Chapter 10
The Role of Investment Planning and Project Management

Chapter Overview
Chapter 10 introduces the concepts of the capital planning and investment control (CPIC) process and its relationship to enterprise architecture and project management. The four phases of the CPIC process are described (plan, select, control, and evaluate). The chapter concludes with a discussion of how a significant part of IT governance is implemented through the CPIC process.

Key Term: Capital Planning
The management and decision-making process associated with the planning, selection, control, and evaluation of investments in resources, including EA components such as systems, networks, knowledge warehouses, and support services for the enterprise.

Learning Objectives
- Understand the concepts of capital planning.
- Understand the four phases of the capital planning process.
- Understand how capital planning relates to EA.
- Understand how project management relates to EA.

Introduction
The EA program is only effective if the enterprise’s resources are effectively applied to gaps in operational performance. It takes people, money, facilities, software, hardware, training, and other resources to do this through the investment in an ongoing series of development and improvement projects. If there were no gaps in operational performance, there would be no requirement for new or upgraded EA components.

However, this is rarely the case, and so capital planning and project management processes are needed to manage the projects that enable the ongoing transition from the current architecture to the future architecture. These processes also help to ensure that strategic, business, and architectural alignment are maintained as the enterprise plans, selects, controls, and evaluates investments in EA components.

Home Architecture Analogy: For an architect’s design to be approved, the owner’s requirements must be met within the budget that is available. The architect must then work with a builder to ensure that the design is properly constructed, that the schedule is met, and that the budget is not exceeded.

Discussion
Capital Planning and Investment Control (CPIC) process supports EA by planning, selecting, controlling, and evaluating investments in new or upgraded EA components. This cyclic process promotes the attainment of the following:

- Identification of operational performance gaps in the enterprise
- Identification of new or upgraded EA components to close performance gaps
- Development of business cases that consider alternatives, alignment, and value
- Development and management of an overall portfolio of investments in the EA
- Maximizing the value of individual investments in EA components
- Encouraging a culture of learning by evaluating each completed investment

The CPIC process operates in four distinct phases that serve to (1) standardize how requirements for technology are identified within a strategic and business context; (2) associate the technology requirement with an EA component; (3) make an investment decision; and (4) implement a solution through standardized project management practices and the EA program. The Project Management Plan (PMP) serves as the common documentation source for all phases of the CPIC process. Figure 10-1 shows the four phases of the CPIC process.

![Figure 10-1: The IT Capital Planning Process CPIC Planning Phase](image)

The CPIC Planning Phase is where business and technology requirements that emerge throughout the enterprise are reviewed at a preliminary level for merit, need, and identification of an association with an EA component. Those requirements that are determined to have sufficient value to enterprise are then associated with an EA component and formalized in a PMP using standard templates for large and small projects. The PMP contains detailed information about the proposed investment/project including the requirement, the business case, a work breakdown structure, a schedule, a budget, roles and responsibilities, measures for success, and a communications plan. The PMP is intended to be a living document that is updated throughout the lifecycle of a project from conception to completion. When the PMP is completed and all project and investment information are present, the potential investment/project moves to the CPIC Selection Phase. Here is also where a cost-benefit analysis is done.

**CPIC Selection Phase**

The CPIC Selection Phase is where a funding decision is made for a proposed investment in an EA component. The funding proposal, as documented in the PMP, is reviewed for value, alignment, strength of business case, strength of technical solution, security, risk, and return.
Based on this review of the PMP, the enterprise’s management determines if the investment should be made in light of available resources. Some enterprises review proposed investments as a group on a periodic basis (e.g., quarterly or annually) so as to align the selection process with budget and business cycles.

Return on Investment (ROI) can be one of the most difficult aspects of a proposed investment’s business case to develop because many of the benefits of enterprise-wide technology solutions are qualitative in nature. For example, in calculating benefits attributable to the EA component that contains enterprise-wide e-mail, there will be an estimate of the dollar values for improvements in productivity, communication, record keeping, and morale; all of which are difficult to precisely measure. For that reason, enterprises should use ROI as only one of a number of factors in selecting investments in EA components.

Once a proposed investment in an EA component is selected for funding, the investment becomes an active project and the PMP is refined to reflect any updates to the implementation schedule and funding plan that may be needed for that project to be activated within the Sequencing Plan of the EA Management Plan. The project then moves to the CPIC Control Phase.

**CPIC Control Phase**

The CPIC Control Phase is where ongoing development and upgrade projects are evaluated for how closely cost, schedule, and EA component performance milestones are being met, and how well areas of risk are being managed.

Cost, schedule, and performance milestones are tracked by establishing baseline estimates and then managing to that baseline. This is the basis of “Earned Value Management” (EVM) which is a project management technique that looks at planned versus actual cost, schedule, and performance data throughout the life of the project.\(^{26}\) One of the key concepts in EVM is that projects that significantly diverge from planned (baseline) estimates are more difficult to return to the baseline the further along that the project is. EVM emphasizes identifying significant divergence within the first third of the project’s schedule in order to have the best chance to recover to baseline values, or to reset the baseline if new requirements have been added which increase cost and/or time estimates. Project planning and tracking documentation is maintained as part of the PMP and includes a Work Breakdown Structure (WBS), project task list and schedule (Gantt Chart), critical path information (PERT Chart), EVM information, and performance metrics. Performance metrics are those which measure the capability of the EA component that is being created. This could include database query speed, application refresh rate, website page refresh rate, usability, navigability, peak network bandwidth, and interoperability.

Risk is related to uncertainty and any potential obstacle to success in the project. It is important to have identified risk areas before the start of the project and implemented proactive and reactive strategies for limiting (mitigating) those risks. Sources of risk include the use of new technologies, loss of key personnel, loss of funding, adding new requirements without adding time/money (called “scope creep”), insufficient testing prior to acceptance, lack of stakeholder buy-in, and insufficient training for end-users and maintenance personnel.

**CPIC Evaluation Phase**

The CPIC Evaluation Phase is where (1) completed IT projects receive a Post-Implementation Review (PIR), and (2) where operational systems are periodically reviewed for continuing value.
PIRs help an enterprise to review the “lessons learned” from each project and in so doing, to mature in their ability to implement similar projects in the future. For example, if an enterprise completes several website projects a year and no PIR is held, the problems, successes, approaches to risk, etc. will not be shared and an opportunity to improve in this area is lost. PIRs help to reduce cost, cycle time, and risk for IT projects, and they help to create a culture of sharing and learning in the enterprise.

Once a system is accepted into the IT operating environment, it becomes what is referred to as a “legacy” system. It is important to not only conduct PIRs just after systems are brought into the IT operating environment, but also to review these legacy systems at regular intervals (perhaps annually) to determine if each one is continuing to add sufficient value to the enterprise to merit additional spending for operations, maintenance, and upgrades. If it is found that a legacy system is not performing to the level that the enterprise needs, or is duplicating capabilities, then that system is identified for phase-out and disposal. Disposing of legacy systems (after needed data and functionality are transferred) is important to maintaining an IT operating environment that is as effective, flexible, and cost-efficient as possible.

**Governance and Capital Planning**

Governance processes, including CPIC, are those that provide policy and decision-making, and they should be overseen by some form of Executive Steering Committee that is comprised of the enterprise’s top executives.

The CPIC process should be managed by the enterprise’s Chief Financial Officer (CFO) in collaboration with the Chief Information Officer (CIO) and LOB managers. Because CPIC is primarily a financial investment decision-making process, the CFO should lead it, but it is very important in information-centric enterprises that the CIO be a partner in the process and that these two executives effectively integrate CPIC and the EA Management process. CPIC decisions in each phase of the process should be made by an executive level Capital Planning Board (CPB) that is supported by a Capital Planning Working Group (CPWG) and an Enterprise Architecture Working Group (EAWG). In this way, CPIC decision-making has senior stakeholder involvement and the documentation and analysis activities are accomplished by subordinate groups of experts in business and technology. Figure 10-2 shows these relationships.

![Figure 10-2: The CPIC Governance Process](image)

The ESC is a top-level policy making and decision review committee. Its purpose is to establish the enterprise’s strategic goals and initiatives, governance processes, and policies to implement
and integrate those processes. Enterprise-wide governance regarding the use of information
technologies primarily involves six processes, which must work together to promote effective
policy and decision-making: strategic planning, enterprise architecture, capital planning, project
management, security, and workforce planning.

The ESC provides the CPB with policy and guidance regarding strategic goals and governance.
The ESC also reviews the decisions of the CPB to ensure that they best promote the achievement
of the enterprise’s strategic goals.

The Capital Planning Board

The CPB is an executive-level decision-making board. The CPB decides which
investments/projects are selected for funding, determines if active projects involving capital
assets (including EA components) are being effectively implemented, evaluates completed
projects for lessons learned, and determines if ongoing programs are continuing to add value to
the enterprise.

To establish a baseline for investment decision-making, the CPB develops a portfolio to
aggregate, categorize, and manage individual investments in capital assets, including EA
components. This “Investment Portfolio” reveals total spending on capital assets, supports
portfolio-level management, and allows for the shifting of resources away from categories with
low ROI. Alternatively, general business categories can be used such as Operations, Sales and
Marketing, Finance and Accounting, Human Resources, Research and Development, and Office
Automation. The goal of portfolio level investment management for the CPB is to identify the
right balance of capital spending between categories, and to weed out weak investments in each
category. The CPB also does cost-benefit analyses.

The CPB should establish a regular schedule for reviewing investment proposals, current
projects, and ongoing programs. Each investment (and investment is a new project or legacy
program) in the portfolio should be reviewed at key schedule milestones or at least once a year.
The CPB should be chaired by the CFO, and the members should include the CIO, program
sponsors, and program managers.

The Capital Planning Working Group

The CPWG supports the CPB by (1) helping Project Managers to prepare and update PMPs,
especially the business cases, (2) providing documentation and business analysis support for
CPB reviews, (3) coordinating their analyses with the EAWG, and (4) maintaining an archive of
CPB documents. The CPWG should be chaired by a CPIC Portfolio Manager and the members
include project managers and CPIC stakeholders. Support staff for the CPWG should include
experts on strategic planning, business analysis, project management, and workforce planning.
The CPWG also performs Cost-Benefit Analyses.

The Enterprise Architecture Working Group

The EAWG supports the CPB by (1) helping Project Managers to prepare and update PMPs,
especially EA information, (2) providing documentation and technical analysis support for CPB
reviews, and (3) coordinating their analyses with the CPWG. The EAWG should be chaired by
the Chief Architect and the members should include project managers and EA stakeholders.
Support staff for the EAWG should include the EA team and experts on information technology
analysis at all levels of the EA³ Cube Framework, security, project management, and
configuration management.
The Role of Project Management

Project (and program) management is a professional discipline that focuses on developing, implementing, operating, improving, and/or retiring enterprise resources. Project and Program Managers (PMs) are responsible for meeting the goals of the project or program. Controlling successful outcomes involves the management of five primary aspects of a project/program: managing scope; controlling costs, maintaining the schedule, achieving desired levels of product performance, and mitigating risk.

Projects and Programs are terms that encompass the work that an enterprise does. Projects are different from programs in that projects create new or updated resources/capabilities. Programs include projects as well as the ongoing governance and business services that constitute most of the activities of an enterprise. Programs are oriented toward the management of existing (legacy) resources/capabilities, whereas projects build new or upgrade existing resources/capabilities.27

Key Term: Project

A temporary endeavor undertaken to create a unique product, service, or result.

Key Term: Program

An ongoing endeavor that manages existing processes/resources, or oversees the development of new processes/resources via projects.

PMs manage both projects and programs by establishing a detailed plan for accomplishing the strategic and/or tactical goals that are supported. Project Management Plan (PMP) and adjusting it to meet changes in requirements or resources. The PMP is a living document that provides information for PMs and others in all phases of the CPIC process. When the project involves the development, upgrade, or retirement of EA components, the development of the PMP also provides some of the EA artifacts needed for that component. Figure 10-3 on the next page provides an example outline of a Project Management Plan.

Project Management Plan

Executive Summary

1. Project Requirements
   a. Project Description
   b. Project Sponsorship and Stakeholders

2. Strategic Alignment
   a. Alignment to Strategic Goals
   b. Value to and Impact on Strategic Initiatives

3. Architectural Alignment
a. Alignment with the Enterprise Architecture  
b. Integration With Existing Resources  
c. Standards and Product Selection Strategy  
d. System Development Lifecycle Methodology  
e. System Performance Metrics  
f. System Standard Operating Procedures  

4. Business Case  
a. Alternatives Analysis  
b. Cost-Benefit Analysis  
c. Return on Investment Analysis  

5. Project Controls  
a. Cost Controls and Project Budget  
b. Schedule and Work Breakdown Structure  
c. Project Performance Goals and Metrics  
d. Risk Management  

6. Project Enterprise  
a. Project Sponsor, Manager, and Team Structure  
b. Roles and Responsibilities  
c. Testing and Quality Assurance  
d. Workforce Training  

7. Security and Privacy  
a. Security Plan  
b. Data Privacy Procedures  
c. Records Management Procedures  

Appendix A Business Case Worksheets  
Appendix B Reference Documents  
Appendix C Glossary of Terms  

Figure 10-3: Example Outline of a Project Management Plan  

PMs should develop the Project Management Plan as follows:  

PMP-Executive Summary  
Provide a one or two-paragraph summary of the purpose of the project, its value to mission accomplishment, the technical approach, alternatives considered, the total lifecycle cost, funding availability, the proposed schedule, and potential implementation risks.  

PMP-Project Requirements: Documentation and Analysis Provide a general description of the
background and context of the project, as well as the EA-related requirement(s) that this project meets. Determine the outcomes that the project must achieve, and how the successful attainment of those outcomes will be measured. Describe the type of EA component(s) that this project develops, upgrades, or retires (system, application, database, website, cable plant, hardware platform, etc.). Determine if this project creates a new IT capability or upgrades an existing capability. Also determine if there is any duplication of existing capability and if so, describe why it is beneficial to create this duplication. For project sponsorship and stakeholders, identify who the funding and implementation sponsor is at the executive level; this is the person with budget approval and operational approval authority. Finally, identify who the stakeholders are in this project (i.e., users, sponsors, developers, and managers).

PMP-Strategic Alignment: Value and Impact

For strategic alignment, describe how this project supports the enterprise’s strategic goals. Describe if this project responds to a directive or a government mandate or initiative, and how this project will meet all aspects of these requirements. For value and impact, describe the value of this project in terms of improving internal and/or external business services and optimizing the utilization of resources. Determine if re-engineering or improvement of those processes is needed before (or as part of) project implementation and operations. Describe the impact if this project is not implemented.

PMP-Architectural Alignment: Integration, Standards, and Approach

For EA alignment, discuss and then document the project’s proposed technical approach with the enterprise’s EAWG for design and operational alignment at the various levels of the EA³ Cube Framework: strategy, business, information, applications, and technology infrastructure. Determine the costs associated with documenting the project throughout its lifecycle in the online EA repository, including views of EA components at all levels of the EA³ Cube Framework in both the current and future architectures, as well as the EA Management Plan. Include these costs in the total lifecycle cost of the project. For integration, determine if there are data or telecommunication interfaces to other EA components and describe how integration, interface, and information exchange issues will be handled. For standards, determine if approved data, telecommunications, and video technical standards at all levels of the EA³ Cube Framework are being followed. If there are new standards being introduced, explain the effect of adopting those new standards on other IT system(s), application(s), database(s), and/or website(s). Describe the approach to configuration management that will be taken in terms of using EACRs at all levels of the EA³ Cube Framework. Determine and describe the System Development Lifecycle Methodology (SDLC) method that will be used to organize IT system implementation efforts (e.g., waterfall, rapid application development, evolutionary, incremental/phased). For performance measures, determine the performance metrics that will be used to measure proper system design performance, to be evaluated as part of acceptance criteria, and during the operations and maintenance phase of the delivered EA component(s). Determine the Standard Operating Procedures (SOPs) that will have to be written for the operations and maintenance phase of the lifecycle, and utilize draft SOPs as part of acceptance testing.

PMP-Business Case: Value and Results

Perform an Alternatives Analysis to determine if there are several viable alternatives for meeting the stated EA-related requirement(s). Identify how each alternative meets or does not meet the requirement(s). Perform a Cost-Benefit Analysis for each alternative and then determine what the
Return on Investment will be (using a Net Present Value discount factor) during the lifecycle. Perform a risk analysis to identify areas of risk and mitigation strategies. Select the best alternative based on (1) strategic alignment, (2) architecture alignment, (3) ROI, (4) security solution, (5) level of risk, (7) total cost of ownership, and (7) available resources. Ensure that the rest of the PMP documentation focuses only on the selected alternative. (See Appendix A for additional details on the business case).

**PMP-Project Controls: Cost, Schedule, Performance, and Risk**

For cost controls, describe the total lifecycle cost of this project, including planning, design, development, operations, and maintenance. Describe the source of funding for the project during the total lifecycle including operations and maintenance. Describe the method for acquiring key project resources (i.e., funding, hardware, software, operating facilities, trained personnel). Use an Earned Value Management approach to track planned versus actual costs, as well as the baseline schedule and actual progress. For additional schedule controls, document the baseline schedule with both task (Gantt Chart) and critical path (PERT Chart) views that identify major milestones, in-progress, reviews, testing, and post-implementation events. For project performance oversight, establish what the performance metrics are for the EA components that are being created and/or upgraded in this project, especially what the acceptance criteria are prior to going operational. In the area of risk mitigation, describe what the potential obstacles to success in implementing this project are and how will this risk be mitigated (overcome the obstacle). Examples include technological risk if the enterprise is an “early adopter”, cost risk imposed by budget cuts, schedule risk imposed by losses of key personnel, late shipment of hardware or software components, and implementation risk if all stakeholders were not involved in all aspects of project development.

**PMP-Project Enterprise: Structure and Responsibilities**

Identify the Project Sponsor, PM, and the project team. Determine and describe the roles and responsibilities of the Project Sponsor, PM, and other key team members. Document this in a project “Roles and Responsibilities Matrix.” Determine a project Work Breakdown Structure (WBS) that identifies all of the major work areas and then decomposes each significant activity in terms of time and budget goals. Use these cost and schedule goals in the Gantt Chart and business case. For testing and quality assurance, describe the approach to testing during development and acceptance. Determine if third-party integration or verification testing is also required, and if so, describe the approach and key participants. Describe the training, user guide, operations, maintenance, and other reference materials that will have to be written for the project’s delivered system(s), application(s), database(s), and website(s). Identify the technical, business process, or other training that users will be required to have in order to operate and maintain the delivered system(s), application(s), database(s), or website(s). Identify sources and cost estimates for all required training and schedule accomplishment prior to acceptance and operations. Identify back-up personnel for key positions to receive training.

**PMP-Security and Privacy: Protecting and Assuring Information**

In the area of physical security, determine and describe the facilities and other direct access protection that will be required to achieve an acceptable level of risk to prevent unauthorized access to these EA components. In the area of information security, determine how the information created/used by the EA component will be protected and authenticated. In the area of personnel security, determine how access control will be provided for system administrators,
database administrators, webmasters, security personnel, and end-users. In the area of operational security, determine and document (via a SOP) the procedures for handling end-user agreements, login and access control, incident response (i.e. virus attacks, denial of service attacks, hackers), password issuance and control, and employee termination. For testing and accreditation, determine and describe the method that will be used to test certify that the delivered EA components(s) meet the risk adjusted-goals in the areas of physical, information, personnel, and operational security. For data privacy, determine the sensitivity and classification of information on delivered EA component(s). Determine the issues related to data privacy and describe how they will be handled (e.g., access to employee’s personal information). For records management, determine the issues related to records management and describe how they will be handled. Determine if information exchange and records management issues exist with other IT resources and describe how they will be handled.

**PMP-Appendices.**

Appendices to the PMP should provide amplifying documentation. This can include the detailed worksheets used in the business case (alternatives analysis, cost-benefit analysis, and NPV/ROI calculations), EA Artifacts, and a project glossary and list of terms.

**Summary of Concepts**

This chapter discussed the role of capital planning and project management processes in the EA Management Program and the implementation of EA components. The four phases of the Capital Planning and Investment Control process were described, as was an investment governance process that centers on the decision-making of the Capital Planning Board and its supporting working groups. These are the groups that perform both business case and EA alignment analyses and help PM prepare and update their Project Management Plans in all phases of the Capital Planning and Investment Control process. The role of project and program management was also discussed in the chapter and an example Project Management Plan was provided.

**Chapter 10 Review Questions**

1. Why is it important to integrate the EA Management Program with the enterprise’s capital planning process and project management practices?
2. Describe the four basic phases of the capital planning process.
3. How can the capital planning process help support decisions on investing in future EA component upgrades or new capabilities?
4. What is a business case for investment in EA components? What are the roles of an Alternatives Analysis, Cost Benefit Analysis, and Return on Investment calculation in the business case?
5. Describe roles and responsibilities in the capital planning governance process.
6. Why is it important to have a standardized format for a Project Management Plan?
7. How are security and privacy issues described in the Project Management Plan?
8. What kinds of updates to a Project Management Plan occur in each of the four phases of the capital planning process?
9. What is meant by “architectural alignment” in developing a Project Management Plan?
10. Describe how an enterprise’s Chief Information Officer, Chief Financial Officer, and Chief Operating Officer should cooperate and coordinate in developing and managing an integrated approach to enterprise architecture, capital planning, and project management.

11. Describe how cost, schedule, performance, and risk managed would be managed in a project to implement an email system in a new location.

12. Develop a business case for the hypothetical outsourcing of an enterprise’s IT Help Desk. The elements of the business case are (1) an Alternatives Analysis that compares in-house operation of the Help Desk and outsourcing to an external service provider, (2) a Cost-benefit Analysis for each of the two alternatives and (3) a Return on Investment calculation for each of the two alternatives.