is reviewed and approved by the organization.

Control Phase

The purpose of the Control Phase is to ensure, through timely oversight, quality control, and executive review, that IT investments are developed and placed in operation using a disciplined, well-managed, and consistent process. During this process, the progress and performance of IT investment initiatives against projected cost, schedule, and performance metrics, are regularly monitored. The Control Phase answers the question "Are the selected IT investments performing as planned?" and includes the following activities:

Complete Detailed Development Plan – The detailed development plan provides a roadmap, including key milestones, which can be used to monitor and assess progress on developing the investment.

Collect Control Data - After the development plan is initiated, data is collected, reviewed, and assessed according to the schedule and control criteria contained in the development plan.

Validate Control Data - A validation review is completed on control data. If an investment fails to meet required control standards a remediation plan is developed and implemented.

Investment Oversight Review - On a quarterly basis, the control data for all organization investments is consolidated, reviewed, and analyzed.

Evaluate Phase

The purpose of the Evaluate Phase is to compare actual performance results and benefits of an investment to the results that were initially projected. The Evaluate Phase includes all investments that have been in operation six or more months. The Evaluate Phase answers the question "Did the selected IT investments deliver the expected value?" and consists of the following activities:

Conduct Post Implementation Review - A post implementation review (PIR) is completed on all new investments within 6 – 12 months of the investment becoming an asset to determine whether the asset is meeting the planned performance criteria and addressing the business needs.

Conduct Asset Evaluation - Asset Evaluations are performed on all assets in order to provide a method for timely identification of sub-optimal asset performance.

Investment Oversight Review - Results from PIRs and Asset Evaluations are summarized and analyzed on an annual basis by the organization and used in the organization strategic planning process.

Conclusions

The purpose of establishing an ITIM process is to improve the outcomes from IT investments in relation to their contribution to the strategic goals of the organization. In order to successfully implement ITIM, it must be both technically adequate and acceptable to users. One approach to achieve these two requirements is to implement a voluntary guideline first, thereby allowing individuals to become familiar with the emerging requirements while also providing an opportunity for “fine-tuning” requirements based on experience. While this process has been used successfully in the public sector in the past, it requires several years to execute.

From a technical perspective, the ITIM framework represents state of the art best practices in the public sector. Sabherwal, Jeyaraj, and Chowa (2006) found that the key factors related to information system success are system quality and perceived usefulness. Clearly, a valid and reliable information system must be a minimum requirement for information system success and the system must include functions and features that are easy to use and result in more efficient work flows.

The ITIM framework builds on the best practice concept of project portfolio management by incorporating assets into the portfolio management process. While this appears to be a minor addition, closer inspection reveals that IT assets constitute nearly 80% of the investments in the public sector and, historically, assets have been largely ignored until a catastrophic event occurs. The ITIM framework places assets into the investment selection process requiring assets to be evaluated and compete with other investments for scarce resources. This process creates transparency into the entire investment portfolio as opposed to simply selecting and controlling projects.

The plan for establishing and implementing an ITIM process must adequately plan for the organization changes that would be required. In order for an organization to realize the full benefit of the ITIM process it must be adopted by agencies, institutions, and subdivisions across the state. It is not sufficient to simply “comply with the standard” but instead requires a cultural change that adopts transparency of action and support for the enterprise strategic vision. Further, the general principle that information systems are composed of three elements: people, processes, and technology suggests that the people component of the equation as measured by user acceptance and satisfaction plays an important role in information system success. In addition, Fernandez and Rainey (2006) in a study of successful organizational change in the public sector found unique organizational change challenges in the public sector including frequent change in political appointments resulting in reduced continuity and shifting priorities, less delegated authority in the public sector, and public employees characterized as motivated by caution and security.

Implications and Future Research

User acceptance and fundamental cultural change are considered key to the success of ITIM in the public sector. Additionally, while the portfolio management concept inherent in ITIM has been shown to be successful in the private sector, little empirical work has been done in the public sector despite the acknowledgement that the two sectors are driven by substantially different success factors. Implementation of an ITIM process puts in place a system to allow a comprehensive evaluation process for both investments and the investment process. At the highest level, the ITIM process is implemented with a goal of improving prioritization of projects, more appropriately allocating scarce funds, and enhancing services through the identification, selection, control, and evaluation of high priority investments. Future research focused on the development and execution of an evaluation methodology to (1) assess the level of user acceptance of the ITIM process and (2) develop a portfolio evaluation model to assess ITIM effectiveness in improving IT investments in the public sector would provide valuable information for refining the ITIM framework.

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