



CONSTRUCTION EXTENSION TO THE PMBOK® GUIDE 3rd Edition

The Project Management Framework

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M1 Construction project management

Project management

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INTRODUCTION

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- ▶ Purpose of the Construction Extension
- ▶ What Is a Project?
- ▶ Project Management in the Construction Context
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INTRODUCTION

- ▶ The **Project Management Body Of Knowledge** is “**the sum of knowledge within the profession of project management**” that resides with practitioners and academics who apply and advance it.
- ▶ This extension to the PMBOK Guide—Third Edition describes **the generally accepted principles for construction projects** that are not common to all project types.
- ▶ Project management professionals should plan to use both documents The PMBOK Guide—Third Edition and **The Construction Extension** concurrently in the execution of their responsibilities.

Pmbok History and evolution?

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Purpose of the Construction Extension

- ▶ The purpose of this extension **is to improve the efficiency and effectiveness of the management of construction projects** and to include material specifically applicable to construction that is not presently covered in the PMBOK Guide.
- ▶ Much of the PMBOK Guide is directly applicable to construction projects. In fact, the practices and project management of construction projects were one of the foundations of the original 1987 document.

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Audience for the Construction Extension to the PMBOK® Guide

- ▶ Taxpayers
- ▶ Regulatory agencies
- ▶ Local government groups
- ▶ Environmental groups
- ▶ Community groups
- ▶ Risk management specialists
- ▶ Civil engineers
- ▶ Architectural and engineers
- ▶ Geotechnical experts
- ▶ Financial specialists
- ▶ Construction project managers
- ▶ Contractors
- ▶ Construction industry tradesmen and professionals
- ▶ Other stakeholders in the construction process, from land acquisition through design, construction, and occupancy

KEY TERMS AND CONCEPTS

- ▶ The Project Management Institute (PMI) defines a **project** as a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists.
- ▶ **Project management.** The application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management refers to guiding the project work to deliver the intended outcomes. Project teams can achieve the outcomes using a broad range of approaches (e.g., predictive, hybrid, and adaptive).

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KEY TERMS AND CONCEPTS

- ▶ Project manager. The person assigned by the performing organization to lead the project team that is responsible for achieving the project objectives. Project managers perform a variety of functions, such as facilitating the project teamwork to achieve the outcomes and managing the processes to deliver intended outcomes.
- ▶ Project team. A set of individuals performing the work of the project to achieve its objectives.

KEY TERMS AND CONCEPTS

Characteristics of a project



A clear start and end date



A project has boundaries



A project creates something new



A project is not business as usual

KEY TERMS AND CONCEPTS

- ▶ A clear start and end date – There are projects that last several years but a project cannot go on forever. It needs to have a clear beginning, a definite end, and an overview of what happens in between.
- ▶ A project creates something new – Every project is unique, producing something that did not previously exist. A project is a one-time, once-off activity, never to be repeated exactly the same way again.
- ▶ A project has boundaries – A project operates within certain constraints of time, money, quality, and functionality.
- ▶ A project is not business as usual – Projects are often confused with processes. A Process is a series of routine, predefined steps to perform a particular function,

KEY TERMS AND CONCEPTS

Project Vs Operational Work Differences

	Projects	Operations
Time Line	Temporary	Ongoing
Output	Unique	Repetitive
Purpose	Attain its objective and then terminate	Sustain the business
Ends	Concludes when its specific objectives have been attained	Adopt a new set of objectives and the work continue

KEY TERMS AND CONCEPTS

► Why are Construction Projects Unique?

Construction projects inherently contain a **high degree of risk** in their projections of cost and time as each is unique. Buildings may be prototypical, but when constructed on different sites, each project presents its own challenges to accurate cost, time projections, and control.

KEY TERMS AND CONCEPTS

- ▶ **Why are Construction Projects Unique?**
- ▶ Construction projects must address **the geography and conditions of the project site and the relation of the project to the environment.**
- ▶ Construction projects produce **deliverables**

KEY TERMS AND CONCEPTS

- ▶ **Why are Construction Projects Unique?**
- ▶ Construction projects involve **many stakeholders** with varying project expectations such as public taxpayers, regulatory agencies, governments, and environmental or community groups, which many other types of projects do not include.
- ▶ Construction projects often require large amounts of materials and physical tools to move or modify those materials.

KEY TERMS AND CONCEPTS

► What is Project Management?

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.

Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing.

The project manager

- ▶ The project manager is the person responsible for accomplishing the project objectives.
Managing a project includes:
 - Identifying requirements
 - Establishing clear and achievable objectives
 - Balancing the competing demands for quality, scope, time and cost
 - Adapting the specifications, plans, and approach to the different concerns and expectations of the various stakeholders.

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KEY TERMS AND CONCEPTS

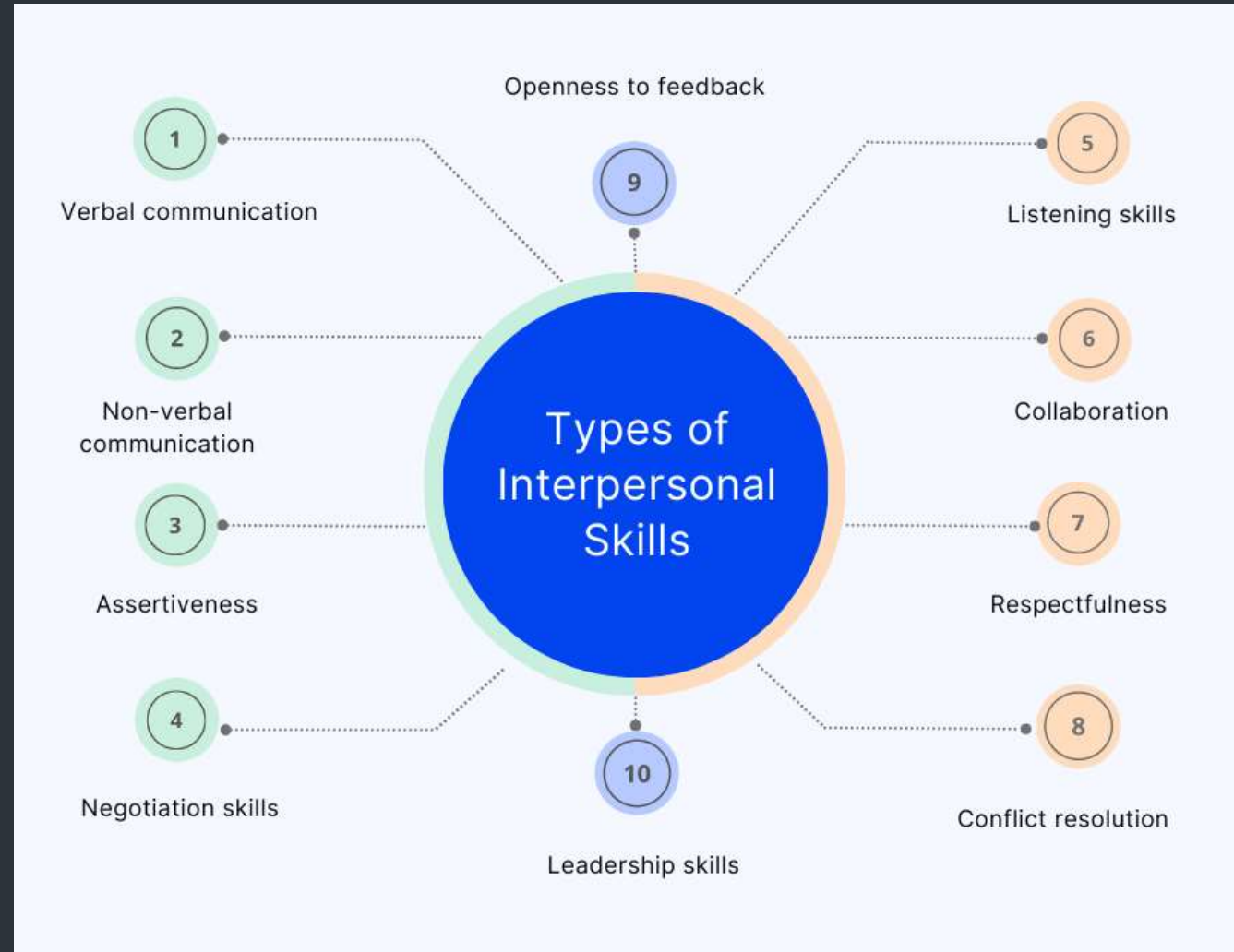


- ▶ Project managers often talk of a “triple constraint”—project scope, time, and cost—in managing competing project requirements. Project quality is affected by balancing these three factors. High-quality projects deliver the required product, service, or result within scope, on time, and within budget.

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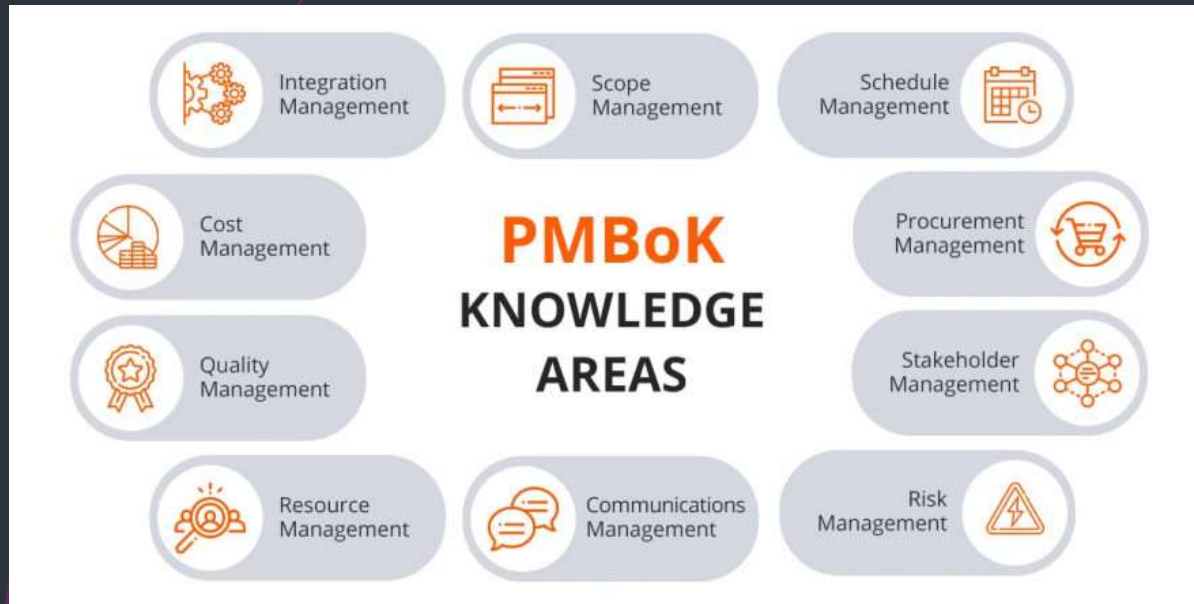
KEY TERMS AND CONCEPTS

- ▶ Interpersonal Skills
- Leading
- Communicating
- Negotiating
- Problem Solving



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KEY TERMS AND CONCEPTS

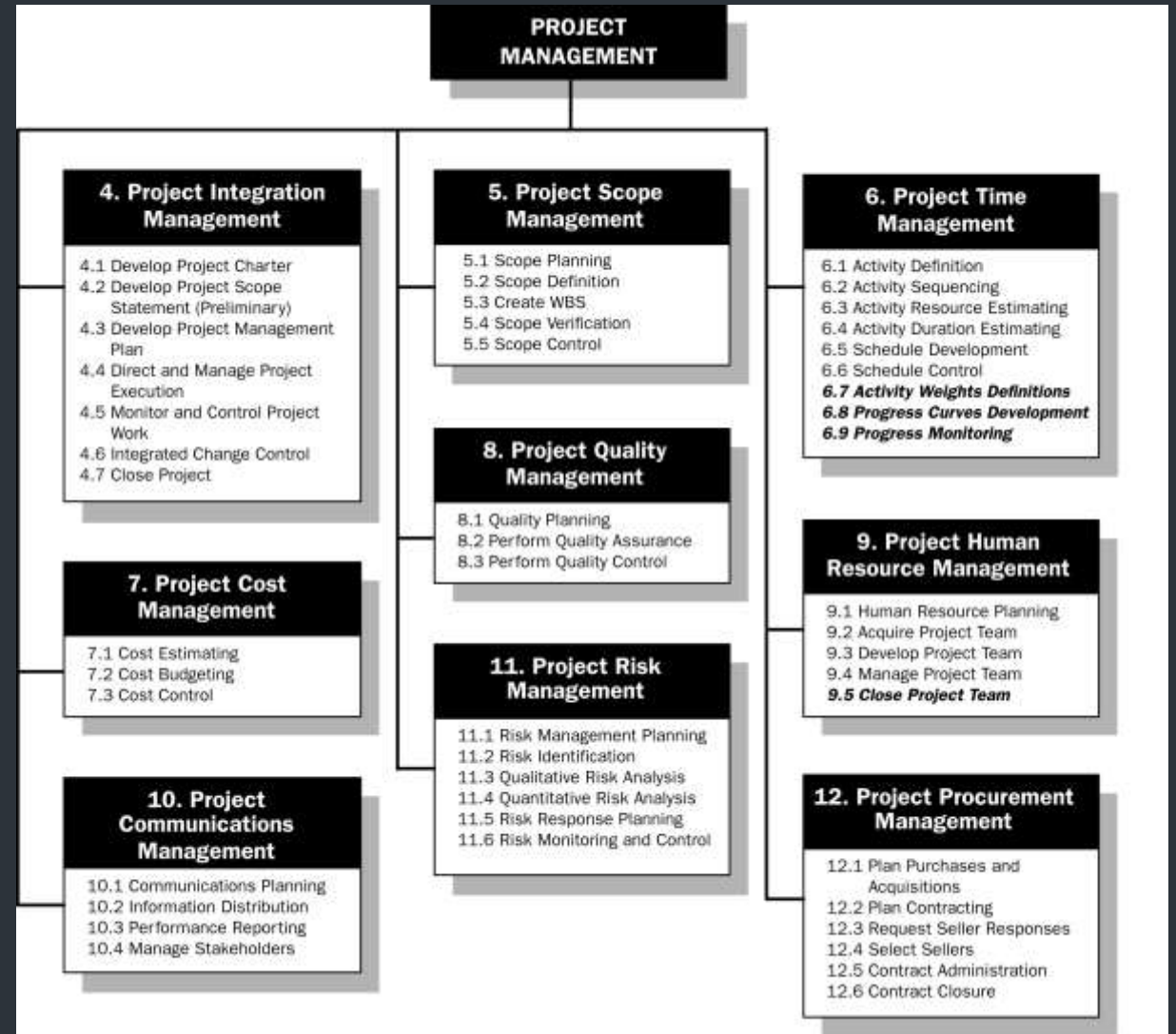


- ▶ The ten Knowledge Areas in the PMBOK Guide—are all applicable to construction projects. However, in this extension, they have been modified to address the unique attributes that are specific to the construction industry and to emphasize those activities that are important in construction. There are additional important Knowledge Areas that apply specifically to construction projects as follows:
- ▶ Safety Management
- ▶ Environmental Management
- ▶ Financial Management
- ▶ Claim Management

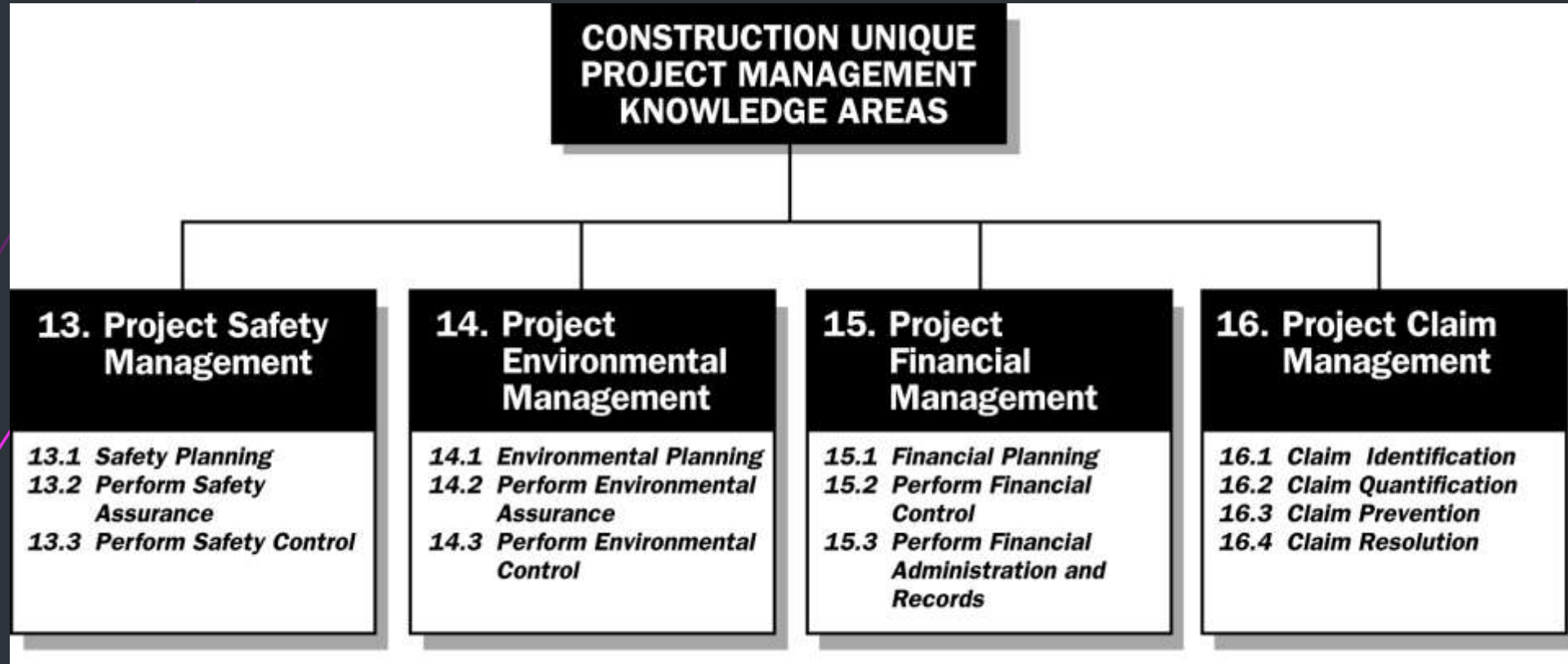
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KEY TERMS AND CONCEPTS

Overview of Project Management Knowledge Areas and Project Management Processes



KEY TERMS AND CONCEPTS



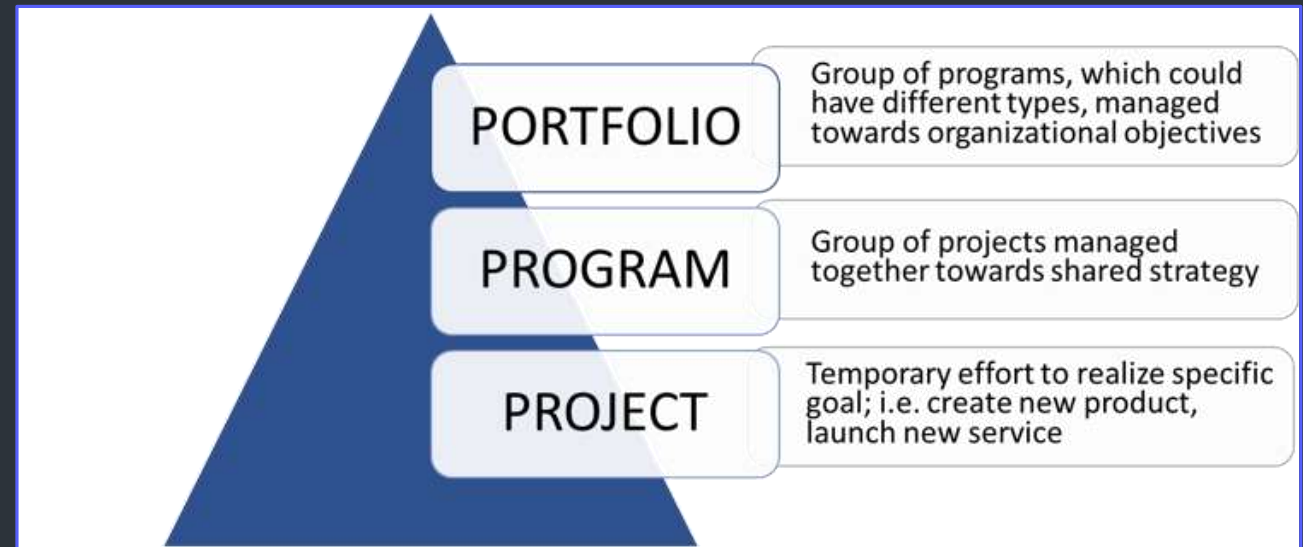
Overview of Project Management Knowledge Areas and Project Management Processes Specific to Construction Projects

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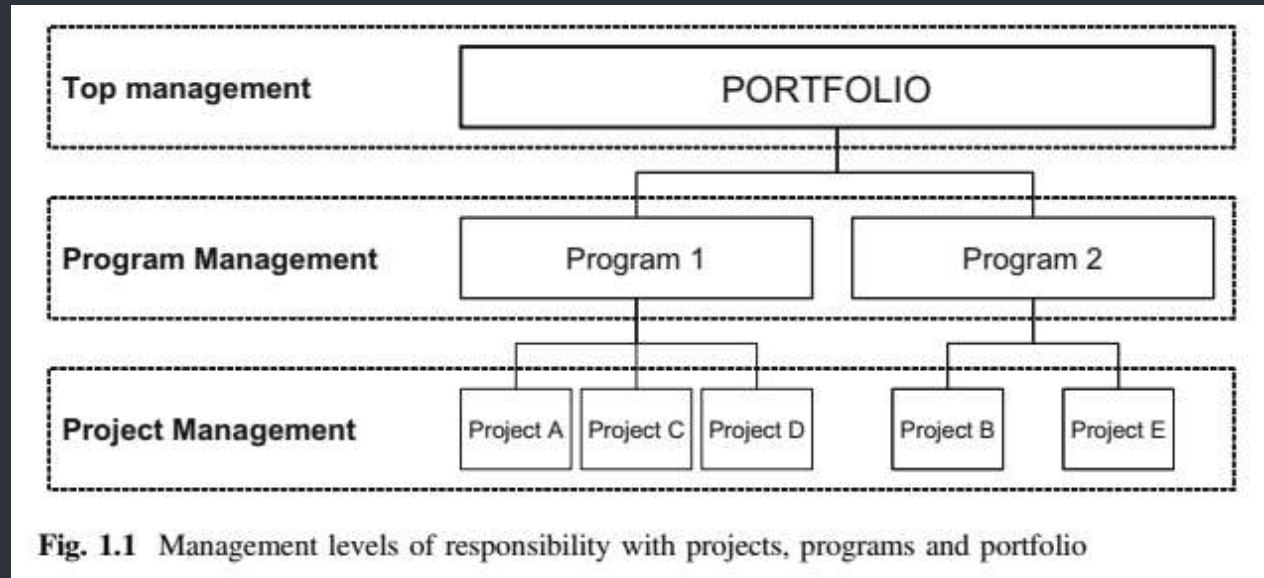
KEY TERMS AND CONCEPTS

► Project Management Context

Project management exists in a broader context that includes program management, portfolio management, and project management offices. Frequently, there is a hierarchy of strategic plan, portfolio, program, project, and subproject, in which a program consisting of several associated projects will contribute to the achievement of a strategic plan.



The portfolio ,programs,Projects



- ▶ The portfolio is the ensemble of all programs the company is committed to. A program is defined as a group of related projects managed in a coordinated way to obtain benefits not available from managing them individually (Project Management Institute 2016).

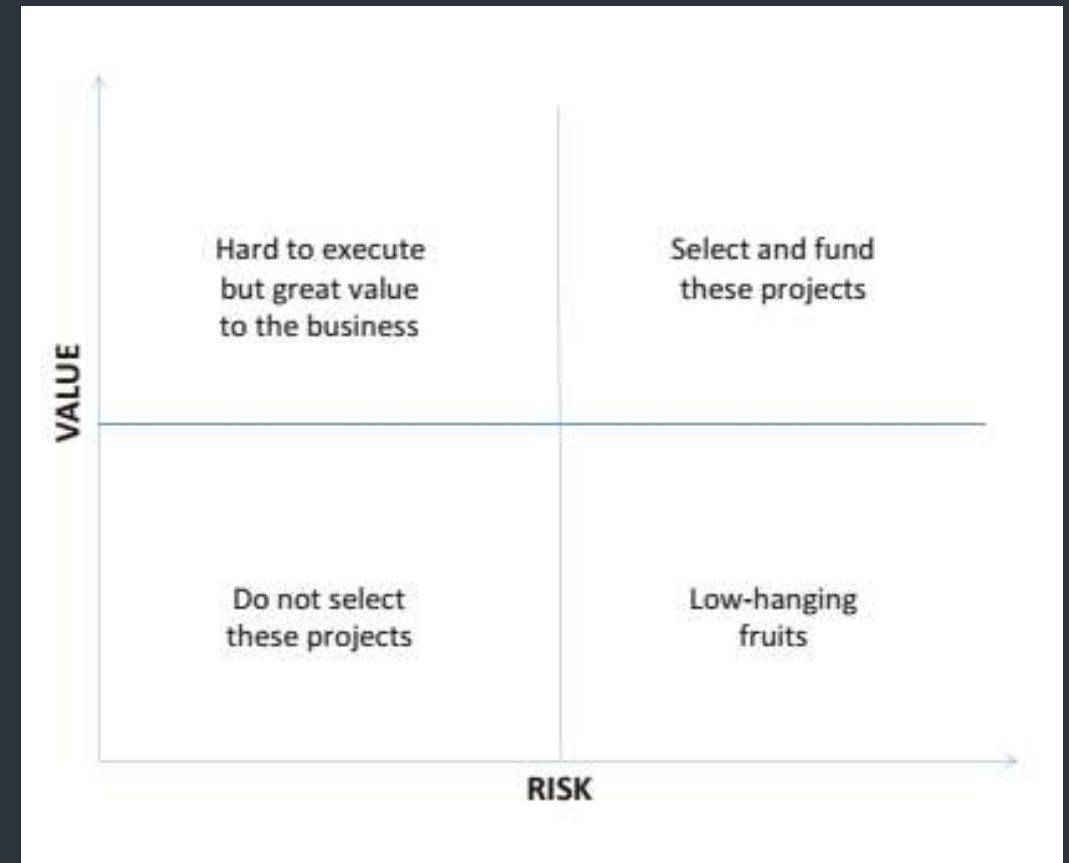
The portfolio ,programs,Projects

- ▶ **A single project** is assigned to a **Project Management team**;
- ▶ **A group of similar projects** is directed by a **Program Management staff**;
- ▶ **A collection of programs**, the **Project Portfolio**, is managed by **the corporate top-executive level**.
- ▶ All three of the tasks are supported by a **Project Management Office (PMO)** or an equivalent central staff.

The portfolio ,programs,Projects

In particular project portfolio managers are demanded to:

- categorize programs and projects according to the strategic objectives established by top management;
- evaluate the value and the risk that each program or project brings to the organization;
- compare, select and prioritize programs and projects;
- establish a roadmap or overall longer term schedule for the prioritized programs and projects.



Project portfolio application matrix

Program Management

▶ The emerging definition of Program Management is consistent with the notion of multiple-project environment. While a Project Manager is assigned the tasks of planning, controlling and directing a single project, the Program Manager keeps an eye on several projects at once, acting as a planner, controller and director of a group of two, or more, similar projects

➤ The definition of Program Management, referred to as management of a folder of similar or related projects



Grouping Projects

Depending on complexity, size, and role of the organization, which may act as owner, contractor or professional service provider, the multiple-project environment poses problems that result from different market orientation, the varied nature of projects, limited resources and competition between projects

Thus, programs can be defined according to:

- Market destination
- Average size of projects
- Product type
- Geographical area
- Delivery system



Grouping Projects

- For example, a general contractor may decide to group projects by type of client industry. In this case, programs are managed as business units: e.g. power, oil and gas, chemical and pharmaceuticals, transportation, environment, industrial plants, etc.
- It may want to consider all small-medium projects as a single program, while large-scaled or complex projects as part of a separate program.



Grouping Projects

- Splitting programs by product type is also very common among contractors; they manage a building program separately from a road program, even if buildings include a mix of industrial, commercial, or residential construction.
- Worldwide or global organizations often group projects depending on their location, because of the different framework of local culture, regulations and practices (e.g.: North-America, Latin America, Western Europe, Middle East, etc.).



Grouping Projects

- Finally, similarities in projects can be found in the type of delivery system with no difference between products: all projects delivered as turnkey contracts may be part of a unique family needing the same standards, processes and resources.



Defining Programs

program managers are concerned with selecting project opportunities and with providing best practices and guidance for managing the projects included in the program.

Defining Programs

- ▶ The selection of investment opportunities arises from the need of giving the highest return to limited financial resources.

▶ Objective assessment methodologies

Quantitative methods

Qualitative methods

Combination of both

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graph TD; A[Objective assessment methodologies] --> B[Quantitative methods]; A --> C[Qualitative methods]; B --> D[Combination of both]; C --> D;
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Defining Programs

- ▶ The SWOT analysis, which lists strengths, weaknesses, opportunities and threats on a table



Defining Programs

Qualitative aspects of projects may also be compared with multiple attribute techniques. The method is based on the notion of expected utility: individuals make choices to maximize their implicit preference. Multiple attribute scoring techniques enable decision-makers to give each option a preference index and to compare alternatives

Defining Programs

semi-qualitative method

- the Program Team or PMO defines a set of attributes that are important for the decision
- Each attribute is assigned a utility weight
- projects are scored with respect to every one of the attributes with a numerical value that is an indicator, in the decision maker point of view of the project capability of satisfying the specific attribute
- Finally, the performance index of a given project (k) is the summation, for all parameters (i), of the utility weight (w) multiplied by the score (s) of each attribute, as in EQ

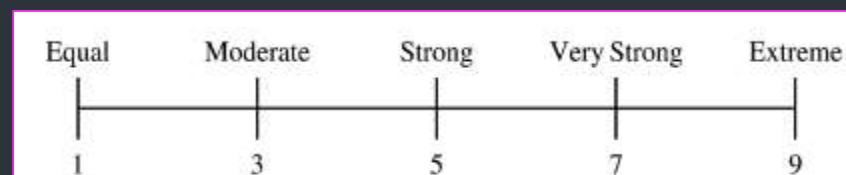


Fig. 1. AHP preference scale.

$$PI_k = \sum_i^n w_i * S_{ik}$$

Defining Programs

To compare projects, qualitative methods may not be enough and it becomes necessary to introduce numerical evaluation of the return on investment by measuring their profit and profitability.

Profit is referred to as the gross profit of a project (the total revenues deducted the direct cost), and return equals the gross margin over revenue or over cost.

Profitability evaluations are based on discounted project cash flow, using net present value (NPV) and internal rate of return (IRR) computations.

Defining Programs

- ▶ Frequently decision-makers care about multiple attributes: namely cost, time, quality, relationship with owner, impact on health, safety and environment, public and commercial image, etc

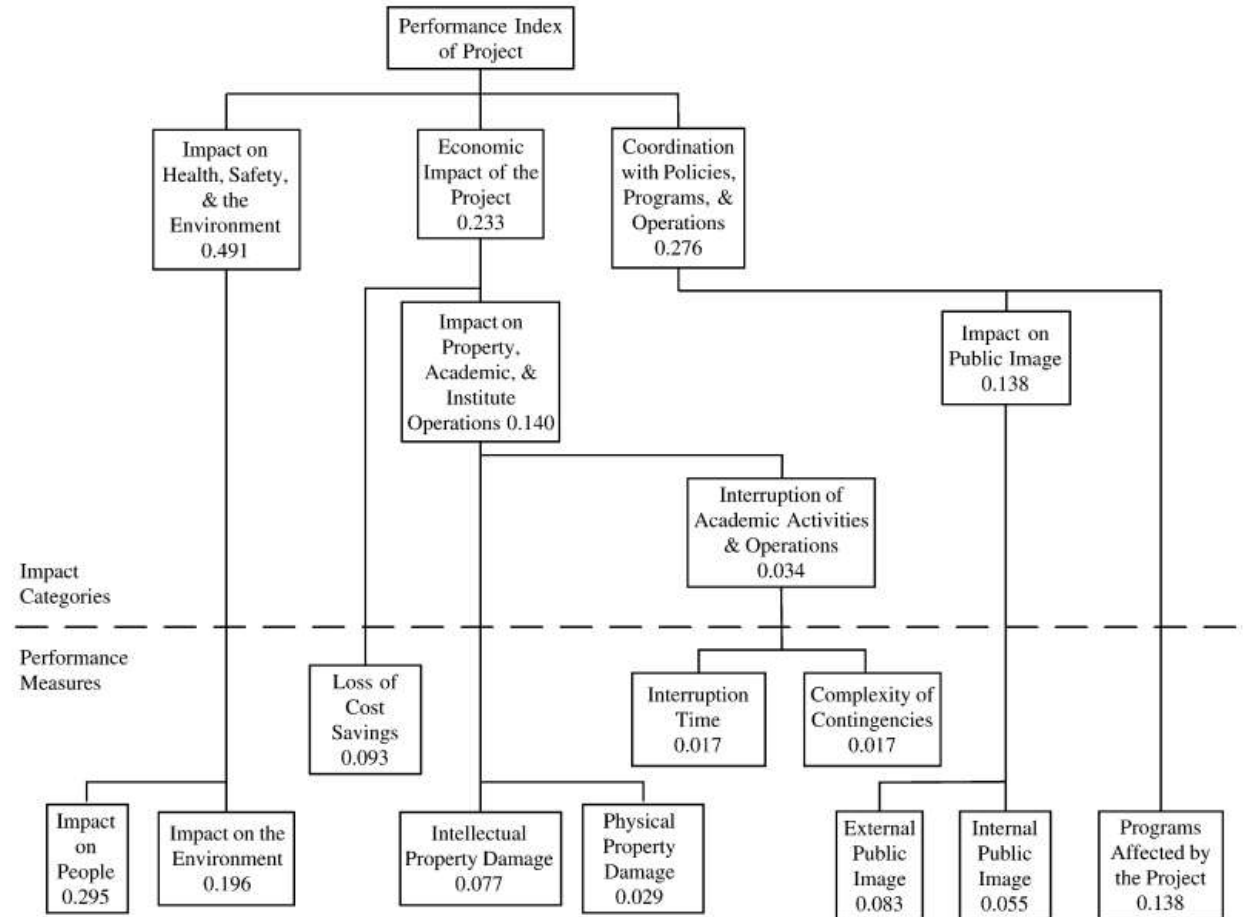


Fig. 3. Value tree.

Defining Programs

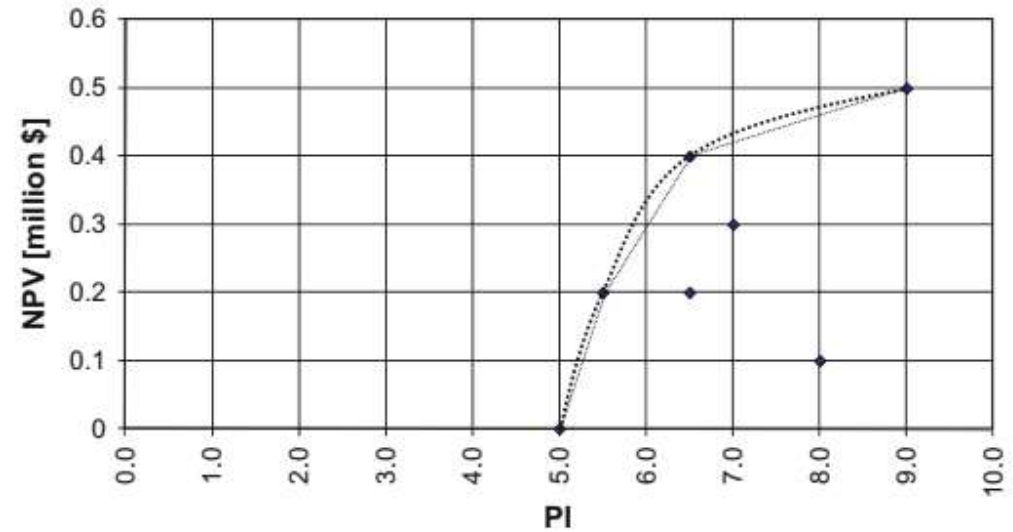


Table 1.1 Project dataset

Project	PI	NPV
A	5.0	0
B	5.5	0.2
C	6.5	0.2
D	7.0	0.3
E	6.5	0.4
F	8.0	0.1
G	9.0	0.5