PMP EXAM PREP HANDBOOK

A CONSISE AND PRAGMATIC

GUIDE TO REVIEW CORE CONCEPTS

BY

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BASED ON LATEST EDITION OF PMBOK

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PMP EXAM OVERVIEW

The PMP certification exam has 200 multiple-choice questions. You are allowed four hours to complete the exam. Once you get your PMP certification, you will need to maintain PMP active status which requires that you must earn 60 professional development units (PDUs) every three years. This can be done in various ways such as attending PMI recognized events, watching podcasts, completing courses and conducting project management.

ELIGIBILITY

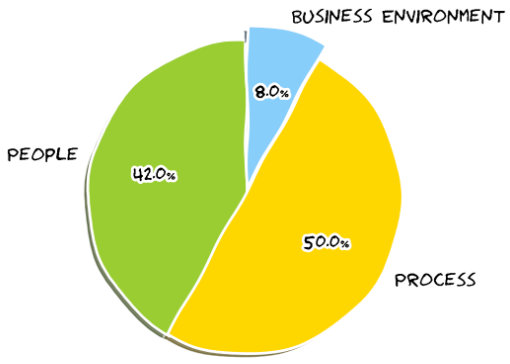
According to PMI, to apply for the PMP, you need to have either:

- A secondary degree (high school diploma, associate degree etc.) with at least five years of project management experience (7,500 hours leading and directing projects and 35 hours of project management education)
- A four-year degree (e.g. bachelor's degree) and at least three years of project management experience, with 4,500 hours leading and directing projects and 35 hours of project management education

The PMP certification exam is comprised of questions from five main project management processes. It is important to note that for PMP exam, you need to understand project management from the PMI's perspective which is described in PMBOK® guide. As you start preparing for this exam here are few things to remember.

- Whenever the exam mentions "project", think of it from the perspective of large (around 10 million dollar or more) projects. Your project management experience may be helpful, but it is not sufficient to pass the exam.
- Don't procrastinate! Manage your PMP exam preparation like any other project. Build your own study schedule and be consistent with your preparation plan.

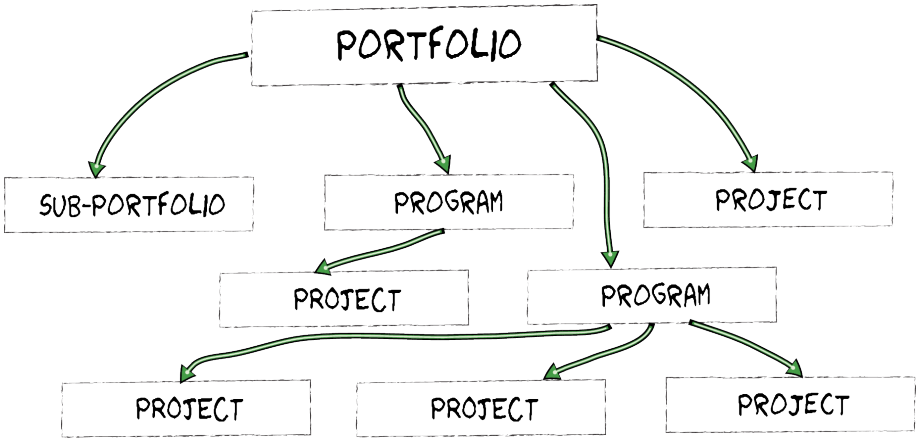
The diagram below shows the percentage of questions that are on exam from each of the project management processes:



EXAM QUESTIONS PERCENTAGE BY DOMAINS

PROJECT MANAGEMENT FRAMEWORK

The first three chapters of PMBOK© establish common vocabulary, environment in which projects operate and role of project manager as defined by PMI. It is important that you develop a very good understanding of the terms defined in the first three chapters. During the exam, whenever a question refers to a project, portfolio, project management office etc., you should be able be understand it in terms of the PMI's definitions. It may be tempting to answer based on your experience, which may or may not be aligned with the PMI definitions. For the exam, think of projects with large teams, US$10 million plus budget, separate Project Management Office (PMO) and teams spread across different countries. It is also important to note that a project as per PMI is a **temporary endeavor**, which indicates that it must have a specific beginning and end, unlike operations which continue indefinitely.



RELATION BETWEEN PORTFOLIO, PROJECT AND PROGRAM

For a Project Manager (PM), it is important to understand strategic objectives of a portfolio as that helps to understand the overall vision for various projects and programs that are part of that portfolio. The PM needs to understand the degree of control and influence of the PMO office, which can be **supportive**, **controlling**, or **directive**.

Projects often take place in environments that may not be in the Project Manager's control. It is important for a Project Manager to **understand organizational culture and structure**. Organizational culture refers to vision, motivation, reward systems, code of conduct, work ethic, work hours etc. Organizational structure refers to characteristics of the organization such as functional, weak matrix, balanced matrix, strong matrix, and projectized. It is essential for a Project Manager to know the organizational structure to understand his authority and control over resources. The Project Manager has most authority and control over a project in a projectized and least-in functional organization.

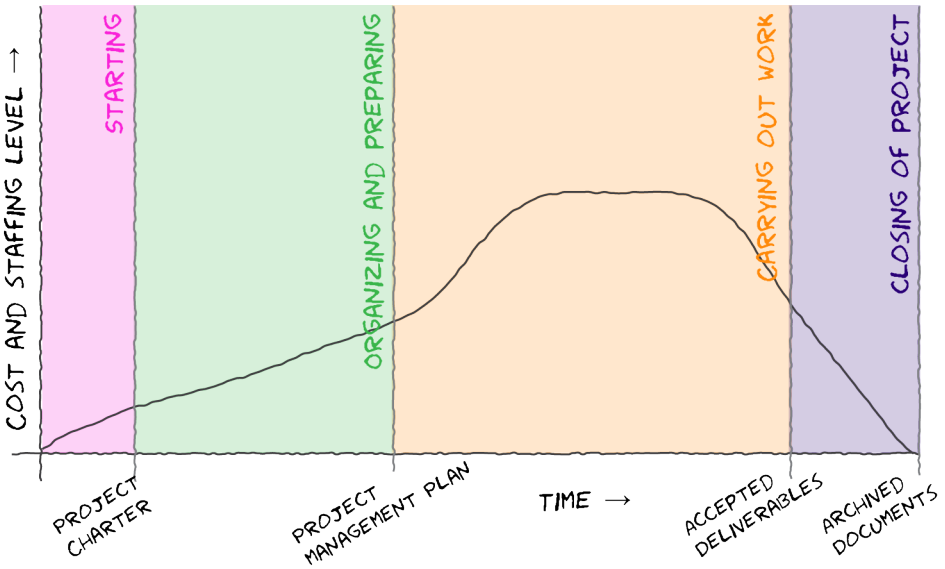
In addition to structure, the PM also needs to know **Organizational Process Assets** (OPA) that are divided broadly into two categories.

1. **Processes and procedure:** Guideline, criteria, policies, templates, change control procedures, financial control procedures, issues and defect management procedures, organizational communication requirements, procedures for work authorizations, risk control procedures, proposal evaluation criteria and project closure requirements
2. **Corporate knowledge base:** This includes databases such as configuration management, financial information (labor hours, incurred costs, budgets etc.), historical information and lessons learned, issues and defects, process measurement, historical project files etc.

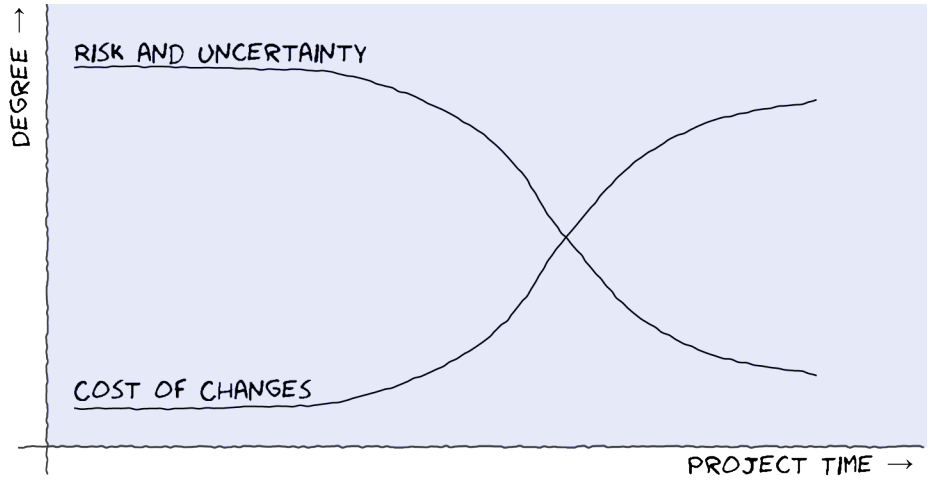
OPA are inputs to most planning processes and can be big time savers for most new projects. OPA provide common, organization-specific procedures that needs to be followed.

There are certain conditions that not under the control of the project team but do affect the project team. These are referred to as **enterprise environmental factors** (EEF). The Project Manager needs to understand and educate his team about **EEF**. These include organizational culture, geographic distribution of resources and facilities, infrastructure, exiting HR, market conditions, and project management information systems. Sometimes these are also referred to as baggage that the PM gets with a project.

Although most projects vary in size and complexity but follow following generic **project life cycle** as shown below:



As a PM, you also need to understand and be cognizant of the impact of change requests in terms of risk and cost with time as shown by following chart.



IMPACT OF CHANGES VS TIME

This chart shows that as the time progresses, it becomes more and more expensive to execute change requests which makes sense for most cases if you think about it.

PROJECT LIFE CYCLES

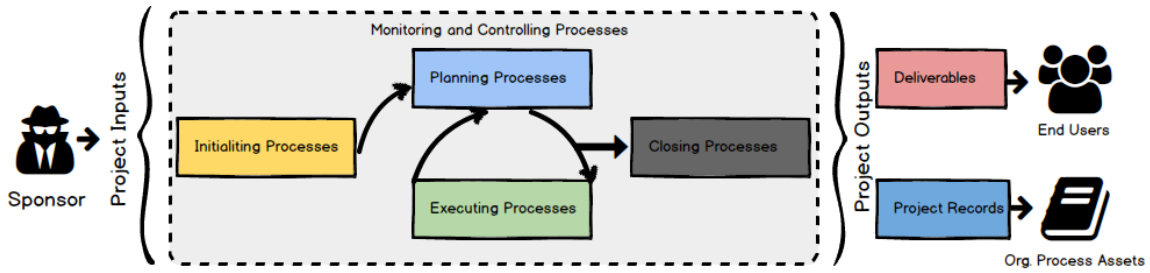
Predictive or **fully planned** or **waterfall** life cycles are the ones where project scope, time and cost are determined as early as possible. These methodologies are more popular for construction projects.

Adaptive or **agile** life cycles or **rolling wave** planning or **progressive elaboration** life cycles are the ones in which project phases (or iterations) intentionally repeat one or more project activities as the project team's understanding of the project increases and require ongoing stakeholder involvement. These methodologies are more popular for software development projects.

THINGS TO REMEMBER

- **Project**: Temporary endeavor to create a unique product, service or result
- **Program**: Group of related projects, subprograms, and program activities managed in a coordinated way to obtain benefits not available from managing them individually
- **Portfolio**: Project, programs, sub-portfolios, and operations managed as a group to achieve strategic objectives
- **Project Management**: Applications of skills, tools and techniques to project activities to meet project requirements
- **Program Management**: The application of knowledge, skills, tools and techniques to a program in order to meet program requirements and to obtain benefits and control not available by managing projects individually
- **Portfolio Management**: Centralized management of one or more portfolios to achieve strategic objectives
- **Operations Management**: Operations management is concerned with the ongoing production of goods and/or services. It ensures that business operations continue well by using the optimal resources needed to meet customer needs.
- **Competing Project Constraints**: Cost, time, scope, resources, risk, quality
- **Organizational Project Management (OPM)**: Strategy execution framework utilizing project, program, and portfolio management as well as organizational enabling practices to consistently and predictably deliver organizational strategy
- **Project Management Office**: Helps with standardizing governance. Three forms of a PMO are:
  - **Supportive (Low Control):** Consultative role by supplying templates, best practices, training access to information and lessons learned
  - **Controlling (Moderate Control):** Provide support and require compliance through various means
  - **Directive (High Control):** Take control of projects by directly managing projects
- **Organizational Project Maturity Model (OPM3):** Examines an enterprise's project management process capabilities
- **Business Value:** The entire value of the business, the total sum of all tangible and intangible elements
- **Key Competencies of a PM:**
  - **Knowledge:** Refers to what the PM knows about project management
  - **Performance:** Refers to what the PM is able to do or accomplish while applying his or her project management knowledge
  - **Personal:** Encompasses attitudes, core personality characteristics, and leadership, which provide the ability to guide the project team

- **Organizational Structures:**
  - **Functional:** One employee has one identified superior
  - **Matrix:** Blend of functional and projectized characteristics
    - **Weak Matrix:** Mostly functional. The PM is like a coordinator/expeditor (cannot enforce/make decisions)
    - **Balanced Matrix:** Recognizes the need for a PM but doesn't give full authority over project and funding.
    - **Strong Matrix:** Mostly Projectized. PMs have considerable authority
  - **Projectized:** PMs have independence and authority over project decisions. One employee can either report to the PM or provide support services for other projects
- **Enterprise Environmental Factors:** Company culture and existing systems that project would have to use
  - **Project Management Information Systems (PMIS):** Software systems for project management such as data storage system, scheduling system, time tracking system etc.
- **Organizational Process Assets:** Processes, procedures and historical information specific to the organization
- **Stakeholder:** An individual, group, or organization who may affect, be affected by, or perceive itself to be affected by decision, activity, or outcome of a project. All these entities could be internal or external. Such as Project Sponsor, customers, users, sellers, business partners, organizational groups, functional managers, government regulators, consultants, subject matter experts (SME)
- **Project Life Cycle:**
  - **Plan Driven:** Waterfall methodology-based projects
  - **Change Driven:** Agile, change driven or iterative methodology-based project
    - **Product Backlog:** Decomposed set of requirements and work to be performed
- **Operations vs Project:**
  - **Project**: Time bound; once the objective is met, it ceases to exist
  - **Operation**: Continues indefinitely to sustain core business and continues to exist
- **Project Management Business Documents:**
  - **Project Business Case:** Organizations typically perform needs analysis and economic feasibility study to proceed with or cancel proposed project.
  - **Project Benefits Management Plan:** This document details the benefits and lists the procedures to measure those benefits.



This graphic provides another way to visualize processes groups within a project. Here you can see outputs from initiating process are fed to planning process. Monitoring and controlling are conducted throughout the project life cycle or phase life cycle. For a big project with multiple phases, the grey box can repeat multiple times for each phase.

To summarize this chapter, a project can have multiple phases. For example, phase 1 for market research, phase 2 for prototype development and so on. Each process group should be performed in each phase. Initiating processes at the start of each phase helps to keep the project focused. At the closing stage of a project or phase, success criteria are verified, and decisions made to continue with the project or make changes if required.

Another frequently asked question on the PMP exam requires an understanding of the difference between **Work Performance Data**, **Work Performance Information** and **Work Performance Reports**. Refer to *Things to Remember* section for the definitions. Figure 1-7 of the PMBOK© guide also does a good job of visually presenting this information.

THINGS TO REMEMBER

- **Project Management Process**: A set of interrelated actions and activities performed to create an identified product, service, or result. These processes ensure the efficient flow of the project throughout its life cycle
- **Project Management Process Groups or Process Groups:** PMBOK© dictates that for each project following five processes groups are performed to successfully execute a project.
  - **Initiating Process Group**: Processes performed to define a new project or a phase of an existing product by obtaining approval to start the project or phase
  - **Planning Process Group**: Processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was established to achieve
  - **Executing Process Group**: Processes performed to complete the work defined in the project management plan to satisfy the project requirements
  - **Monitoring and Controlling Process Group**: Processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes
  - **Closing Process Group**: Processes done to finalize all activities across all Process Groups to formally close the project or phase
- **Project Information:**
  - **Work Performance Data**: Raw observations and measurements captured during activities performed to carry out the project work
  - **Work Performance Information: P**erformance data collected from various controlling processes, analyzed in context and integrated based on relationships across areas
  - **Work Performance Reports: P**hysical or electronic representation of work performance information compiled in project documents, intended to produce decisions or raise issues, actions, or awareness

PROJECT SCOPE MANAGEMENT

Project Scope Management is the process where formal documentation is prepared to meet customer expectations and describes *all* the work required and *only* the work required to complete project successfully.

1. PLAN SCOPE MANAGEMENT — PLANNING

Inputs	Tools and Techniques	Outputs
1 Project management plan	1 Expert judgment	1 Scope management plan
2 Project charter	2 Data Analysis	2 Requirements management plan
3 EEF	3 Meetings	
4 OPA		

Note: Throughout the rest of the handbook, every section has a table similar to the one above. PMBOK® calls these ITTOS (Inputs, Tools and Techniques and outputs). You will see some questions based on (e.g. Which of the following is not a Tool and Technique for creating Scope Management Plan?) these tables. You definitely don't need to memorize any of this. Here is how you can study these:

- Divide a piece of paper into three columns. Label them with titles input, tools and techniques and outputs. Hide the columns titled Tools and Techniques, Inputs.
- Now think about the outputs and on a separate piece of paper, try to write down what Inputs and tools / techniques you'd need to get outputs
- Writing this would help you to identify your knowledge gaps
- Once you repeat this 3-4 times, you'll start recognizing patterns and won't need to memorize!

BENEFITS

- Provides a formal process for project scope definition, validation and control
- Gives guidance and direction as to how the scope will be managed
- Helps detect and control project scope creep

Plan Scope Management produces two outputs: Scope Management Plan and Requirements Management Plan. Scope Management Plan guides the documentation for Work Breakdown Structure (WBS) management whereas the Requirements Management Plan is for how activities will be planned, tracked and reported. Requirements traceability matrix (RTM) (see next section) connects WBS to RTM.

2. COLLECT REQUIREMENTS — PLANNING

Inputs	Tools and Techniques	Outputs
1 Project charter	1 Expert judgment	1 Requirements documentation
2 Project management plan	2 Data gathering	2 Requirements traceability matrix
3 Project documents	3 Data analysis	
4 Business documents	4 Decision making	
5 Agreements	5 Data representation	
6 EEF	6 Interpersonal and team skills	
7 OPA	7 Context diagrams	
	8 Prototypes	

As the section title indicates, in this process using the inputs from stakeholder, and project objectives, all the requirements are identified, documented and managed.

BENEFITS

- Provides a foundation for managing the project scope
- Requirements become foundation for WBS.
- Provides a necessary categorization for requirements such as business requirement, stakeholder requirement, solution requirement, quality requirement etc.

This process has five inputs but if you look closely. It starts to make sense why those inputs are required. Since you are collecting requirements, you need to know all the stakeholders, their influence level and communication requirements. You need the stakeholder register along with the stakeholder management plan. The Project charter is also required as it provides high-level requirements.

If any of the tools and techniques appear unfamiliar, see the section **Things to Remember** at the end to refresh your understanding these terms. The exam usually has a couple of questions based on it.

The two major outputs of collect requirements process are **Requirements documentation** and **Requirements traceability matrix**. Once the Requirements collection is done, the data needs to be compiled into clear-cut, measurable, consistent and acceptable requirement descriptions and presented to key stakeholders. The documentation format for these requirements can be one single document or more a comprehensive list of documents depending on the project, company or business requirements. Requirements traceability matrix is another important output that ensures that every requirement adds business value as it links requirements to business and project objectives. This helps to track requirements as the project progresses and provides a structure that helps to keep track of scope change.

FORMULA SHEET

1. EARNED VALUE

$$CV = EV - AC \qquad CPI = \frac{E}{A}$$

Where:
CV: Cost Variance EV: Earned Value
AC: Actual Cost CPI: Cost Performance Index
CV > 0 ⇒ Project under budget CV < 0 ⇒ Project over budget
CPI > 1 ⇒ Project on track ☺ CPI < 1 ⇒ Project behind ☹

$$SV = EV - PV \qquad SPI = \frac{E}{P}$$

Where:
SV: Schedule Variance EV: Earned Value
PV: Planned Value SPI: Schedule Performance Index
SV > 0 ⇒ Behind schedule SV < 0 ⇒ Ahead of schedule
SPI > 1 ⇒ Project on track ☺ SPI < 1 ⇒ Project behind ☹

$$EAC = AC + Bottom\ up\ ET$$
$$EAC = \frac{BAC}{CPI}$$
$$EAC = AC + (BAC - EV)$$
$$EAC = AC + \frac{(BAC - EV)}{CPI \times SPI}$$

Where:
EAC: Estimate at Completion BAC: Budget at Completion
CPI: Cost Performance Index SPI: Schedule Performance Index
AC: Actual Cost EV: Earned value
Use equation:
1st: When original estimate is fundamentally flawed
2nd: CPI will stay the same for the rest of the project
3rd: If current variances are considered atypical of the future
4th: If project has to meet a deadline

$$TCPI = \frac{BAC - EV}{BAC - AC}$$

Where:
TCPI: To complete performance index BAC: Budget at Completion
EV: Earned value AC: Actual Cost
TCPI > 1 ⇒ Over-budget ☹
TCPI ≤ 1 ⇒ Within-budget ☺

$$ETC = EAC - AC$$

Where:
ETC: Estimate to Complete EAC: Estimate at Completion
AC: Actual Cost

$$VAC = BAC - EAC$$

Where:
VAC: Variance at Completion BAC: Budget at Completion
EAC: Estimated at Completion

2. COMMUNICATION CHANNELS

$$C = \frac{n(n-1)}{2}$$

Where:
C: Number of communication channels
n: Number of team members or stakeholders