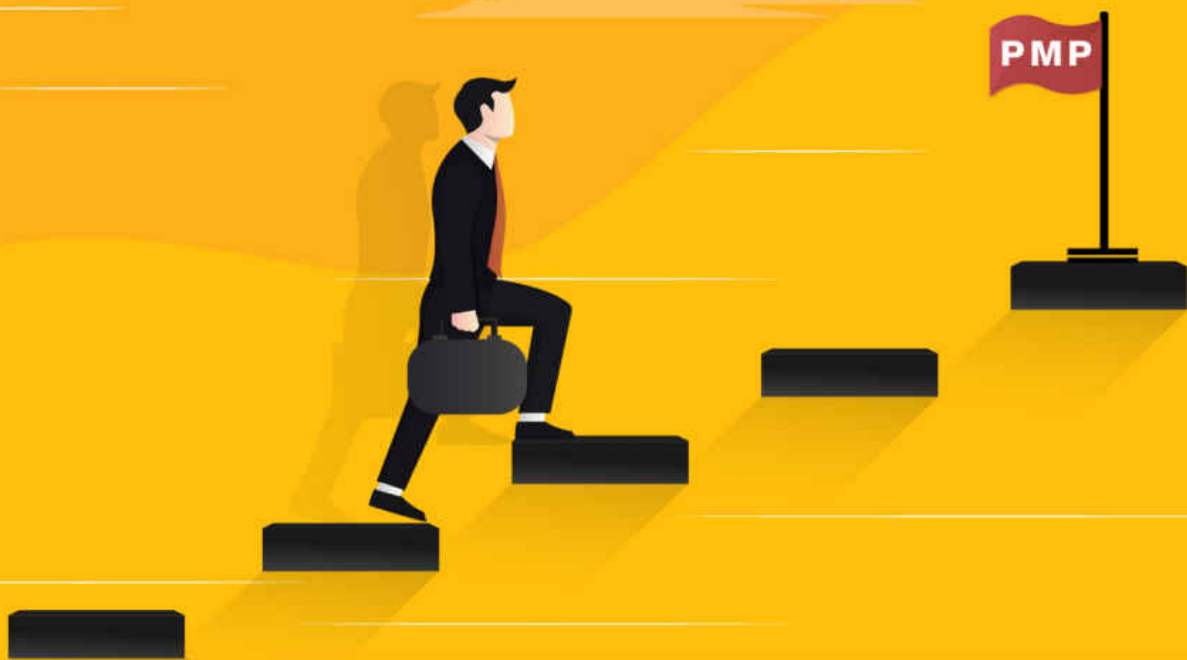


# ESSENTIAL **PMP** PREPARATION

A PRACTICAL EXAM PREP WITH SIMPLIFIED EXPLANATIONS, DEFINITIONS, AND EXAMPLES



**INCLUDING 8 PRACTICE TESTS + 1 FULL EXAM  
(TOTAL OF 300 QUESTIONS)**

**YASSINE TOUNSI**

# Essential PMP Preparation

A practical exam prep with simplified explanations, definitions, and examples - Aligned with PMBOK 7th edition and the Agile Practice Guide

**Including 8 Practice Tests + 1 Full-length Mock Exam  
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**Yassine Tounsi**

## Preface

As much as the PMP certification gets increasingly sought after year by year, pursuing this credential seems to get equally harder. Undoubtedly, PMP is a tough, challenging exam due to its duration, type of questions asked, and mainly the fact that it covers a broad spectrum of project management topics, concepts, and approaches.

PMP aspirants often face several demotivating factors during their preparation journey, ranging from their inability to meet their study goals, a fear of failure, or even a fading commitment and enthusiasm. However, through encountering and assisting numerous PMP aspirants on a daily basis, I noticed that their main struggle is often not knowing what to study and how to handle the difficult concepts they encounter while preparing for the exam.

I strongly believe that people are generally not afraid of the hard work PMP requires, they are however afraid of failure, which is only made worse by the complexity of preparation resources. Their lengthy content just adds to that fear and erodes their confidence. With the countless PMP training, books, and courses in the market nowadays, the preparation process can get unnecessarily overcomplicated.

Think of it this way, and this does not only apply to PMP: The simpler you keep things, the more likely you will achieve success! As Thomas Mann says "Order and simplification are the first steps toward the mastery of a subject."

Based on this belief came the idea of the *Essential PMP Preparation* book. While it is difficult, PMP is certainly reachable. With the right resources, you'll not only pass the exam, but you'll even do it outstandingly. The *Essential PMP Preparation* is created with two main aspects in mind; eliminating the complexity of project management concepts and presenting an encapsulation of all the resources that a PMP aspirant should go through, covering the PMBOK 7th edition as well as the Agile practice guide.

This is the sole reference that will transform your PMP preparation from overwhelming to practical. With an easy-to-go-through structure, the *Essential PMP Preparation* simplifies the hardest topics and covers all project management performance domains, presenting a summed-up recapitulation of the exam's syllabus in easy-to-understand explanations and examples, as well as practice tests with enough questions to evaluate your readiness and identify any knowledge gaps.

This is your basic preparation guide for a simple, practical, and fast studying process. Covering both theoretical and practical aspects of PMP preparation, the essential aim of this guide is to help you steer clear of common complications and avoid the burnout caused by going through endless resources. The psychological side of PMP preparation is one of this guide's focus points, with an emphasis on motivation and stress management, efficient studying, and getting into the right mindset, prior to and during the exam.

The *Essential PMP Preparation* can be either used as the main PMP preparation guide for those who have experience in the Project management field, a summary that you can go through to facilitate your studying, memorize all the essential terms and concepts, and practice mock questions, or even as a final preparation step to make sure you're fully ready and you're not missing any crucial points. Its rich content and practical form make it a versatile studying tool.

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# Introduction

## *Simple - Practical - Comprehensive*

As hard to believe as it can be, PMP preparation can be simple. Buying as many studying materials as you can and reading through countless pages and books is not the way to get your PMP certificate while keeping your sanity.

The *Essential PMP Preparation* is designed to cover both the theoretical and practical aspects of the exam by breaking down the most complicated project management concepts into simple, easy-to-understand and remember explanations as well as providing you with enough practice material to get you fully ready. The goal is to help you have a comprehensive preparation experience without the usual stress and burnout that comes along the PMP studying process.

The fact that PMP can be hard to obtain does not mean it requires the most complicated preparation resources you can get your hands on. The *Essential PMP Preparation* content is laid out in a logical, organized manner, making it quite easy to flow from one section to another and from one concept to the following, without facing any hardships to understand any of the included terms and with the option of practicing what you learned in each step of the way.

This guide was written with two things in mind: presenting technically accurate content and making sure it's done in an understandable lucid way. This way you won't have to worry about struggling with the dense content and the complicated academic language of the traditional PMP preparation resources.

The *Essential PMP Preparation* is a comprehensive guide that includes essential project management concepts addressed in the PMBOK 7th edition as well as other resources recommended by PMI in the PMP reference list, including the Agile Practice Guide, making it the ideal preparation tool for anyone sitting for the PMP exam.

This prep book is purposed to help you make sense of PMP concepts, principles, procedures, and vocabulary of all three domains of knowledge: People, Process, and Business Environment. Additionally, the *Essential PMP Preparation* thoroughly covers predictive, agile, and hybrid approaches. Along with the theoretical material, the book includes a total of 300 practice questions to provide you with a global preparation resource.

This self-study guide is designed to help PMP aspirants learn faster and retain easily; keywords are highlighted to allow you to focus your attention and adjust your pace while going through each section. Each chapter is followed by a practice test of 15 questions intended to test your comprehension of each of the project management performance domains. Along with 8 practice tests, you will also be provided with a full-length mock exam at the end of the book as a final step to evaluate your exam readiness.

The *Essential PMP Preparation* starts with a general initiation into Project Management & PMP, moving on to everything related to stakeholders and the project team. Next, project development approaches, cadence, and life cycles are tackled in detail, thoroughly covering Agile and Scrum. Then, project planning is addressed to explain project requirements collection and analysis, schedule development, and estimation and prioritization techniques under predictive and adaptive approaches.

This chapter is logically followed by project work execution and monitoring as well as project knowledge and procurement management, accompanied by a thorough explanation of contract types and their proper use. The next chapter focuses on delivery and quality succeeded by a chapter dedicated to project performance measurement and assessment. Lastly, the book tackles uncertainty and risk, examining risk analysis, planning, and responses.

The *Essential PMP Preparation* also dedicates a supplementary chapter for exam tips and tricks involving preparation best practices, tips for efficient studying, guidance on time management, and a collection of all the Dos and Don'ts that a PMP aspirant should carefully keep close attention to before the day of the exam, on the day of the exam, and during the exam, whether they're taking it in person or online. The psychological side of the PMP preparation journey is also covered in this chapter by explaining how to get and stay motivated throughout the whole process, as well as manage stress, to eventually get into the right mindset for acing the certification exam.

We've helped hundreds of PMP aspirants achieve their goal of acquiring the certification with our previous PMP book releases. We've done it by setting high standards for our preparation materials, and the *Essential PMP Preparation* is no exception.



# **CHAPTER 1**

## Introduction to Project Management and PMP

# 1. Overview of the PMP Exam

Since you're reading this book, you're most likely to be pursuing the **PMP** (Project Management Professional), a project management certification administered and issued by the **PMI** (Project Management Institute).

In addition to the most sought-after PMP credential, PMI provides the CAPM (Certified Associate in Project Management), PgMP (Program Management Professional), PfMP (Portfolio Management Professional), PMI-ACP (Agile Certified Practitioner), PMI-PBA (Professional in Business Analysis), PMI-RMP (Risk Management Professional), PMI-SP (Scheduling Professional) certifications.

When preparing for your PMP exam, you should be guided by the **ECO** (Exam Content Outline), which serves as a blueprint for the certification exam, along with the **Exam reference list**, which presents PMI's recommendations for the exam preparation resources and guides.

Among this list, you can find the **PMBOK** (Project Management Body of Knowledge), which is the most known and used PMI-issued resource, mainly covering methods, terminologies, and guidelines of the project management profession.

Along with each newly issued PMBOK edition, PMI also updates and publishes the **Standard for Project Management**, presenting the standard principles and best practices of project management and guiding the actions and behaviors of professionals working in the field.

Apart from the PMBOK, the PMP exam reference list includes the **Agile Practice Guide** as well as other titles. The Agile Practice guide was developed by the Agile Alliance and PMI to provide project management practitioners with the needed tools and guidelines to understand and properly implement agile approaches.

As a PMP aspirant, you should also check PMI's **Code of Ethics and Professional Conduct** during your exam preparation phase. This document represents the authoritative guide on how all PMI members should behave, as it sets values each project manager should possess, including responsibility, respect, fairness, and honesty.

To be eligible for the PMP exam, you should acquire 35 **contact hours** through completing an approved project management training. Once you're

PMP certified, and in order to maintain your credential, you will need 60 PDUs every three years.

**PDUs** (Professional development units) are hourly blocks of time that a PMP certified professional is required to accumulate through training, studying, teaching, or volunteering.

These PDUs should cover the different areas defined by the PMI's **Talent Triangle**. This talent triangle identifies three skill sets: business management and strategic skills, technical project management skills, and leadership skills.

When earning the required PDUs, you must maintain a minimum of 35 Education PDUs and a maximum of 25 Giving Back PDUs. This means that you can renew your certification with 60 Education PDUs and 0 Giving Back PDUs, but not the other way around.

## 2. Overview of Project Management

Before getting into in-depth PMP concepts, we should first start with some key fundamentals and basics to get us off on the right foot.

While preparing for your PMP exam certification, I bet you'll come across the next term countless times, so it only makes sense to start off with it. A **project** is a temporary carefully planned endeavor with the purpose to achieve or create a result, product, or service.

Projects often get confused with operations. The difference is that **operations** are ongoing, permanent, and repetitive work or activities that typically follow organizational procedures to support the organization's main functions.

A project can be either internal or external. An **internal project** is when the customer or sponsor is a certain person or department within your company. Alternatively, an **external project** is undertaken for the benefit of an independent external party that supports the project's development financially.

In both cases, the end-user of the delivered product or service is not necessarily the project sponsor or customer. Internet and software companies, for instance, primarily create projects in which they are their own client and the general public is their end-user.

Whether it's internal or external, **project management** involves applying a set of knowledge, skills, tools, and techniques to fulfill the project requirements and reach its objective. Project management should focus on delivering the expected outcome, benefits, and value, instead of paying more attention to outputs and artifacts.

Talking about project management, I should clarify that it's different from **Product Management**, as the latter implies developing and maintaining a product throughout its life cycle, not just at the time of its development.

A **product life cycle** involves the cycle or duration a product goes through from the time it gets introduced into the market until it gets eventually taken off the shelves. There are four stages in a product's life cycle: introduction, growth, maturity, and decline.

Part of managing a project is choosing the right approach to proceed with it. Since there is no standard, unique way to manage a project, the project

manager should determine which methods and processes to adopt depending on their project nature, size, complexity as well as other factors.

Here comes the need for **tailoring**, where you deliberately adjust and adapt your project management approach, processes, and practices to better fit your project properties. Continuously tailoring your processes is a purely agile practice.

Tailoring your processes does not only increase the efficiency of your project work, but it also helps you better handle project constraints. **Constraints** refer to any limiting factors that restrict a project manager's options while executing their project work.

**Triple Constraints**, or the **Iron Triangle**, for instance, refers to the time, cost, and scope constraints that should be kept in check in order to ensure your project deliverables quality.

The triple constraints can extend to include six project management constraints instead: Scope, Quality, Schedule, Budget, Resources, and Risk, making up the **competing constraints**.

### 3. Project Initiation

Now that we're good on the basics side, and that you can clearly distinguish a project from other similar concepts and terms, let's get into the practical side of things and start with the project initiation phase and how exactly it should be conducted.

As you certainly know, a project originates from an idea that was found to have a potential business value. So, in order to bring this idea to life, it gets closely and thoroughly examined, explored, and analyzed through first and foremost developing a business case.

The **Business case** is a developed document with the purpose of demonstrating your idea's financial and nonfinancial potential benefits. For instance, you can use the **triple bottom line (3BL)** as a tool for evaluating a business opportunity value from the perspective of 3 basic lines: profit, people, and the planet, aka the 3P's. This analysis method aims to demonstrate the economic, social, and ecological balance a business idea could achieve.

The purpose of the business case document is to persuade your organization to select your project for execution by showcasing its anticipated benefits once it gets implemented. Consequently, a **value proposition** should be created too in order to state the tangible value your project will bring to end-users.

Often, the value produced by a project lasts beyond its lifespan as the product continues to exist. Therefore, a **product life cycle assessment** can be done to identify the potential financial, social, and environmental impacts of the project output. This assessment comprises the associated impact of the used materials and processes on the environment, sustainability and toxicity wise.

A further step that should be taken to determine whether an idea is practically apt for execution, is the realization of a feasibility study. A **project feasibility study** mainly assesses a proposed project to determine if it is realistically and practically feasible to achieve, and if so, how likely is it to succeed.

In order to carry out the above-mentioned assessments and analysis, you'll need a number of tools and techniques to help you determine your project's assets as well as any potential gaps. **SWOT** is one of the most used tools in this case, as it provides on-point analysis and identification of a project's Strengths, Weaknesses, Opportunities, and Threats.

When demonstrating an idea, entrepreneurs often opt for a visual display called the **Business model canvas** to concisely capture how a project or an organization will function and eventually deliver value. This canvas is a one-page visualization of nine aspects: value proposition, key resources, key partnerships, key activities, cost structure, revenue streams, customer relationships, customer segments, and channels.

Prior to the initiation phase, and in the early stages of any project, a project vision and a strategic plan should be both set up as the stepping stone for the practical implementation of the project. A **project vision statement** is a brief, high-level description of the project purpose and a declaration or a commitment to what the project team will accomplish by the end of the project. This statement usually plays the role of inspiring the involved parties, especially the project team to commit to the project direction and to the defined success criteria.

A **strategic plan**, on the other hand, defines the adopted approach and practical steps to achieve the project mission and vision by specifying, on a high level, the project goals and objectives throughout its lifecycle.

Once it gets approved, it's time to define the project scope and deliverables. The **project scope** presents the overall amount of work required to achieve the project's main objectives and deliver a product, service, or result that fulfills the specified features, functions, and requirements.

The unique product or service created by the end of the project is called a **deliverable**. However, if you're managing an iterative project or one that is being developed in phases, each iteration or phase can result in certain deliverables which can be also considered increments.

Approving a project does not mean it will be immediately executed as it must be authorized first. And for that purpose, a project charter is created. The **project charter** is a formal authorization document for the project manager to initiate the execution phase using the organization's resources.

The project charter is issued by an external party such as the project sponsor, Project Management Office (PMO), portfolio steering committee, or anyone with the authority to assign project resources and name the project manager.

# **CHAPTER 2**

## **Project Stakeholders**



# 1. Identifying Project Stakeholders

When managing a project, you are most likely to come across, work with, and collaborate with a number of stakeholders that are commonly present in every project. Any organization, group, or individual who has an effect or might be affected by your project's outcomes, decisions, or activities is considered a **stakeholder**.

Typically, a project will have three main stakeholders: the project manager, the project team, and the project sponsor or client.

The **project manager**, also called the **project lead**, is the person assigned by the organization to lead the project work by engaging the project team throughout the project lifecycle in order to achieve the project objectives.

As a project manager, you are responsible for planning, managing, and delivering your project within the constraints of schedule, budget, resources, risks, etc, making you the one accountable for the project outcomes.

The role and title of a project manager vary depending on the approach they're adopting for work execution. For example, a project manager in an agile scrum project is more of a facilitator as they're called a **Scrum Master**. On the other hand, a project following the Kanban approach is led by a **Flow Master**, who, as the name implies, is responsible for ensuring that work moves smoothly across the Kanban board.

Along with the project manager, a set of individuals representing the **project team** performs the required work for the project to successfully meet its goals. Within this team, you can set up a **project management team** to assist you with management tasks.

Under an agile approach, the project team is the same as the project management team since all members take part in the planning activities. However, they're commonly called the **development team** or **cross-functional team members**.

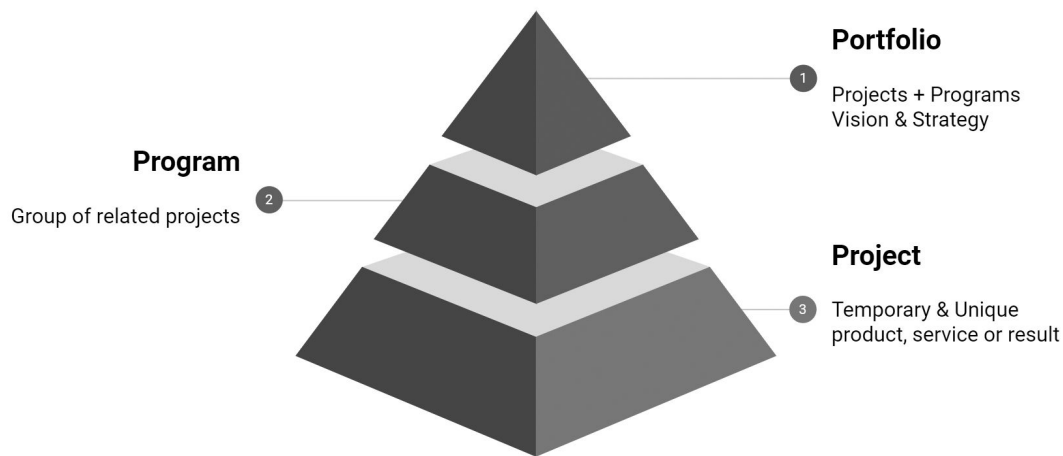
A project would be merely an idea without a **sponsor or customer**. Your project sponsor is the person or entity that takes care of providing the needed resources and support for your project to be executed. This person is the one who can authorize your project realization and in some cases, discontinuation.

When a large project involves multiple business units, organizations, or individuals who all have a substantial stake in the project's success and outcomes, a **steering committee** is established rather than a single sponsor.

If your project outcome is a product, the sponsor might designate a **product owner** or **product manager** to act as their representative, with a mission to maximize the product value, thus, being responsible and accountable for the end result. Their responsibilities include identifying user needs, gathering feature requests, and working with cross-functional teams to plan and schedule releases and iterations.

In large organizations, multiple projects that are similar or related to one another could be gathered into a program, and the person who coordinates the efforts of the various projects under a certain program is a **program manager**.

A portfolio, on the other hand, assembles a number of programs and/or projects, which are not necessarily related to one another. A **portfolio manager** monitors the projects and programs within a portfolio in order to fulfill the organization's vision and business goals.



In order to standardize project governance processes across the organization, a **Project Management Office (PMO)** could be set up. A PMO is an important stakeholder as it could define and set project management frameworks, templates, forms, etc. as well as provide administrative support, centralized communication, training, project staffing, etc.

Organizations adopting the agile approach typically have a **Value Delivery Office (VDO)** instead of a PMO, which is a project delivery support structure that is responsible for training project teams, promoting agile skills, guiding sponsors and product owners, etc.

Stakeholders differ depending on the organization's structure and the adopted approach; if you work in a functional organization, for instance, you will need to collaborate with the **functional manager** as they're the manager of the permanent staff of your department, line of business, or function (sales, finance, production, etc.). Managing a predictive project, you will need to refer to the **Change Control Board (CCB)** for reviewing and approving any change requests.

The above-mentioned list of potential stakeholders is not exhaustive, since anyone involved or has an interest in your project's outcome can be considered as one of its stakeholders. This leads us to the next point: how to ensure efficient stakeholder management, regardless of the number of stakeholders.

Well, it starts with documentation, more precisely with creating a **stakeholder register**. A stakeholder register is a record of all of your project's stakeholders, their roles, information, concerns, interests, and attitudes toward the project, as well as any other assessment and classification of these stakeholders.

## 2. Analyzing Project Stakeholders

In the previous section, we went through the process of identifying your project's potential stakeholders depending on a number of factors such as project size, its execution approach, organization size and nature, etc.

Your next logical step should be analyzing those identified stakeholders. **Stakeholder analysis** implies assessing your stakeholders and classifying them depending on their level of influence, impact, interest, power, legitimacy, urgency, support, resistance, etc.

As a project manager, you will need to use a number of models and grids to systematically collect and analyze quantitative and qualitative information to eventually classify your stakeholders. The most common tools for this activity are the Stakeholder engagement assessment matrix, the Power/interest grid, the Stakeholder cube, the Saliency model, and the Directions of influence.

**Stakeholder Engagement Assessment Matrix** classifies stakeholders under five categories: Unaware, Resistant, Neutral, Supportive, and Leading. This matrix showcases a stakeholder's current position and stance towards your project, helping you determine how to further develop their engagement to the desired level.

The amount of effort that you should put into ensuring and promoting your stakeholder engagement depends on several factors. For example, you need to invest more time and effort when it comes to stakeholders with high levels of authority and interest. For this purpose, you need to rely on the **power/interest grid** to classify your stakeholders according to their power and interest levels.

If you need to add another dimension to your analysis, you can use the **stakeholder cube**; it uses three classification dimensions, such as power, interest, and attitude. Hence, you will be able to get a more in-depth version of the power/interest grid.

It is useful to determine the importance of each particular stakeholder when you are tackling a large, complex stakeholders group. The **saliency model** comes in handy for assessing your stakeholders' power, urgency, and legitimacy.

PS: The term saliency means noticeable or prominent.

The classification of your stakeholders' influence on your project team might also be needed. For that, you can use the **directions of influence** to classify

stakeholders under four categories: upward, downward, outward, or sideward influence.

It's a good idea to be also familiar with the **organizational chart**, also known as organigram, organogram, hierarchy chart, and organizational breakdown structure (OBS), which depicts a large project team or an organization's reporting structures as well as its flow of information.

When you're done with both stakeholder identification and analysis, you'll be able to start planning for stakeholder engagement by setting up a **Stakeholder Engagement Plan**. This plan will be your roadmap as the project manager for strategically handling, managing, and monitoring your project actors.

Accurate, in-depth stakeholder analysis helps you manage all parties involved in your project efficiently during the execution phase, ensuring coherent communication and collaboration, thus meeting their expectations, addressing their concerns, and fostering their adequate involvement.

### 3. Engaging Project Stakeholders

Successful stakeholder engagement is the result of efficient communication, and, a typical, basic communication comes in the form of a **sender/receiver model**. This model simply consists in making sure the message is delivered from the sender to the receiver, through encoding the message or information by the sender in the form of words or symbols, transmitting it through a communication technology or channel, and finally decoding the message by the receiver in a way they can easily understand it.

The flow of communication in this two-way model might face some barriers known as noise which can interfere with or obstruct the successful delivery of the message from the sender to the receiver. This noise can be psychological (stereotypes, biases, assumptions, etc.), environmental (sounds, sights, etc), physical (background music, loud noise, etc.), or semantic, which occurs when the sender uses a language, grammar, jargon, etc that the receiver cannot decode or fully understand.

The context could also be considered noise. Typically, in a **high-context culture**, and in order to successfully decode messages, you'll have to fully understand and be aware of the situation or the sender's surrounding context.

Depending on the number of stakeholders involved in your project, the number of communication channels can vary. To figure out how many communication channels your project may involve you'll have to resort to the **communications formula**. The formula is:

$N \times (N - 1) / 2$  with N representing the total number of stakeholders. For example, a project of 7 stakeholders will have 21 communication channels.

Communication within a project can manifest in various forms and types depending on the situation, context, goal, and factors. For instance, no matter what type of project you're managing, you'll always need to use formal and informal communication.

**Formal communication** refers to the process of communicating official information through proper, predefined channels. Reports, presentations, contracts, etc. are all considered formal communication as they usually take some time and effort to plan and prepare. Formal communication provides a record of any terms, conditions, dates, etc. that have been discussed and approved, binding communicating parties to comply with any decisions made.

**Informal communication**, on the other hand, is multi-dimensional communication that is not bound by pre-defined channels and protocols. Unlike formal communication, informal communication is a natural flow of communication as it simply occurs when people interact and talk about different topics, often extending outside of their work duties. This includes hallway conversations, cubicle chatting, networking, and all types of communication that do not hold any official significance or record.

Based on the direction of the hierarchies within your organization, your communication can also be either horizontal or vertical. **Horizontal communication** refers to all communication occurring at the same organizational level. This includes communication with peers or colleagues on your level, or communication between team members, for instance.

**Vertical communication**, however, involves an upward downward communication flow between different hierarchical levels, such as in the case of communication between the project manager and the Chief Executive Officer (CEO).

Along with formality and organizational perspectives, and from a channel perspective, communication can also be in a verbal or non-verbal form, written or oral, face-to-face or via a medium, ultimately depending on the type of information you're communicating, your purpose, and your audience.

**Verbal communication** refers to the use of language and words whether written or spoken, while **nonverbal communication** refers to communication using body language, gestures, facial expressions, voice tone or volume, personal space, eye contact, touch, appearance, etc.

As a project manager, you should always pay attention to nonverbal communication as it often reveals reactions, stands, and other meaningful information.

When discussing nonverbal communication, we should address paralanguage or paralingual communication since both concepts get often confused. **Paralingual communication** is a subpart of the nonverbal communication method. It involves the use of voice tone, pitch, intonation, prosody, volume, etc., to convey and express feelings or opinions. For example, when someone says "let's wait and see", you can usually detect through their tone whether they are optimistic or pessimistic about what's going to happen.

**Written communication** is any type of communication that uses written words to communicate messages and information, which can be both in a

formal or an informal way. Written communication is commonly preferred to exchange formal or detailed information such as decisions, deadlines, procedures, etc. to provide clarity and reduce or avoid misunderstanding.

In order to be efficient, written communication should respect the **5 Cs** technique: Correct grammar and spelling, Concise expression and elimination of excess words, Clear purpose and expression directed to the needs of the reader, Coherent, logical flow of ideas, and Controlled flow of words and ideas.

All of the above-mentioned types of communication can be used in push, pull, interactive, and/or asynchronous communication methods. **Push communication** is when the sender pushes a message to receivers via an email, SMS, voice message, etc. This type of communication is recommended when the sender does not need an immediate response from the receiver.

**Pull communication**, on the other hand, is conveyed by the sender to a large audience such in the case of blog posts, web portals, corporate wiki or handbooks, etc., where information is available for people to access when they need to retrieve it. The information delivered through pull communication has little to no impact on the project if receivers do not read it.

The concept of **interactive communication** is quite self-explanatory; it refers to any type of real-time, dynamic, two-way flow of communication, usually involving one or more people exchanging thoughts and ideas. Examples include focus groups, physical meetings, phone calls, virtual meetings (e.g., via Google meet or Zoom), etc. This type of communication is convenient when the information you are communicating is sensitive and might get misinterpreted, or when you require an immediate response.

Unlike the interactive form of communication, **asynchronous communication** doesn't happen in real-time as it can occur without the requirement that the communicating parties be present at the same exact moment in time. This includes communication via emails or messaging platforms, such as Slack or Microsoft Teams, where it might take time for the recipient to get the information and provide their response.

Another aspect of communication is the way we communicate our knowledge to others, which can differ depending on the type of knowledge we are trying to deliver; whether it's tacit knowledge or explicit knowledge.

**Tacit knowledge**, aka implicit knowledge, is the know-how embedded knowledge that we acquire through experience, personal wisdom, beliefs, values, insights, intuitions, etc. This type of knowledge is difficult to extract and



codify, thus, it can't be easily transferred to another person through written or verbal communication.

**Storytelling**, for instance, is a way to share tacit knowledge; by telling stories, people can better understand someone's tacit knowledge and interact with them.

**Explicit knowledge**, however, is the type of knowledge that can be identified, articulated, and expressed using words, numbers, or pictures. Explicit Knowledge can be captured and shared through documentation and conversations.

Whatever type or form of communication you're relying on to express and deliver your ideas, you will have to master some skills in order to have an efficient communication process. The set of skills that you use to efficiently communicate and interact with others, both individually and in groups, on a daily basis is called **interpersonal skills**.

Communication skills, emotional intelligence, teamwork skills, negotiation, persuasion and influencing skills, conflict resolution and mediation, problem-solving, decision-making, and active listening all fall under interpersonal skills.

**Active listening** implies carefully listening to others instead of passively receiving their message. This entails paying close attention to everything that is being said by allowing others to deliver their ideas with no interruption, while occasionally asking questions to better understand the situation.

Active listening also requires maintaining comfortable eye contact, remaining open-minded about the received ideas, employing paraphrasing skills and feedback when needed, and attentively observing the speaker's non-verbal signs such as body language and facial expressions.

## 4. Resolving Conflicts

Bringing together a group of people with different personalities, views, needs, and attitudes to work on your project is bound to create disagreements that might evolve to be conflicts. That's why a successful project manager is one with great skill in conflict resolution.

**Conflict resolution** is when conflicting parties work on finding a solution to their disagreement. When the project manager tries to resolve a conflict between them and another stakeholder or within their team members, they resort to six main strategies: Confrontation, Collaboration, Forcing, Compromising, Smoothing, and finally Withdrawing.

The **confrontation or problem-solving** technique is used when the conflicting parties are focusing on finding the best solution and when they have confidence in each other's judgment and ability to solve the issue.

The **collaboration** technique relies on an open dialogue between conflict parties to discuss different perspectives and eventually reach a consensus and commitment to the final resolution.

The collaboration method requires direct communication and a collaborative mindset in order to be efficient and achieve an agreement. This approach results in a **win-win situation** for all involved parties as everyone's viewpoints are discussed and incorporated into the agreed-upon final solution.

**Forcing or directing** is another conflict resolution method where a dominating person forces their point of view or solution to resolve a conflict. Since a dominating perspective is imposed on all conflict parties, this approach usually results in a **win-lose situation**.

The **compromise or reconcile** approach is another way to deal with a conflict. This method requires conflicted parties to give up something in the process in order to achieve a commonly agreed-upon solution and thus bring everyone involved a certain level of satisfaction.

Unlike collaboration, which is a long-lasting conflict resolution technique, compromise only brings a temporary or partial solution, and, since everyone has to make concessions in order to meet each other halfway, compromise or reconcile results in a **lose-lose situation**.

The **smoothing or accommodating** technique, on the other hand, consists in temporarily smoothing disagreements to maintain harmony. The goal is to reduce disputes especially when there is a difference in power or authority between the involved parties, as in the case of a disagreement between the project manager and the sponsor. This conflict resolution method often leads to a **yield-lose situation**.

Finally, **withdrawal or avoiding** implies the unwillingness to deal with a conflict by either postponing it or completely avoiding it. This method is used when one side of the conflict is outranked or they're trying to cool things down, or when the other side of the conflict is unassailable or uncooperative.

This technique should only be opted for when the issue is not critical and won't have a negative impact on the project outcome. Since the conflict will not get resolved by avoiding it, this technique usually leads to a **lose-leave situation**.

## Practice Test

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### Question 1

Mid-project, the project manager noticed that stakeholders' engagement was fading out and felt the need to measure their satisfaction. What tools or techniques could the project manager use (select two)?

- A. Net Promoter Score
- B. Mood chart
- C. Power/interest grid
- D. Engagement assessment matrix

### Question 2

A project manager is leading the second phase of a project using a hybrid approach. In order to build a common ground between involved stakeholders and appease any differences, the project manager proceeds with defining the project requirements through:

- A. Sending a questionnaire to all of the involved stakeholders in order to determine the project requirements
- B. Setting up a meeting with each stakeholder to identify their needs
- C. Inviting all concerned stakeholders to a requirements workshop to develop user stories
- D. Conducting a survey of the project's current users

### Question 3

Halfway through the project, the sponsor designates an inspector to check the quality of the deliverables so far. The project manager doesn't know the inspector in person, but they overheard that they are not flexible and working with them is usually hard. What is the best way for them to handle the situation?

- A. Ask the sponsor to designate another inspector
- B. Ignore the inspector's designation since they are an external stakeholder
- C. Collaborate with the inspector and provide them assistance when needed
- D. Use your soft skills to talk the inspector into looking past any quality issues and not reporting them to the sponsor

### Question 4

A customer informed their project manager that they are going to launch a new project and they will assign it to the same product owner of the current

ongoing project. How should the project manager react in response to the customer's decision?

- A. Ask the customer to reconsider their decision since a product owner should handle one product at a time
- B. Ask the customer to reconsider their decision to avoid a conflict of interests situation
- C. It's ok to have the same product owner for both products as long as they can fulfill their duties
- D. Ask the customer to add another product owner to the current project as a backup

### **Question 5**

During product validation, a key stakeholder refuses to sign off the acceptance document, claiming that some of the functionalities do not meet their expectations. What should the project manager have done to avoid this situation?

- A. Involve the key stakeholder during the quality control phase
- B. Involve the key stakeholder during the project initiation phase
- C. Involve the key stakeholder during the planning phase
- D. Involve the key stakeholder during all project phases

### **Question 6**

A project involves dozens of stakeholders. Most of them need high-level information and updates about the project status, while the rest need more detailed information and frequent updates. To respond to these different requirements, what should the project manager create?

- A. Power/interest grid
- B. Salience Model
- C. Stakeholder engagement plan
- D. Stakeholder engagement assessment matrix

### **Question 7**

During the sprint review, the product owner informs the scrum team that the meeting is being recorded in order to send it to a key stakeholder. A day later, the stakeholder contacted the product owner to express their disappointment with the product, claiming that it is nothing like what they had in mind. What should the scrum master do next?

- A. Facilitate a meeting between the product owner and the concerned stakeholder
- B. Meet the stakeholder to review the product backlog items
- C. Ask the development team to have more frequent backlog refinement sessions with the product owner
- D. Ask the development team to collaborate with the key stakeholder

### **Question 8**

A project manager is leading an adaptive project using an online project management system that displays the real-time progress of the iterations and the overall project through different charts. However, a key stakeholder prefers to receive an email with the weekly status report instead. What should the project manager do in this case? (Select two)

- A.** Add a small recurring task of “1” story point in the product backlog to send the weekly report
- B.** Take this in charge in order to let the team focus on achieving deliverables
- C.** Check if there is a way to automatically send the weekly report through the project management system
- D.** Ignore the stakeholder request since they have access to the online system and therefore can easily check the project status

### **Question 9**

A project manager keeps receiving negative feedback concerning one of the project suppliers. The conflicts between the project team and the supplier’s team are getting worse recently and are starting to have a negative impact on the project. What should the project manager do next?

- A.** Send an email to the supplier’s team manager explaining the alarming situation
- B.** Meet with the supplier’s team manager to discuss the issue
- C.** Call the supplier’s team manager and urge them to commit to the procurement agreement
- D.** Proceed with Alternative Dispute Resolution (ADR)

### **Question 10**

During the kick-off meeting of their first project, the project manager presents the project plan to the attending stakeholders. When going through the details, the project manager notices that most stakeholders don’t seem happy about the plan. A certain stakeholder even expressed their frustration with how inaccurate this plan describes their expectations. What is the most likely reason behind the project manager’s inaccurate description of stakeholders’ requirements?

- A.** The project manager did not use the project scope as a guide when creating the project plan
- B.** The project manager only presented the first draft of the project plan, so it can be always improved
- C.** The project manager did not engage the project stakeholders enough to be able to accurately capture their requirements
- D.** The project manager did not explain the project well enough. A better presentation of the plan would have prevented this misunderstanding

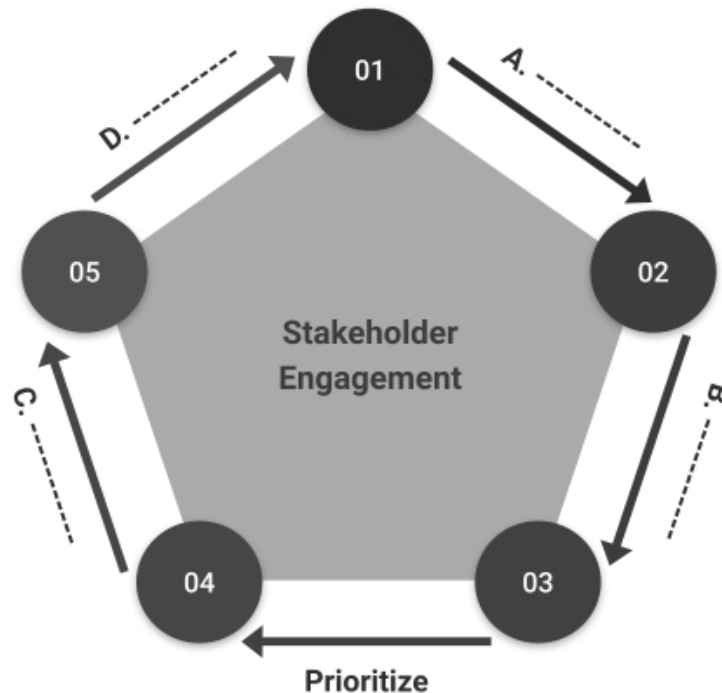
### Question 11

A project manager learns that they were not assigned the human resources they were promised during the planning phase. Instead, they got a team that did not have the required skills for executing the project work. Taking into consideration that they work in a weak matrix organization, what should the project manager do?

- A. Issue a change request to get a more qualified team
- B. Negotiate with the functional manager in order to obtain the required team members
- C. Take the matter to the project sponsor
- D. Use their legitimate power by informing the organization that they will not perform the project without the needed resources

### Question 12

The stakeholder engagement process involves five steps. Add the following steps to the figure below: Identify, monitor, engage, and understand & analyze.



### Question 13

A project manager is leading a complex project with a very demanding sponsor. The sponsor wants to stay on top of every project progress update as

well as all planned subsequent work. What's the best way for the project manager to communicate with the sponsor?

- A. Send a comprehensive monthly report detailing all project progress aspects regarding scope, schedule, cost, risks, etc.
- B. Schedule a monthly face-to-face meeting to discuss the project status
- C. Schedule a meeting once or twice a week and let the sponsor know that they can also attend daily standups
- D. Schedule a fortnightly meeting and give the sponsor access to the project management software so they can check real-time updates concerning the project status

#### **Question 14**

A project manager has just taken over an ongoing project for creating a newborns' essentials brand. Items made of fabric are manufactured by external vendors. To get to know all vendors involved in the project, the project manager should check out:

- A. RFQs
- B. Stakeholder register
- C. Vendors' proposals
- D. Stakeholder engagement plan

#### **Question 15**

An agile project manager noticed that several stakeholders have lost interest in the project; they rarely provide inputs, give feedback, or attend meetings. What can the project manager do to resolve this problem? (Select two)

- A. Send a reminder before each meeting
- B. Inform stakeholders that they can provide their feedback anonymously
- C. Value and show appreciation of everyone's ideas
- D. Demonstrate the working increments



## Answers

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### Question 1 = A, B

**Explanation:** Stakeholder satisfaction can be measured with surveys or by looking at related metrics such as Net Promoter Score (NPS) and Mood chart (PMBOK 7th edition, page 103). The Net Promoter Score is a numerical measure of the stakeholder's satisfaction with your product, service, or workplace and their willingness to recommend it to others. The score ranges from -100 to +100. A high promoter score reflects high business loyalty and job satisfaction. Mood charts, on the other hand, are used to track the daily mood of certain key stakeholders, where they can use colors, emojis, or numbers to express how they're feeling. This method can help the project manager anticipate and identify potential issues and work on improving certain areas, such as in the described scenario where engagement is fading. The power/interest grid is created in order to categorize stakeholders based on their power or influence levels and has nothing to do with measuring their satisfaction. The Engagement Assessment Matrix is a stakeholder management technique that is used to monitor the engagement levels of stakeholders and therefore identifies involvement issues. This tool might have helped the project manager detect the stakeholders' engagement problem but it can't help them figure out satisfaction levels.

### Question 2 = C

**Explanation:** The project manager is collecting requirements for the second phase of the hybrid project. So, requirements could be captured in the form of user stories. Facilitating a workshop is the best option in this situation to identify the project requirements and appease stakeholder differences. The interaction occurring during a workshop can help the project manager build a common ground between the stakeholders and establish consensus. Sending a questionnaire, setting up one-on-one meetings, and conducting surveys could help collect data and get insights, but stakeholders should communicate with one another to bridge any disagreements.

### Question 3 = C

**Explanation:** When a new stakeholder is identified, they should be analyzed, prioritized, engaged, and then monitored (PMBOK 7th edition, page 12). In the described situation, the project manager should engage the inspector by collaborating with them. Regardless of the situation, stakeholders should never be ignored. On the other hand, it's not appropriate to ask the sponsor to replace the inspector without a solid reason. Plus, the project

manager should certainly avoid influencing the inspector's work or decisions as it can undermine the project quality and lead to corruption.

**Question 4 = C**

**Explanation:** A product should only have one product owner, considering they're the one responsible for deciding which features to build and in which order (Essential Scrum by Rubin, Kenneth S, page 15). When there are multiple products being developed, it's possible to either have a product owner for each of them or have one product owner for all of them. This depends on the projects' size as well as other factors such as the connection between projects. But, in all cases, the product owner should fulfill their role and be available to respond to queries from the development teams.

**Question 5 = D**

**Explanation:** Stakeholders need to get involved early on during project planning and sometimes during the project initiation as well. Key stakeholders should also be involved during the quality control phase so that they can assess the project deliverables and recommend any changes before the official acceptance. Alternatively, and since the concerned key stakeholder is responsible for signing off the acceptance document, their power is considered as high. Therefore, stakeholders who are identified to have high power using the power/interest grid should be managed closely and/or kept satisfied throughout the whole project.

**Question 6 = C**

**Explanation:** A stakeholder engagement plan sets up strategies and actions to ensure the positive and effective involvement of all stakeholders in the project (PMBOK 7th edition, page 187). The power/interest grid, Salience Model, and stakeholder engagement assessment matrix are tools and techniques to analyze stakeholders and assess their level of engagement. Unlike the stakeholder engagement plan, these tools do not generate or comprise practical information on how to engage and monitor stakeholders such as the frequency of official meetings, recipients of status reports, communication channels, etc.

**Question 7 = A**

**Explanation:** Since the product doesn't meet the expectation of the key stakeholder, then there is no alignment between the product owner and the stakeholder. The product owner is responsible for gathering and prioritizing requirements. The feedback of the stakeholder indicates that the product owner didn't involve them enough in the process. As an agile project manager or scrum master, you can help the product owner, who is the stakeholder representative, while also protecting your team from dealing with such issues.

Additionally, the development team should collaborate with the product owner, who in turn should review the product backlog items with the key stakeholder, being their point of contact in the project. Plus, it's not the scrum master's responsibility to review the product backlog items.

**Question 8 = B, C**

**Explanation:** The project manager should remove impediments that slow down the team's progress towards achieving the iteration goal. This can be done by taking this task in charge, whether by sending the status reports manually or by finding a way to automate it. Furthermore, the project manager can remind the key stakeholder that they have real-time access to the project status. Their request to receive weekly status reports by email should not be ignored or dismissed since it's critical to particularly engage key stakeholders by using whatever communication channels they prefer.

**Question 9 = B**

**Explanation:** When you want to resolve a conflict, a face-to-face meeting is always the best first step. Hence, the project manager should meet with the manager of the supplier's team to discuss the issue and try to find a solution. Other communication methods, such as sending an email or having a phone call, are less effective than an in-person meeting. If direct negotiation fails, then the project manager should proceed with Alternative Dispute Resolution (ADR), such as mediation or arbitration.

**Question 10 = C**

**Explanation:** Since requirements are not accurately defined and stakeholders are not satisfied, the project manager most likely didn't engage them sufficiently. Stakeholder engagement ensures a proactive identification of their needs and requirements, which can promote alignment and buy-in of the project. The project plan is derived from the scope. So, if the scope is not defined in collaboration with relevant stakeholders, the plan will most likely fail to meet their expectations. The stakeholders are unhappy with the plan content, not with the way it was presented. Since the project manager is presenting the plan during a kick-off meeting, we can conclude that the scenario involves a predictive project. Consequently, it's improbable that the project manager is presenting a draft to stakeholders since the purpose of a kick-off meeting is to present a final or properly elaborated version of the plan to get stakeholders' buy-in.

**Question 11 = B**

**Explanation:** A project manager's power is considerably low in a weak matrix organization. In fact, they are rather considered a coordinator or expeditor. It's up to the functional manager to assign resources in such

organizations. Therefore, the only solution to obtain the needed resources in this situation is by negotiating your requirements with the functional manager.

**Question 12 = A**

**Explanation:** Identify B. Understand & analyze C. Engage D. Monitor (PMBOK 7th edition, page 10). Stakeholders' engagement starts by identifying all parties directly or indirectly connected or involved in the project. Next, the identified stakeholders must be fully understood in terms of their beliefs, attitudes, expectations, etc. towards the project in order to be able to analyze each one's level of power, interest, impact, etc., and prioritize them accordingly. After that, an engagement plan is created according to the findings of the previous steps, where a project manager should ensure clear and constant communication, the satisfaction of stakeholders' requirements and expectations, and issues resolving when needed. Monitoring stakeholders is the final step in the process, and it entails monitoring any changes in their attitudes or power levels to adapt the engagement plan accordingly.

**Question 13 = C**

**Explanation:** Since the project is complex, frequent communication is required. Therefore, the best option is to schedule regular meetings once or twice a week, with the possibility of attending standup meetings to get daily updates. Monthly meetings, even if they're face-to-face, are not efficient for complex projects. Giving access to the project management software is considered pull communication since the sponsor has to seek information themselves. Pull communication might not be sufficient for high-power demanding stakeholders.

**Question 14 = B**

**Explanation:** The stakeholder register document contains all relevant information concerning the project stakeholders including their influence, interest, involvement, and potential impact on the project's success. External vendors are considered project stakeholders and therefore they should take part in the stakeholder register. The project manager should refer to this document whenever they need any information concerning both internal and external stakeholders.

**Question 15 = C, D**

**Explanation:** Most probably, stakeholders are losing interest in the project because their input or feedback is being disregarded, or they are not seeing any tangible progress. The project manager has to engage stakeholders by taking their feedback into consideration to show them that their ideas are valued. The project manager should also demonstrate working increments as early in the project lifecycle as possible. This is considered as one of the agile

approach advantages that the stakeholders expect and appreciate. Sending reminders before each meeting or allowing for anonymous feedback does not yield more engagement as both options don't address the root cause of the problem.

# **CHAPTER 3**

Project Team

# 1. Setting up Work Environment

The key part of any project, which is responsible for transforming ideas and concepts into concrete results, is your project team. Gathering up a suitable team for the mission is the basis for success.

A project team can be colocated, remote, or a mix of both. A **co-located team** means that the whole team is working in a single physical workspace. A **virtual, remote, or distributed** team is one that has dispersed members who work remotely from different geographical locations and/or time zones.

The main advantage that a colocated team can benefit from is the possibility of using interactive communication. To leverage this advantage, some organizations set up a **war room**, which is a physical room, office, or space that is dedicated for the team to use when they need to collectively address certain project activities, issues, or workflows.

Along with war rooms, a colocated team is able to apply the Caves and Common office design. **Caves and common office design** is a design that integrates both private offices (caves) where team members can temporarily work without being interrupted by others, with a shared open space (common) where all of the team typically works.

Unlike virtual teams, colocated ones are also able to employ close or osmotic communication, which is one of the crystal methodology's characteristics. **Osmotic communication** refers to the process of receiving information indirectly or accidentally either by overhearing it or through nonverbal cues.



Osmotic Communication

A virtual team has its advantages too, as it allows you as a project manager to have access to a wider more diverse specialized skills pool, and your project to run 24/7 if you need to without overworking any members, due to being located in different geographical zones.

Whether it's collocated, remote, or a mix of both, your team will need some basic rules to ensure their day-to-day well functioning and efficiency. A **Team Charter**, for instance, is a must for any team, as it represents an official record of any established values, work guidelines, agreements, behavior and interaction directives and boundaries, expectations, and any regulations and rules that the team should go by and adhere to. This charter should be created at the team's forming phase to ensure commitment, understanding, and buy-in.

Among the elements included in the team's charter are ground rules. **Ground rules** are the directives and policies that a group sets up consciously to guide its members on how to act within a team.

An additional set of rules that a team should follow is their project or organization's **Code of Conduct**. This code outlines the main standards and principles the project team or the organization's employees should act in accordance with on a daily basis.



Besides ground rules, team charter, and the code of conduct, you might need to define some cultural norms if you're leading a multi-national team. Since cultural differences between team members or stakeholders can impact communication, decision-making, and workflow, putting some **cultural norms** in place as expectations within a certain culturally or socially diverse group is necessary.

## 2. Acquiring the Team

After setting up basic rules and guidelines for your team, and preparing their work environment, here are the main aspects that you might encounter and should definitely consider when building and acquiring your team.

If you're about to launch your project, and the resources you're in need of are already available in your organization, you can opt for pre-assignment as an option. **Pre-assignment** involves an advance assignment or acquisition of resources for a project before it starts. This potential technique can be employed if the project requires specific resources or if it is dependent upon the expertise of particular individuals.

When looking for suitable people to carry out your project work, you might want to target cross-functional members, mostly if you're managing an agile project. A **cross-functional team** is made of members with diverse substantial skill sets, making it possible to produce your project deliverables with no external dependency.



Example of a Cross-functional Team

Hard skills-wise, a cross-functional team typically includes T-shaped and I-shaped members. A **T-shaped** team member, also known as a **Broken comb**, is a generalizing specialist who has one or multiple skills with deep expertise in

a certain field while others are less developed. T-shaped people are usually more willing to collaborate.

On the other hand, an **I-shaped** team member, who is also known as a **paint drop**, has deep specialization and expertise in one domain and has no interest to participate or get involved in work outside of that domain.

Besides the technical skills that you want to focus on while acquiring resources, you may consider using the Myers–Briggs Type Indicator (**MBTI**) to make sure your team members have the needed soft skills.

A **Myers–Briggs Type Indicator** is a personality questionnaire that indicates the different psychological preferences and how people perceive the world and make decisions, depending on each person's unique personality. The test identifies four personality categories: introversion or extraversion, sensing or intuition, thinking or feeling, judging or perceiving. To determine someone's personality type, one letter from each category is taken to find out a four-letter test result, such as "ISTJ" or "ENTP".

When evaluating or considering someone for a specific role or certain activities, be careful not to fall for the Halo effect. The **Halo effect** is when your decision is influenced by someone's single impressive performance, attribute, or quality in a specific area. For instance, when someone gets promoted to a project manager position based on just their excellent technical skills, and with no previous experience or evidence that they'll be able to lead a project successfully, this decision is made under the Halo effect.



Halo Effect

In case you're managing your project in a foreign country, your team might experience a cultural shock. A **cultural shock** is when someone feels disoriented when they are suddenly subjected to a foreign environment, an unfamiliar culture or way of life, or a set of attitudes.

When leading a project abroad, or even when working with foreigners, you should prepare your team in order to avoid or reduce cultural shock. It's also important to identify whether your team includes any ethnocentric people. **Ethnocentrism** is when an individual compares a foreigner's actions to their own local culture, considering their own culture superior to others.

### 3. Leading the Team

Now that you know how to set up your team and what to consider when assembling one, here is how to properly and efficiently lead your team.

Leadership is the way you guide and steer your team towards the successful delivery of your project by ensuring that the team collaborates to achieve and accomplish a common objective or goal. To be a skillful leader you'll have to be able to align your team with the project vision, motivate them to reach their best performance, inspire them to adopt the right practices, and promote trust and creativity throughout the project.

According to **McGregor's Theory of X and Y**, there are two types of leaders: type "X" who believe that people lack motivation because they initially don't want to work, and thus need to be micromanaged, and leaders of type "Y" who think that people are motivated as they strive to accomplish, and thus they should be self-led.

Leadership styles range from Directing, Facilitating, Autocratic, and Democratic or participative, to Laissez-faire, Transactional, Servant, Transformational, Charismatic, and Interactional. So, let's check out the most commonly applied leadership styles in project management!

For any PMP aspirant who is going through the exam preparation phase, servant leadership might be the most prominent style among all the ones mentioned above. **Servant leadership** implies prioritizing others' needs and focusing on serving them. A servant leader works on providing growth and training opportunities, as well as promoting well-being within the project.

Listening to others, serving your team, and assisting people with the impediments they're facing are what make a project manager a great servant leader. This leadership style mainly fosters security, respect, trust, and mentoring or coaching, over controlling.

As an actively practiced leadership model especially in Agile projects, servant leadership proves to be efficient as it often yields a team's best performance possible, leading to the project's overall success.

**Transactional leadership**, on the other hand, is when the leader initially relies on rewards or punishment to motivate their teams, which is referred to as management by exception; the exception gets either rewarded or punished.

A transactional leader is goal and performance-oriented and is fully in favor of rules and procedures. However, using incentives and penalties as motivation tools only works in the short term, meaning you can't keep followers motivated in the long run using this type of leadership.

**Transformational leaders**, however, rely on another type of motivation. They encourage their teams to be innovative, creative, ambitious, and not be afraid to take action. This leadership style is based on inspiring and motivating the project team to reach the project set goals.

Another leadership style that relies on inspiring others to fulfill the project vision is **charismatic leadership**. A charismatic leader is one who has positive high energy and is typically considered an inspiration by people around them. Thus, they easily motivate their teams by engaging them in the project's overall vision, making them a key part of what they can all achieve.

A hybrid leadership style of the transactional, transformational, and charismatic types is **interactional leadership**. An interactional leader is one who is typically excited about their project work, hence they inspire others to be motivated as much as them. Even though they want the team to take action and take the initiative, they still hold the team accountable for their work results and performance.

At the other end of the spectrum, we find autocratic leaders. **Autocratic leadership**, or **authoritarian leadership**, as the name indicates, implies a leader who makes all decisions on their own. The whole decision-making process under this type of leadership is based on the autocratic leader's own choices, ideas, and judgment, rarely involving or accepting their followers' advice.

Contrarily to being authoritarian, some leaders opt for the laissez-faire style, which is the French word for "Allow to do or act". **Laissez-faire leadership** is a hands-off management approach where teams are fully in charge of making their own decisions and deciding on how to function. Autonomy is the key motivator here instead of the typical rewards and incentives tool.

This style works best when you acquire a skilled, talented, and trustworthy team that can successfully take charge of project work with no intervention from the project manager or any other parties. A project manager who applies this type of leadership should first provide their team with the needed training and support to enable them to work efficiently under this system. Plus, they'll have to be comfortable with letting their teams make mistakes as they're the ones being held accountable after all.

Other leadership styles include Authentic, participative or democratic, and situational. **Authentic leaders** manage their projects by being totally transparent, honest, genuine, and self-aware, and that's how they inspire loyalty and trust in the first place.

**Participative leadership**, aka **democratic leadership**, takes into consideration team members' opinions and input during the decision-making process, yet the ultimate decision is taken by the participative leader.

Finally, **situational leadership** involves a project manager who employs the appropriate leadership style depending on the situation, adapting their behavior to the project needs and to the group they're aiming to influence.

## 4. Developing the Team's Skills and Collaboration

No two teams or members are exactly alike. Whether they are temporary or permanent teams or team members, they are likely to share some similarities. However, their differences such as their personalities, skills, knowledge, etc. often result in conflicts which makes it hard to work in cohesion.

This is where the project manager steps in to implement key techniques in order to promote team collaboration and work efficiency, resolve and overcome conflicts, and more importantly, encourage creativity and team growth.

Team building is one way to develop cohesion among team members. **Team building** is a set of practices and techniques to bring a team of individuals with different characteristics, needs, backgrounds, and expertise together. Team building works on transforming your team into an integrated, efficient work unit.

Team building activities can include participating in team training, holiday and birthday celebrations, engaging in social events such as trips or physical activities like going on hikes, etc. These activities build and enhance social relations among your team members, resulting in a more cooperative work environment. Team building also proves to be effective for enhancing communication, minimizing individualism, and improving the decision-making process, resulting in a committed team with better work results.

Team-building should be a continuously implemented technique throughout the project lifecycle and especially in the early stages when barely any relationships among team members exist. To put more emphasis on developing collaboration, you can integrate collective work through pairing, swarming, or mobbing.

**Pairing** involves two team members working together on a particular activity or on resolving a certain issue. It can be introduced as a collaboration technique among members of a remote team as well, where two members are paired in an online event at a predetermined time to discuss a specific subject or work simultaneously on the same work item.

Swarming and mobbing, on the other hand, implies the participation of multiple team members or even the whole team collectively in an activity that requires collaboration. The only difference between the two methods is that **swarming** takes place to resolve an impediment while **mobbing** is used to focus and coordinate team members' contributions on an appointed work item.



Since remote working can impede both collaboration and communication, and in case colocation is not an option for your team, you can occasionally rely on fishbowl windows. **Fishbowl windows** involve an ongoing video conferencing feed between various locations where a large project team can join. This also allows a number of members to have a more focused conversation, whereas the rest of the team listens or has the option to join the discussion at any moment.

Developing a collaborative work environment leads to adopting shared values and building interpersonal relationships on one side and improving productivity and team performance on another side. Competency-wise, you can opt for customized training depending on your team's needs and weaknesses along with other team development techniques such as shadowing.

**Shadowing** is when a team member shadows or follows a certain work expert or professional for observation purposes as a way of learning or understanding a specific job or role. This method usually works for interns, beginners, and newly graduated professionals. Shadowing can occur through observation, briefings, or a hands-on approach.

Shadowing through observation depends on the followed person's availability as it takes place to gain insight into the way they practice their role on a daily basis. Receiving regular briefings before and after the shadowing activity as a follow-up proves to be efficient for those who are already working alongside their host. Finally, hands-on shadowing is when someone starts to practically exercise some of the observed activities under the supervision of the host to gain hands-on experience.

**Reverse shadowing**, as the name suggests, happens the other way around as one of the more junior level team members is being shadowed by a senior colleague from a higher managerial or leadership level to learn some of their skills or experience, which helps to get over the traditional hierarchical barriers within a team and promote knowledge sharing towards reaching the team's development goal.

To implement any type of training, you should first identify your team's requirements in order to set up an adequate training program. For an accurate analysis of your team's training needs, you can use a training gap analysis, an attitudinal survey, an ability test, or a structured interview.

A **training gap analysis** is a tool for determining the skills a team is lacking in order to plan and implement the required training for addressing and closing this gap. This is used to identify the skills that team members need but don't

have yet, in order to carry out their job in a more effective way and meet the project or organization's goals.

Your team members happen to have a particularly relevant perspective on their development needs, so they might be your best source of information for obtaining input concerning training requirements.

Surveying employees individually in order to get a complete picture of training requirements is a valuable input into the overall organizational development plan. This can be achieved through an **attitudinal survey** that aims to measure your team members' satisfaction level and feelings concerning their roles, work environment, career opportunities, executive management, organizational culture, and much more to eventually give you an insight on how to help your team grow.

**Ability tests** or **aptitude tests** are other methods for assessing an individual's skills and abilities in different work domains or situations. These tests are frequently used by recruiters during the hiring process to determine fit candidates for the position, making their hiring decisions more accurate. As a project manager, you can use such tests to measure your team's abilities and aptitudes in order to provide them with the most convenient training.

Additionally, you can opt for structured interviews for the same purpose of identifying your team's skills gap. **Structured interviews**, also known as formal interviews, are a quantitative research method where you set prepared closed-ended questions and will not deviate from the content of your pre-selected questions except when you need to clarify their meaning. These interviews allow you to obtain a large sample of reliable representative findings regarding each of your team members' needs, easily and in a short period of time.

Many techniques and methods allow you to plan a personalized training program to enhance your team's capabilities and performance. But, they do not ensure the efficiency of the implemented training, nor do they determine how successful the planned training was. For this, you'll need a training assessment tool known as baselining.

**Baselining** is a way to assess your team's training efficiency through conducting a pre-training assessment which will represent a baseline of where your team stands before receiving the intended training. Then, you should carry out a post-training assessment to compare it to the pre-training one, allowing you to understand the impact of the implemented training program on your team's skills. A mid-training assessment is optional but it can be incredibly beneficial as it will allow you to make the necessary improvements if needed.

All of the above techniques, methods, and practices are meant to build and establish the required level of cohesion, collaboration, and competencies that any team needs in order to successfully perform their assigned work. However, other events might have an impact on this cohesion such as the case of a member leaving the team regardless of the reason. As a project manager, you should ensure that the leaving person creates a transition plan for their successor.

A **transition plan** is a document that outlines and lays out the hand-off process and defines all of the priorities, goals, strategies, tools, and techniques for a successful responsibilities transfer or transition. A transition plan helps the project team cope with any expected or unexpected change, establish a sense of stability, and maintain everyone's commitment to the project goals.

## 5. Motivating the Team

Setting up a convenient work environment, figuring out your leadership style, promoting collaboration and cohesion, responding to training needs as well as closing any skill gaps are all basic practices to pave the way for your team to reach their ultimate performance and productivity levels.

Having addressed these aspects, let's now discuss how to get and keep your team motivated, as it has a huge impact on their work attitude. Motivated teams are found to be highly adaptable to change, have a positive attitude at work, and share the organization's values and vision, which often results in a reduction of turnover and absenteeism rates, as well as improved performance and well-being.

In order to establish the right means for motivating your team, you'll have to understand what motivates them. Motivators differ depending on each person's preferences, however, people share a number of common motivators no matter how different they are. This is explained in **Maslow's Hierarchy of Needs**, which states that humans have five layers of basic needs: physiological, safety, love and belonging, esteem, and self-actualization.

These needs are what dictate a person's behavioral motivation. Since these five levels of needs are presented hierarchically in a pyramid shape, higher-level needs can only be addressed and satisfied when lower-level basic needs are fulfilled. For instance, you can't respond to someone's esteem needs such as professional growth when their basic psychological needs of clothing and shelter for example are neglected.

To be able to efficiently motivate your team, you'll have to understand the type of motivators you can employ. For that, you can refer to **Herzberg's Theory of Motivation**, also known as the Two Factor Theory, which identifies two motivator categories: Extrinsic (hygiene agents) and Intrinsic (motivating agents).

**Hygiene factors** do not motivate employees to work harder but their absence demotivates them, thus they're considered more as maintenance factors. These are **extrinsic** to the work itself as they involve external motivating aspects including job security, work conditions, supervisory practices, salary, etc. Contrary to extrinsic factors, **intrinsic factors** are motivating agents that come from within a person. Recognition, achievement,

or personal growth all present motivating factors for workers, leading to positive satisfaction.

As a project manager, and apart from providing hygiene factors, you should also focus on motivating factors. You can do this by recognizing your team members' achievements, giving them the opportunity to do something meaningful and challenging, involving them in the decision-making process, etc.

Adopting an agile work approach, for instance, allows your team to be self-organized thus fulfilling their desire for achievement. A **self-organized** team comprises cross-functional members who work in an autonomous way, assuming responsibility for achieving the project objectives without relying on any outsiders.

Empowering the team to be self-organized through determining which tasks must be accomplished, prioritizing those tasks, and handling their own schedules and deadlines will ensure a greater sense of ownership, engagement, and responsibility, and most importantly will result in a highly motivated staff.

The whole process of understanding your team's exact needs and expectations requires interpersonal skills including emotional intelligence. **Interpersonal Skills** are the needed skills for establishing and maintaining relationships with other people. These include the set of skills we use on a daily basis to communicate and interact with others.

Interpersonal skills comprise a wide range of skills: verbal and non-verbal communication, active listening, emotional intelligence, teamwork, negotiation, persuasion, and influencing skills, as well as problem-solving and decision-making. All of these skills come in handy when you're trying to identify which elements to implement to satisfy and motivate your workforce.

Emotional intelligence is certainly one of the most important skill sets that every project manager should acquire and master. **Emotional intelligence** implies a person's ability to identify, assess, manage, and be aware of the personal emotions of oneself and other people.

Emotional intelligence covers self-awareness, self-management, social awareness, social skill, and motivation. Motivation in this context is about understanding what drives and inspires people, consequently helping a project manager to figure out the best way to get and keep their teams motivated.

Sometimes, even though you accurately identified what motivates your team members and you implemented the suitable motivation policy and practices, you might be surprised that they didn't work as you initially anticipated. Well, you shouldn't worry about failing to provide the best conditions for your team to be as productive and performant as you hoped for. Other factors have a huge impact on a team's performance regardless of its work conditions and environment. A team's development stage, for instance, can play a huge role in its output quality.

According to **Tuckman's team development ladder**, a team goes through five development stages: forming, storming, norming, performing, and adjourning. Forming is the first stage where members begin to get to know each other and form impressions. Storming is the most difficult and critical stage a team can go through as different individual personalities emerge during this phase, resulting in conflict, rivalry, and poor performance. The next stage is norming; this is when team members begin to work together and trust each other. In the performing phase, teams begin to function as a unit; they get the job done smoothly and effectively without any conflicts or need for supervision. In the adjourning phase, project tasks are completed, the team breaks up, and members move on to other assignments.

Identifying your team's development stage will help you adapt your motivation practices to respond to each phase's requirements. For this, you can also be guided by the Motivational Theory Z and the Expectancy Theory.

**Motivational Theory Z** or **Ouchi's Theory Z** states that workers are motivated by their sense of commitment, opportunity, and advancement, meaning that their work performance is directly impacted by whether they are being challenged and motivated. Ouchi introduced the concept of a lifetime or long-term employment where workers stay loyal to their organization until they retire due to being appreciated and valued.

The **Expectancy theory**, on the other hand, implies that employees behave based on what they expect as a result of their behavior. This means that they believe making more effort will improve their performance and lead them to getting rewarded, which they value, meaning it motivates them to continue to be productive. However, if they don't get rewarded when they expect to, they lose their motivation to be productive.

Some organizations opt for rewards as a motivation system. However, you should be careful when employing certain rewarding approaches, such as the **Zero Sum reward**, which refers to the act of only rewarding one or a few team members, such as in the case of the employee of the month programs. This

type of rewarding policy can have negative consequences as they often create contempt among those who did not receive the reward.

Whatever motivation practices or policies you decide to go for, you will have to continuously analyze their efficiency and look out for any signs of team members' dissatisfaction. Your team member turnover rate can give you an in-depth insight into your motivational tools' efficiency.

**Team Member Turnover** involves the rate at which people leave your team during a specified time period. Team turnover can be voluntary when a member voluntarily chooses to leave the team, or involuntary when a member's contract is terminated or they are permanently removed from the project team.

Turnover is natural in any project or organization. However, you should determine whether your turnover rate is low or high compared to a typical or expected rate, which depends on the industry, job nature, organization size, etc.

A high turnover rate is usually a sign of a deeper, more serious issue within your organization or team. You should especially analyze the reasons behind turnover; for instance, if your team members are leaving due to conflicts within the workplace, disengagement, or dissatisfaction with the work conditions, then you should work on lowering this rate by fixing internal issues and improving work conditions.

Identifying the causes of high turnover rates will help you make the necessary changes to retain your qualified workforce and avoid the resulting decreased productivity, increased recruitment costs, bad reputation, missing deadlines, etc.

## 6. Using Different Power Types

In a project or generally in an organization, power dynamics have the greatest influence on decisions, people transactions, and workflow. The usage of the different types of power by people who possess it should be carefully managed as it has a direct impact on the motivation and engagement level of employees.

Power also takes part in defining an organization's culture; hierarchy and power-driven organizations often do not easily allow creativity and innovation opportunities, thus delaying team members' growth. On the other hand, in an organization that is flat-structured, new concepts and ideas are encouraged thus promoting growth and expansion.

As a project manager, you'll possess a number of powers that naturally come with the position, along with other types of powers whose acquisition depends on a number of factors such as your experience, personality, management preferences, etc.

There are a total of fourteen powers that a project manager can possess: formal, reward, punishment, expert, relational, informational, persuasive, ingratiating, personal, situational, pressure-based, guilt-based, avoiding, and referent power.

**Legitimate power**, also known as a **formal, positional, or authoritative power**, is the type of power that originates from the official position that someone holds. For instance, in the traditional project management context, when you get assigned as a project manager, you are given legitimate power over your team.

Legitimate power includes formal power, reward power, and penalty power. **Reward power** is when someone is able to use rewards to compensate and influence others. Rewards can be non-monetary in the form of recognition, promotion recommendation, training opportunity, valuable assignment, etc.

Conversely, **penalty or coercive power** implies the ability to penalize team members, thus gaining as the person holding this power is perceived as being capable of penalizing others. This type of power uses fear and threats to make people comply with orders. This can involve threatening someone with transfer, firing, demotions, etc.



Similarly, **guilt-based power** is when the power holder makes stakeholders feel guilty by telling them that they're not living up to the expectations, for instance. This type of power is used to motivate the team or to get their compliance. Likewise, a project manager can use **pressure-based power** to restrict their team members' choices to force them to perform certain work in order to avoid bad consequences.

On the more positive side, a project manager can use their **expert power**. As the name suggests, this type of power is derived from someone's deep skills and long experience in a specific field, and therefore they're perceived as an expert. The expert power is of higher quality and not easily acquired as it yields others' respect and gives credibility to its holder.

In the same way, **referent power** is when team members admire a project manager for their personal qualities; kindness, empathy, intelligence, etc., considering them as role models. Referent power holders often have a similar influence on others around them as celebrities do with their fans since they're able to lead their followers through admiration and respect.

Another type of power that is based on the admiration of the leader's qualities is **personal or charismatic power**. This type of power-holders are usually people with warm, charismatic, and attractive personalities that others like.

**Relational power**, on the other hand, is gained through building a network of connections and creating alliances with others, while informational power involves holding control and ownership of data by being in charge of the process of gathering and distributing information.

A project manager can also hold and use **persuasive power**, which implies gaining power through persuading to act or think in a certain way. This power is often acquired by people who are able to provide convincing arguments to influence others.

On the other hand, a project manager can use flattery to find common ground and gain the cooperation and favor of the project team and stakeholders, which is known as **ingratiating power**. Contrastingly, some leaders might choose to use the **avoiding power**, which implies a total refusal to act, get involved, or take part in a certain activity including decision-making.

Finally, a project manager may be able to occasionally exercise **situational power**, when they happen to be the only one able to step up and rescue the team, project, or organization from a certain crisis.

### Question 1

A project experienced a significant team conflict during the final sprint. Nonetheless, the agile team succeeded in delivering a product that was accepted by the customer. What should the project manager do at the end of the sprint?

- A. Conduct a retrospective meeting with the team to discuss what happened
- B. Meet individually with the involved team members to express concerns regarding their behavior
- C. Disregard the conflict since the project is coming to an end
- D. Disregard the conflict since the team succeeded to achieve the project goals

### Question 2

During a retrospective meeting, some agile team members stated that it sometimes gets confusing to check who is working on each work item and at what stage they are. What can the project manager do to solve this problem?

- A. Coach the team on how to be more attentive during the daily standup meeting
- B. Guide the team on how to use the kanban board and update it regularly
- C. Send a daily status report to all team members to remove the impediment
- D. The project manager shouldn't do anything since agile teams are self-organizing

### Question 3

The project team is suffering from low morale since the departure of a key project stakeholder, who was a big support and motivation source for them. What actions should the project manager take to boost morale?

- A. Understand the team's needs and what motivates them
- B. Perform team building activities to strengthen team bonds
- C. Try to prevent the departure of the key stakeholder
- D. Set objectives and encourage the team to attain them

### Question 4

In order to ensure that their agile team is cross-functional, a project manager hires a new team member who is more inclined towards testing tasks. After a few days, the new member informs the project manager that they are unable to do their work properly because they don't have the necessary

permission to access a portion of the code. What should the project manager do next?

- A. Ask the team member to raise the issue during the retrospective meeting
- B. Tell the team member to adjust the acceptance criteria of their pending tasks and then inform the product owner
- C. Explain to the team member that they cannot access the whole code due to security restrictions
- D. Reach out to the appropriate stakeholder to either confirm or update the team member's privilege

### **Question 5**

Mid-sprint, an agile team encountered too many impediments to the point it became impossible to produce any working increments by the end of the sprint. What should the project manager do next?

- A. Cancel the sprint
- B. Proceed with resource leveling or smoothing
- C. Ask the development team to work on the less difficult work items first
- D. Continue supporting the development team even though the sprint goal will not be achieved

### **Question 6**

After introducing a new foreign developer to the team, the project manager noticed that a certain senior team member seems to be avoiding any interaction with them. What should the project manager do about this issue?

- A. Talk to the senior team member privately to try and find out the reason behind their behavior while making it clear that discrimination is neither tolerated nor accepted
- B. Notify the functional manager of the senior team member's behavior and ask them to take the appropriate disciplinary action
- C. Look past the senior team member's behavior since no conflict between the two has occurred and work seems to be going just fine
- D. Address the issue in the next team meeting by scolding the senior team member and lecturing everyone about the importance of an inclusive work environment

### **Question 7**

An organization recently transitioned to the agile approach. However, project team members always wait for the project manager to assign them work. How can the project manager help their team be self-organized?

- A. Take a few weeks off to force the team to act on their own
- B. Mentor the team on how to make their own decisions
- C. Ensure that the team includes different functional expertise

**D.** Support the team by removing encountered impediments

**Question 8**

A project manager is leading a multi-year software project. After a few months, a senior team member started losing motivation and complaining that their assigned work can be easily done by a junior team member. What should the project manager do in this case?

- A.** Incentivize the senior team member by increasing their salary or rate
- B.** Increase the engagement of the senior team member by holding team-building activities
- C.** Be proactive and start looking for a replacement for the senior team member
- D.** Find more challenging tasks for the senior team member to tackle

**Question 9**

A project manager is contractually engaged to present a monthly report on what was done the previous month and what preventive measures will be taken the following month. The project manager used to deliver the status update presentation themselves, but now that they are on vacation, a team member has volunteered to replace them. Later, the project manager received feedback from key stakeholders saying that the latest presentation was not good. What should the project manager do to address the situation with their team member?

- A.** Reproach the team member to let them know how disappointed they are
- B.** Send an email to the team member to use their reply as a justification for any ulterior decisions
- C.** Ask the team member what happened with the presentation that resulted in the stakeholders' dissatisfaction
- D.** Ignore the issue since it only occurred once and it won't happen again now that they'll be back to delivering the upcoming status presentations

**Question 10**

During the last three daily standup meetings with the team, the project manager notices that a new team member is struggling with one of their assigned tasks as they seem to be making no progress towards completing it. What should the project manager do?

- A.** Ask an experienced team member to take over the task
- B.** Check whether other team members can help their new colleague with their task after the standup meeting
- C.** Express their disappointment to the new team member and encourage them to make more effort
- D.** Ask the new team member to check the team ground rules

### **Question 11**

A project manager is leading a project within a functional organization. Halfway through the project implementation, a team member left the organization. What should the project manager do first?

- A.** Collaborate with the functional manager to get a replacement
- B.** Update the project's resource breakdown structure
- C.** Reassign their workload to the project team member
- D.** Evaluate the impact of the team member's departure on the project

### **Question 12**

A project manager is leading a team of engineers to perform a two-year project. After a few months, the project manager notices that the team is becoming less interested in the project. What can the project manager do to maintain motivation?

- A.** Offer a bonus at the end of the project
- B.** Offer an immediate salary raise
- C.** Align work assignments with the team members' personal ambitions
- D.** Align the project with the organization's goals

### **Question 13**

Even though they create an agenda and timebox for the meetings they're facilitating, the project manager can't seem to engage all attendees. What can they do to address this issue?

- A.** Make meetings shorter to prevent boredom
- B.** Limit the interventions of the most talkative attendees to allow others to participate
- C.** Change to remote meetings to make everyone feel more comfortable
- D.** Encourage all attendees to participate and share their thoughts by asking for their opinions on the discussed matters

### **Question 14**

A project manager is leading a team with distributed members across different countries. Apart from cultural barriers, the team seems disconnected, leading to multiple rework cases. What could the project manager do to improve communication within the team?

- A.** Collaborate with senior management to co-locate the team
- B.** Request from the team to only use emails for communication in order to avoid any misunderstanding or misinterpretation
- C.** Hold short daily meetings with all team members to sync on what's everyone is doing
- D.** Offer team members training about overcoming cultural barriers

### **Question 15**

During a workshop about the Agile approach, the project manager stated that Agile teams should be cross-functional and self-organizing, explaining that:

- A.** Each member of the team should be cross-functional and self-organized
- B.** The Agile team should have all the required skills to deliver the product on their own
- C.** The Agile team should have complementary skill sets and be able to organize the backlog by themselves
- D.** The Agile team should self-organize to acquire the necessary skills to be cross-functional

## Answers

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### Question 1 = A

**Explanation:** Even though the project is going to be closed soon, the project manager should hold a retrospective meeting to openly discuss what happened during the last sprint. This allows the agile team to understand what went well and what actions to take in the future to improve work processes and collaboration. Lessons learned is an important process not only for the ongoing project but also for the organization. Thus, the project manager should openly discuss the conflict, rather than disregard it.

### Question 2 = B

**Explanation:** In the case of unclear work assignments or work progress, the project manager should help their team by using a Kanban board to display the flow of work (Agile Practice Guide, page 58). A kanban board could be already used, but team members might not be updating it properly; they're not self-assigning tasks or they're not moving work items to the right column. The project manager should ensure that all team members know how to properly handle the kanban board. Even though the problem raised by the team is considered an impediment, it's not practical for the project manager to solve it by sending a daily status report to everyone. It's also not sufficient to coach the team to pay more attention during standups, as it's difficult to keep in mind the status of all items throughout the day, thus an up-to-date information radiator is needed. Self-organizing teams work autonomously by assuming responsibility for achieving the product increment. However, they still need the project manager's help to adjust work processes and support them so that they can focus on achieving deliverables without interruptions or hindrance.

### Question 3 = A

**Explanation:** The key to maintaining your team's morale and motivation is the accurate identification of their incentives. Knowing what each of your team members needs will help you provide them with the necessary conditions to reach their potential, create a productive work environment, and keep them encouraged in the long run. In most cases, the project manager cannot prevent the departure of a stakeholder if they decide to. Instead, the project manager should set a long-term motivation policy to avoid having their team's morale depend on the presence of certain members or factors. Setting objectives or performing team-building activities won't probably solve this team's issue since they might be missing other motivational factors that the key stakeholder was providing, such as recognition for instance.

**Question 4 = D**

**Explanation:** Being a servant leader, the project manager should reach out to the appropriate stakeholder in order to verify why the new member doesn't have access to that portion of code. It could be for security reasons, or because the concerned stakeholder is unaware of the nature of the new member's duties. In an Agile work environment, a project manager should listen to the impediments faced by their team members and act to solve them. If the new member's permission can't be changed, the project manager should explain this to them and to the product owner in order to update the tasks' acceptance criteria. Retrospective meetings are set up to improve processes rather than remove impediments.

**Question 5 = D**

**Explanation:** In agile, the project manager should be a servant leader. Therefore, the right course of action in the described scenario is to support the development team by helping them remove existing and new impediments, regardless of being able to achieve the sprint goal or not. However, the project manager should not dictate what the agile team should work on during the sprint. The project manager cannot cancel the sprint either, since it's up to the product owner to take such a decision. Resource leveling or smoothing are two schedule compression techniques used in a predictive work environment.

**Question 6 = A**

**Explanation:** The project manager should talk to the senior project manager privately to get to know the reason behind their behavior. Besides, the project manager should be clear about not tolerating any kind of discriminating behavior towards the new team member and the potential consequences and disciplinary procedures the senior team member will face in case their behavior persists. The project manager should talk directly to the concerned party with no need for escalating the issue to the functional manager at this stage. Such behavior should not be ignored, even when it seems to have no tangible impact on work progress. On the other hand, it's not appropriate nor professional to scold a team member in a meeting and in the presence of their colleagues, regardless of their behavior.

**Question 7 = B**

**Explanation:** The project manager can help their team get self-organized by mentoring them on how to make their own decisions. This will empower them to pick their own tasks without waiting for assignments or asking for permission or direction from the project manager every time. Taking a vacation is a passive approach to dealing with the problem and it won't solve it since the team will get back to relying on the project manager as soon as they come back. Ensuring that the team includes different functional expertise will help the



team be cross-functional rather than self-organizing. Supporting the team by removing encountered impediments is part of the agile project manager's duties and won't help make the team self-organizing.

**Question 8 = D**

**Explanation:** The reason behind the team member's demotivation is intrinsic. The senior team member is looking for challenging work and will respond well to stretch goals and problem solving (PMBOK 7th edition, page 25). Increasing their salary or holding team-building activities will not help address the original problem. Looking for a replacement should be the last resort if all other options fail to motivate the concerned team member.

**Question 9 = C**

**Explanation:** The best way to address this issue is to have an informal discussion with the team member to understand what happened and provide them with the appropriate guidance. Since the issue is neither severe nor recurrent, it does not necessitate formal communication. It's not appropriate for the project manager to reproach the team member and express their disappointment. They also shouldn't ignore the situation because it's their responsibility as the project manager to develop, coach, and mentor their team.

**Question 10 = B**

**Explanation:** Asking another team member to help mentor the new member and guide them through getting their task completed and overcoming the challenging aspects of their assignment is the right course of action. Since the member is new and they might lack certain skills or experience dealing with certain types of tasks, they will get the chance to learn and overcome any impediments by collaborating with more experienced team members. Assigning someone else to get the task done will only have a bad impact on their self-esteem and motivation and make them miss out on a learning opportunity. Similarly, expressing their disappointment at the new member's performance will do more harm than actually resolving the issue. Checking the team ground rules is irrelevant to this situation.

**Question 11 = D**

**Explanation:** First, the project manager should understand the impact of the team member's departure on the project. It might have a big impact where the leaving member needs to be promptly replaced with an experienced member. Or, their departure might have a limited impact and the project can proceed without their contribution. Based on the evaluation findings, a decision should be taken on whether to get a replacement or reassign the workload. The project's resource breakdown structure should be updated later on to reflect the new changes.

**Question 12 = C**

**Explanation:** The project manager should understand the team members' ambitions and create a link between the project's activities and goals and their personal objectives. Offering a bonus at the end of the project may not have an immediate effect since it's intended to be done in the future. Offering an immediate salary raise, on the other hand, may prove to be an efficient short-term solution, but it can't engage team members for long. Aligning the project with the organization's goals does not answer the question of "what's in it for me?" for the team members.

**Question 13 = D**

**Explanation:** As a facilitator, the project manager must ensure that all attendees take part in the meeting by encouraging them to share their ideas and opinions and engaging them in the discussed topics. It's among their responsibilities as a facilitator to ensure that everyone takes part in the decision-making, problem-solving, brainstorming, etc. activities that take place during meetings. Promoting participation and maintaining the ideas and discussions flow during such events is an indication of efficient facilitation. Changing meetings from face-to-face to virtual or limiting their duration does not guarantee more engagement or participation. Moreover, limiting the intervention of talkative participants will only result in more inactive attendees.

**Question 14 = C**

**Explanation:** Short daily meetings are referred to as daily standup meetings which represent a framework for sharing what each member has accomplished, what they will be doing next, and what blockers they're facing. This type of meeting helps build a connection between team members, improves communication, and as a result reduces rework. Co-location can resolve this issue too. However, team members are dispersed in different countries, making it difficult to assemble them in one location. Offering team members training about cultural differences could only help them overcome cultural barriers, but it can't help them sync their work to avoid rework. Written, asynchronous communication such as emails does not promote bonding or building connections in comparison to verbal synchronous channels such as virtual meetings.

**Question 15 = B**

**Explanation:** A cross-functional team is a group of individuals who acquire different substantial skill sets that are enough to accomplish their common goal proficiently. A self-organizing team is autonomous in the sense that it does not rely on any outsiders to figure out how to best accomplish its work. This does not mean that each team member possesses all of the necessary skills for

delivering the product; rather, they just need to be competent in their area of expertise.

## **CHAPTER 4**

### **Project Development Approach, Cadence, and Life Cycle**

# 1. Project Development Approaches

As a project manager, you have the responsibility to choose a development approach to execute your project work. A **project development approach** is a method according to which you're going to create and achieve your project deliverable whether it's a product, service, or result. It consists in applying a set of procedures, techniques, practices, and rules throughout your project life cycle.

A project development approach is not the same as its **delivery cadence**, as the latter refers to the timing and frequency of the project deliverables. Delivery cadence can be single, multiple, periodic, or continuous. For instance, the delivery cadence of an agile project of two-week sprints is periodic since it occurs every fortnight. Essentially, cadence is the duration of a work cycle, meaning that a short work cycle leads to a faster delivery cadence.

In software development, **continuous delivery** implies the immediate release and delivery of the product's incremental features to the client. This can be achieved through automation platforms, such as Jenkins.

Going back to development approaches, when choosing the way you want to implement your work, you should take into consideration your organization and project's unique characteristics. These should dictate the type of approach to be adopted, whether it's predictive, adaptive, or hybrid.

A **predictive** approach, also known as a **plan-driven** or a **waterfall** approach, is a more traditional work management approach, where the scope, time, cost, requirements, and acceptance criteria are all thoroughly planned and determined upfront before starting with execution. This type of development approach is sequential and rigid, as everything is described, fixed, and agreed upon in the project's early stages. Predictive approaches also consist of a single delivery, with predefined work phases that usually overlap.

Even though a Waterfall approach is too rigid to handle the market or the client's changing requests, change is still possible; predictive projects form a Change Control Board (CCB) to handle change requests and to ensure that only valuable modifications are considered for implementation.

**Adaptive approaches**, on the other hand, adapt to the project's changing environment. This type of approach is suitable for projects with high levels of uncertainty and volatility, and in which requirements are likely to change throughout the project life cycle.

Unlike the predictive approach, an adaptive one is known to be **change-driven**, meaning it welcomes and adapts to changes through frequent planning. An adaptive approach can be iterative, incremental, or agile.

An **iterative approach** implies defining the scope at a high level at the very beginning of the project while progressively developing the cost and schedule through timeboxed iterations as deliverables become clearer. Work implementation under this approach relies on progressive elaboration until the final product is fully developed. This allows for implementing improvements according to the solicited feedback and any discoveries made during work execution.

The iterative approach often gets mixed up with the incremental approach. The main difference is that the **incremental approach** delivers ready-to-use finished product functionalities to the customer at the end of each iteration. These partial outcomes are known as increments, mainly presenting functional, tested, and accepted subsets of the project's final deliverables. To make sure the product is aligned with initial requirements, produced increments are demonstrated to the client to acquire their feedback.

Gathering both iterative and incremental properties, the **agile approach** focuses on refining work through frequent delivery. This approach is characterized by its flexibility to adapt to changes and react to the constant involvement of different parties. An agile approach can be implemented in the form of various frameworks such as Scrum, Kanban, Scrumban, Agile Unified Process, eXtreme Programming (XP), Crystal Methods, Dynamic Systems Development Method (DSDM), Feature-Driven Development (FDD), etc. which will be all explained in detail in another section under this chapter.

By default, agile relies on the **progressive elaboration** of work planning in order to handle ambiguity. This involves starting off with a broadly outlined idea and scope, and with more information becoming available, a specific and detailed plan is elaborated.

On the other hand, predictive projects can deploy the **rolling wave planning** technique where near-term work is decomposed to the greatest degree of detail, while longer-term work is identified more broadly. This allows work to progress on current and near-term deliverables while planning for potential work packages continues.

If neither predictive nor adaptive approaches seem suitable for your project requirements, you can opt for a combination of both. A **hybrid approach** mainly combines and incorporates different predictive and adaptive elements

and components into one development approach. This can be an effective transition method to introduce the organization or the team to a new approach.

## 2. Project Life Cycles and Process Groups

Now that we examined the different approaches to managing a project, let's get into the project life cycle and phases. The **project life cycle** is the process and different phases that a project goes through, from start to finish, in order to create and deliver a product. For example, to build a mobile app, you may need to go through six phases: wireframing, prototyping, designing, developing, testing, and deploying the app.

Each **phase** is goal-oriented as it comprises a number of logically related project activities, aiming to complete one or more deliverables and hence reach a certain milestone. The project plan determines the systematic hierarchy of the phases and establishes dependencies among them, meaning that project work can follow iterative, sequential, or overlapping phases. Besides, a phase can be also divided into sub-phases if it's found to be more practical for fulfilling and monitoring work.

A project life cycle is different from the **product life cycle** in that the latter consists of the product life duration and evolution phases, from being a concept or an idea to the point of its retirement or discontinuation. A product passes through five stages: development, introduction, growth, maturity, and decline, each representing the amount of value or revenue it generates over its life duration.

A product life cycle can expand over one or more projects as it's often longer than the project life cycle. For instance, you can have a first project dedicated to the product's initial development, a second project to add a complex feature, a third project for maintenance, etc. A product life cycle can be distinguished by the fact that its phases occur only once and can only be sequential, unlike project life cycle phases, which can be iterative, sequential, or even overlapping.

Project life cycle phases can be also confused with process groups. Unlike life cycles which are specific to each project, project management **process groups** consist of generic, standard collections of processes that all projects follow. Project management process groups involve initiating, planning, executing, monitoring and controlling, and finally closing processes. These process groups are not phases, but rather logical sets of project management inputs, outputs, tools, and techniques, that are adapted to the project, organization, and stakeholders' needs and requirements.



Process groups could all occur and be iterated within a single project life cycle phase, depending on the project, and regardless of the development approach or application field or industry. Besides, the output of a certain process is generally the input to another, or it can even be considered a project or phase deliverable. For instance, the product backlog produced during the planning process group is an input to the execution process group.

Now that you have a fundamental understanding of what the process groups are, let's dive into the characteristics of each of the processes.

Starting with **initiating**, this is the process group for launching your project and establishing its vision to ensure successful delivery. This process group is performed in order to identify your project purpose as well as its stakeholders and scope. It can also be performed to obtain authorization to start a new phase of your project.

The initiating process group generally takes place after a project is formally approved and a project manager is assigned to perform two main processes: project charter creation and project stakeholder identification, making the project charter document and stakeholder register the main outcomes of the initiation process group.

Moving on to the **planning** process group, this is where you start developing your project management plans including its budget and schedule, along with assignments and responsibilities. The planning processes play the role of refining your project objectives and defining its course of action. This group comprises multiple processes to set up the details for your project execution in several documents that will need to be constantly reviewed and updated throughout the project life cycle.

In order to implement the work defined and detailed in the planning process group, the **executing** processes are performed to realize the project goals. This group involves carrying out all planned project tasks and activities to produce your project deliverables. The executing processes focus on getting work done, meeting with the project team, maintaining an adequate level of engagement with stakeholders, and ensuring that deliverables meet expectations.

Along with executing your project work, and in order to make sure it's progressing and advancing as it's supposed to, you need to proceed with **monitoring and controlling** processes. This means tracking, monitoring, reviewing, and adjusting your project performance whenever you identify any improvement areas or when certain changes occur. The controlling and

monitoring processes help you limit errors, respond to changes, identify arising issues, control all key aspects, and keep everything on track to ultimately ensure the quality and accuracy of your deliverables.

Lastly, and in order to formally wrap up your project, phase, or contract, you should execute the **closing** process group by ensuring the customer's approval and acceptance of the final deliverables. Then, all loose ends should be tied up, documentation should be finalized and archived, and a final project analysis and report should be carried out.

### 3. Agile Frameworks

As a term, **agile** refers to a particular mindset that is based on a well-defined set of values and principles. The **agile mindset** implies the way of thinking and acting according to these values and principles. In 2001, a group of experts in the software development industry, named “The Agile Alliance”, created and published the **agile manifesto**. This manifesto consists of an official document that presents agile software development’s 4 values and 12 principles, with the purpose of guiding teams through the successful implementation of Agile project management.

The 4 core **agile values** are:

- Individuals and interactions over processes and tools,
- Working software over comprehensive documentation,
- Customer collaboration over contract negotiation, and
- Responding to change over following a plan.

From these values, 12 **agile principles** were derived:

- 1) Satisfying customers through early & continuous delivery,
- 2) Welcoming changing requirements even late in the project,
- 3) Delivering value frequently,
- 4) Breaking the silos of your project,
- 5) Building projects around motivated individuals,
- 6) The most effective way of communication is face-to-face,
- 7) Working software is the primary measure of progress,
- 8) Maintaining a sustainable working pace,
- 9) Continuous excellence enhances agility,
- 10) Simplicity is essential,
- 11) Self-organizing teams generate most value, and
- 12) Regularly reflecting and adjusting your way of work to boost effectiveness.

Going through the above-mentioned principles and values, you can draw the conclusion that Agile focuses on providing a flexible way of managing projects and handling changes. Therefore, all Agile project management frameworks were built around these basic concepts. A **project management framework** is a set of practices, standards, processes, tools, and techniques used to carry out a project from initiation to closure.

While there are numerous frameworks that can be used to implement agile principles, each has its unique application requirements that should be fully

understood in order to successfully adopt Agile. That being said, here is an overview of the most common Agile frameworks.

Starting with a flow-based Agile framework, **Kanban** is a lean method that uses a board as a visualization tool to showcase workflow progress, enabling easier identification of blocks, overcommitments, and improvement opportunities.

**Scrum**, which is agile's most common framework, is used to facilitate the development and creation of complex products, by adhering to specific roles, events, and artifacts. Scrum is based on three pillars: transparency, inspection, and adaptation, and five core values: commitment, focus, openness, respect, and courage.

When more than one Scrum team gets involved in developing the same product, we're referring to the **Scrum of Scrums** rather than the typical Scrum. Under this framework, each team shares their work updates, progress, and impediments, and all of their work gets integrated in order to deliver the final product.

Other than Kanban and Scrum, Agile frameworks also include Crystal Family of Methodologies, Large Scale Scrum (LeSS), Scaled Agile Framework (SAFe), and eXtreme Programming (XP) among others.

The **crystal family of methodologies** is a set of agile software development approaches including crystal clear, crystal yellow, crystal orange, crystal red, etc. A darker color indicates a more complex approach. Therefore, choosing the right Crystal method depends on the number of people involved in the project and the criticality level of the project at hand. A team of 5 members, for instance, can opt for the crystal clear approach, while a team of 15 members might find it more suitable to use crystal yellow.

Crystal methodologies promote teamwork, continuous improvement, communication, early frequent delivery, stakeholders' high involvement, bureaucracy and distractions elimination, and overall simplicity.

The **Large Scale Scrum (LeSS)** framework, on the other hand, is similar to the Scrum of Scrums as it extends Scrum basics on a larger scale of application, where multiple teams tackle product development together according to the framework's 10 principles: Large-Scale Scrum is scrum, Empirical process control, Transparency, More with less, Whole product focus, Customer-centric, Continuous improvement towards perfection, Systems thinking, Lean thinking, and Queuing theory.

For building enterprise-class software, the **Scaled Agile Framework (SAFe)** is often used as a system for integrating Agile, Lean, and DevOps practices at scale. This framework applies Agile principles, Lean processes, and product development flow practices, mainly targeting employee engagement improvement, software quality, and team productivity.

Unlike Scrum which basically used to manage small teams, SAFe is used to organize the whole enterprise. For this reason, “Take an economic view” and “Apply systems thinking” are both part of SAFe principles.

Another agile framework that puts more emphasis on high responsiveness to changing requirements is **Extreme Programming (XP)**. This framework is an agile software development method that aims to deliver high-quality software through frequent releases of one to two weeks. As a matter of fact, Extreme Programming teams are more open to change during iterations than Scrum teams.

If you’re considering an agile framework for your project but none of these detailed frameworks seems to be fit for your needs, you can always opt for a blended agile framework. **Blended agile** consists of implementing a hybrid framework that combines different practices and elements of two or more Agile frameworks. This can be a good starting point to switch from one Agile approach to another.

A blended agile framework can incorporate Scrum practices with the Kanban method, which is known as the **Scrumban** framework. Scrumban provides teams with more flexibility, making it a great solution for teams considering a transition from Scrum to Kanban or vice versa.

## 4. Scrum Fundamentals

In this section, we're examining Scrum in a more in-depth manner, exploring its structure, roles, artifacts, and events in detail. As mentioned in the previous section, **Scrum** is an agile framework that follows transparency, inspection, and adaptation as its fundamental pillars, as well as commitment, courage, focus, openness, and respect as its main values.

Scrum comprises a set of defined roles, events, and artifacts that should be implemented and practiced in order to ensure the successful use of this framework. A **scrum team** typically consists of a Scrum Master, a development team, and a product owner.

The **Scrum Master** is considered the development team coach, as they provide the team with guidance, handle obstacles, facilitate Scrum events, and protect the team from disruptions. The **product owner** focuses on the product value as they're the ones responsible and accountable for the delivered product. Finally, the **development team** is a group of people that usually comprises 3 to 9 members, who have the needed technical skills to work on developing the required product in order to achieve the defined goals and objectives.

Along with the designated roles, scrum also consists of 3 main artifacts: The product backlog, the sprint backlog, and the increment. An **artifact** presents any information depicting the product and the actions taken by the scrum team in order to produce it. This can take the form of a document, an output, or even a deliverable.

The **product backlog** is a list of user-centric product requirements. These requirements are sorted out under the backlog as user stories. During work execution, user stories get continuously prioritized and refined to ensure that they are detailed enough and relevant to the project objective.

Work under scrum is executed in a timeboxed cycle of 2 to 4 weeks known as a **sprint** or an iteration. Deciding on a sprint's duration mainly depends on the project's volatility; the more its requirements are susceptible to change, the shorter the duration should be.

The planning and preparation process that precedes the initial sprint is usually referred to as **Zero sprint**. During this precursory sprint, activities such as preliminary research, technical choices, and backlogs preparation, are carried out.

Now that sprints are explained, let's move on to scrum's 2nd artifact. The **sprint backlog** is a list of identified and selected work items by the scrum team that they intend to complete during the sprint. The main difference between the product backlog and the sprint backlog is that the product backlog represents work that needs to be done in order to create the entire product, while the sprint backlog constitutes a subset of the work that needs to be executed in the current sprint.

Lastly, an **increment** is a tested and accepted deliverable at the end of each sprint, typically representing a functional subset of the project's overall outcome.

Throughout the project life cycle, a scrum team uses four main events: sprint planning, daily scrum, sprint review, and sprint retrospective.

**Sprint planning**, as it obviously indicates, consists in collaboratively planning the upcoming sprint work. This can take place in a single meeting or in several planning sessions, aiming to select a list of work items to be accomplished in the next sprint.

Sprint planning meetings typically involve the scrum master, product owner, and the development team. The product owner is responsible for identifying and prioritizing product features, while the development team gets the chance to get any ambiguities cleared up in order to be able to break down high-level user stories into more detailed, actionable tasks.

During the sprint and throughout work execution, the team holds daily stand-up meetings. A **daily scrum or stand-up** is a daily meeting that takes up to 15 minutes. In this meeting, each team member provides insight into everything going on with them, by addressing three points:

- 1) What did they do yesterday?
- 2) What will they do today?
- 3) Did they face any impediments or blockers?

At the end of each sprint, a sprint or an iteration review should be performed. A **sprint review** aims to demonstrate and evaluate the accomplished work during the sprint. This is a product-centric meeting during which the scrum team demonstrates the created product's functionalities or increments seeking the product owner's feedback and approval.

After the sprint review meeting, the scrum team holds another meeting known as the sprint retrospective. Unlike the sprint review, the **sprint retrospective** is a process-oriented meeting; it is held to reflect on the potential ways to improve work processes in future sprints.

Among the examined elements during a sprint retrospective is the team velocity. **Velocity** is the measurement of a team's capacity in a single sprint. A team's velocity is calculated by summing up the story points of all the completed user stories in a certain sprint or iteration. Velocity helps the scrum team plan its next sprints more accurately. It's also used as a team performance diagnostic metric since a consistent velocity is the hallmark of a healthy agile team.

Along with the above-mentioned events, the product owner and the development team can hold another meeting to review, update, and reprioritize product backlog items. This mid-sprint event is known as **backlog refinement**, which can be either carried out as a formal planned meeting or as a regular ongoing activity.



# Practice Test

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## Question 1

A project manager is assigned to lead a digital marketing project. Some stakeholders don't support the project, and others want the entire project to be planned out before it starts. The sponsor, on the other hand, is looking for a quick win to get the support of the majority of stakeholders and ensure the project's continuation. What approach should the project manager adopt in such circumstances?

- A. An agile approach, as it would please the majority of stakeholders
- B. An agile approach, as it would produce functioning deliverables quickly
- C. A predictive approach, as it would give more clarity to the project
- D. A predictive approach, since agile is only used for software development projects

## Question 2

After discussing the matter with stakeholders, the project manager decided to go with a hybrid approach for the new project in order to take full advantage of both predictive and adaptive approaches. When the project manager documented and estimated all activities, one of the stakeholders complained that the project seemed to follow the predictive approach instead. What should the project manager do next in order to demonstrate that they are actually following a hybrid approach?

- A. Sequence activities
- B. Develop schedule
- C. Plan iterations
- D. Estimate costs

## Question 3

An organization selected a pilot project to experiment with the Agile approach. They hired an agile coach to help the project manager since they have been only using the predictive method in the past. During the fourth sprint retrospective, the project team complained that many organizational processes are hindering their work progress, resulting in project delays and rework. What should the project manager do?

- A. Start dedicating part of daily standup meetings to resolving impediments
- B. Conduct a root cause analysis in the following sprint retrospective
- C. Identify the organizational processes that are causing issues and work on removing, changing, or alleviating them

- D. Encourage the project team to be self-organizing by dealing with any problem that gets in their way

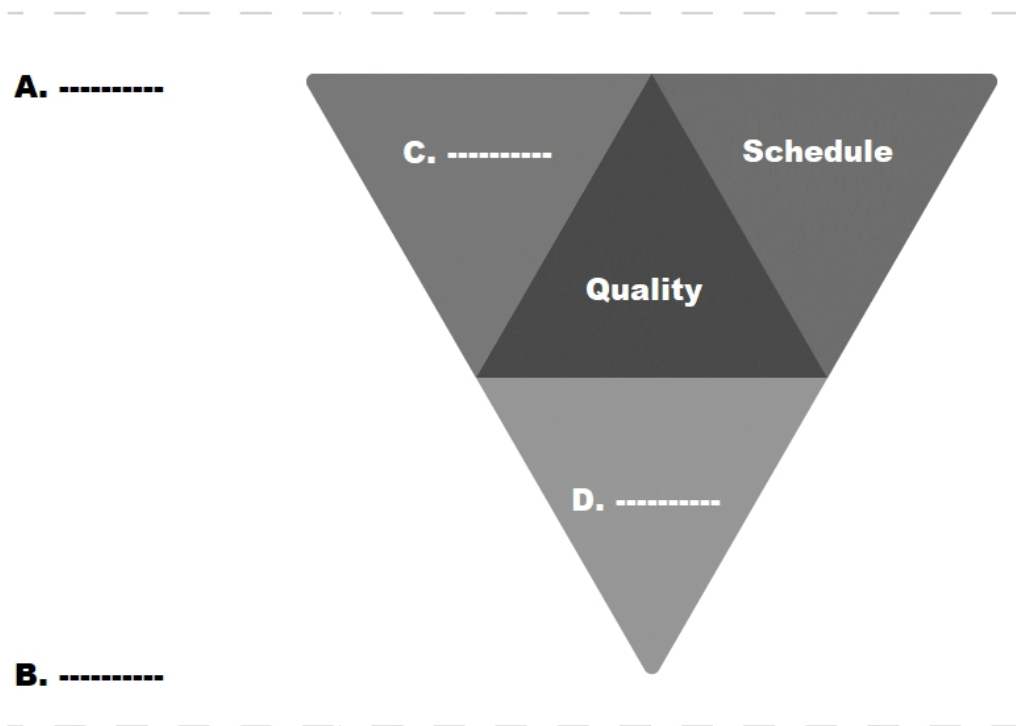
**Question 4**

At the time they joined the organization, the scrum master was leading a team of 6 members. But, the number has doubled since then, making collaboration complicated. Plus, team members expressed their discontent with standups lately, as they tend to repetitively exceed their allotted time. What could the scrum master do to deal with this situation?

- A. Be more vigilant to standups' duration so they do not exceed 15 minutes
- B. Increase the standup meeting timebox to 20 minutes
- C. Split the team into two Scrum teams and apply the Scrum of Scrums technique to facilitate coordination between them
- D. Switch to a predictive approach since scrum is not suitable for teams counting more than 9 members

**Question 5**

Drag the following terms to the right position in the Agile triangle of constraints below: Cost, Scope, Flexible, Fixed



**Question 6**

An organization decided to use the agile approach for its new project. What should they get at the end of the first sprint?

- A. A plan for the subsequent sprint
- B. A potentially releasable product increment
- C. A Minimum Viable Product (MVP)
- D. A Work Breakdown Structure (WBS)

### **Question 7**

An organization is making a progressive transition from the predictive to the adaptive approach. What can the project manager do to prepare their team for the transition? (Select two)

- A. Provide training for the team on agile values and practices
- B. Apply the “learning-by-doing” philosophy by immediately switching to agile approaches
- C. Plan a gradual transition by introducing a few iterative or incremental techniques to their current project
- D. Suggest a full transition since agile practices cannot be combined with predictive ones

### **Question 8**

A project manager was assigned to develop a mobile app with a team of five members. Which of the following project life cycles can be adopted by the project manager?

- A. Initiation, planning, executing, monitoring and controlling, and closing
- B. Wireframing, prototyping, designing, developing, testing, and deploying
- C. Development, introduction, growth, maturity, and decline
- D. Forming, storming, norming, performing, and adjourning

### **Question 9**

An organization is intending to launch a project where team members are going to employ a pull system while aiming to limit work in progress. The pull system functions as follows: when a work item is done, it triggers a pull to bring in the next item on the to-do list. Which Agile framework does this describe?

- A. Scrum
- B. Kanban
- C. Pull
- D. Lean

### **Question 10**

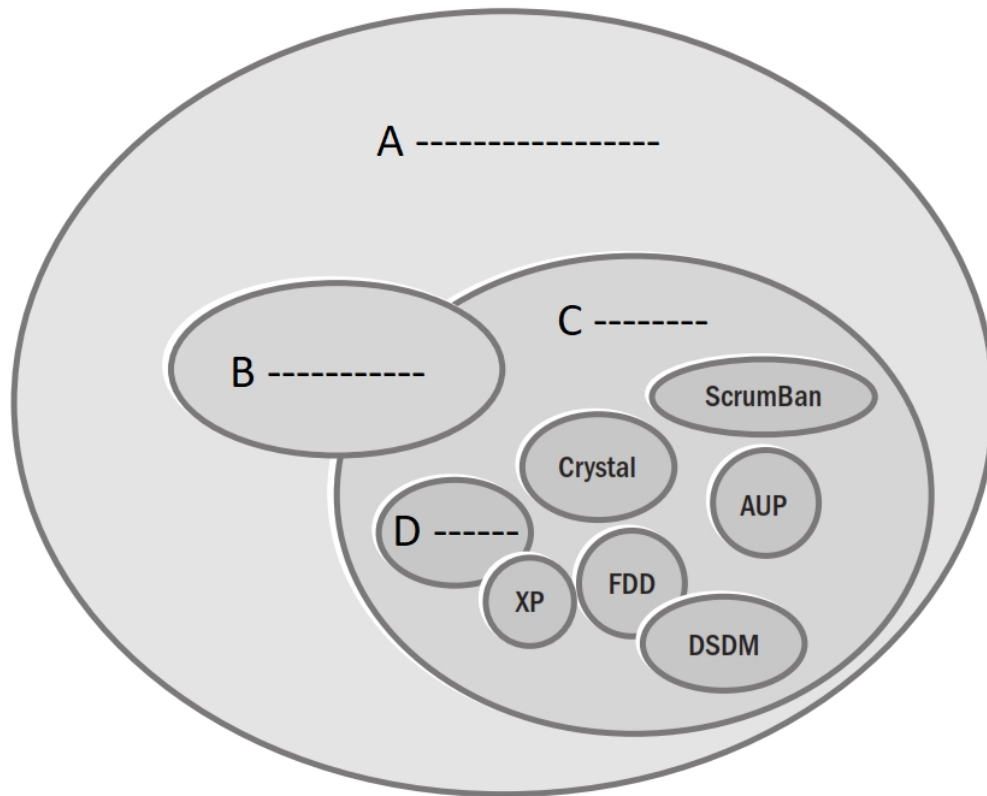
A project manager was assigned to a large project that has unclear requirements and deliverables. After choosing an agile approach to deal with the situation, what should the project manager do next?

- A. Acquire an agile coach in order to clarify the project scope

- B. Facilitate the identification and prioritization of current work items, then execute work in an iterative and incremental way
- C. Set up a cross-functional team to help define all the needed iterations for completing the project
- D. Have a meeting with the product owner or sponsor to discuss project baselines

**Question 11**

Drag four of the following concepts and approaches to their right positions: Agile, Predictive, Hybrid, Scrum, Lean, Kanban.



**Question 12**

When the dimensions of the dug canals for the new dam project were compared to the plan, a huge variance was revealed. Therefore, the project manager had to call for a meeting with the team to decide what to do next. In which of the following process groups does the project manager's activity take part?

- A. Executing
- B. Closing
- C. Monitoring and Controlling
- D. Inspecting

### **Question 13**

In a meeting with the product owner, the agile project manager has been informed that many other functionalities should be added to the product, without the possibility of extending the project's deadline. What should the project manager do?

- A.** Use the smoothing technique and allude that delays are possible in such cases
- B.** Inform the product owner that lower priority work items will have to be dropped from the project
- C.** Create a separate backlog for the new functionalities and work on it when time allows
- D.** Inform the product owner that the new functionalities should be first authorized through an official change request

### **Question 14**

An organization assigned a Product Owner to a new agile project and asked them to work on creating value and generating Return on Investment (ROI) as early as possible. How can the product owner achieve the organization's demands?

- A.** Share these priorities with the project team
- B.** Support and serve the project team
- C.** Prioritize product backlog items
- D.** Improve work processes

### **Question 15**

An organization went through a transformation to adopt the Kanban approach for managing their new projects. The Kanban board includes four columns: To do, Doing, Testing, and Done. How should the project manager deal with the items on these different lists?

- A.** Limit the items in the To-do list
- B.** Limit the items in the Testing list
- C.** Increase the number of items in the Testing list
- D.** Increase the number of items in the Doing list

## Answers

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### Question 1 = B

**Explanation:** Since the sponsor is looking for a quick win, then the project manager should adopt an agile approach. The agile approach introduces working functionalities early in the project, which could help the project manager/sponsor win the stakeholders' support and avoid project discontinuation. Certain stakeholders wanted the entire project to be planned out before it starts, so they would be pleased with using a predictive approach for the project implementation. This approach gives more clarity to the work scope. However, the risk of losing stakeholders' support along the way is very high since the project manager won't be able to introduce tangible results until the end of the project (PMBOK 7th edition, page 46). Finally, agile is applicable to various fields, not just in the software industry (Agile Practice Guide, page 1).

### Question 2 = C

**Explanation:** The project manager can demonstrate that they are following the hybrid approach by adopting iterative practices along with predictive methods. All of the other options represent processes within the predictive approach, therefore they will not demonstrate to the stakeholder that the project manager is following a hybrid approach.

### Question 3 = C

**Explanation:** Transitioning to Agile does not mean that the approach with all its components will work for the organization, project, or team. Therefore, when issues with the new processes arise, the best practice would be customizing, tailoring, and adapting them to the team's needs for optimum efficiency. This involves removing any processes that don't seem to bring any value to the way the team is conducting work, changing to other more suitable processes, or altering the existing processes to fix any issues and make them more compatible with requirements. Daily standups are meant for learning the current progress of each team member's work as well as detecting impediments rather than dedicating part of the meeting to resolving them, which is neither convenient nor practical since the meeting duration is timeboxed to 15 minutes. Besides, the impediments were already detected by the development team, which means that the project manager should work on removing them as their role entails, beyond the standup meetings.

### Question 4 = C

**Explanation:** Scrum of Scrums (SoS), aka meta Scrum, is used to coordinate the work of two or more Scrum teams (Agile Practice Guide, page 111). The main aim of implementing the Scrum of Scrums approach is to create smaller, more coordinated independent teams. Since your team exceeds the maximum number of 9 team members per Scrum team, the logical alternative is to split the team in order to benefit from the efficiency of Scrum processes. The consequences of increasing resources should not be tackled by switching to a predictive approach. Instead, Scrum can evolve to “Scrum of Scrums” or even “Scrum of Scrum of Scrums” in such a case. Monitoring the standup duration, on the other hand, will not fix the problem since a very large team naturally results in longer standup meetings. Deciding to increase the meeting duration is not right either since it goes against Scrum principles.

#### **Question 5**

**Explanation:** Unlike predictive approaches, projects that follow adaptive approaches have a fixed cost and schedule, and flexible scope. A. Fixed, B. Flexible, C. Cost, and D. Scope.

#### **Question 6 = B**

**Explanation:** Agile uses iterations, also known as sprints, in each, a potentially shippable increment of the product is produced (Agile Practice Guide, page 101). The plan for the subsequent sprint is the output of the sprint planning event. A Minimum Viable Product (MVP) is a primary version of the product with just the basic functionalities with the purpose of collecting feedback or validating the product idea. It could take several sprints for the product to reach the MVP stage. Finally, a WBS is a planning technique used in the predictive approach.

#### **Question 7 = A, C**

**Explanation:** The project manager should provide their team with relevant training in order to enable them to adopt the new agile practices with more confidence. They should also gradually introduce certain iterative or incremental techniques to make the transition smoother. This will improve the team learning process and accelerate delivering value to sponsors. Many teams can't make a full immediate switch to the agile approach. It is preferable and even recommended to make a gradual transition by combining adaptive and predictive practices, which is known as a hybrid approach (Agile Practice Guide, page 30).

#### **Question 8 = B**

**Explanation:** The project life cycle that can be adopted for developing a mobile app project is: Wireframing, prototyping, designing, developing, testing, and deploying. A project life cycle comprises the different development phases

that a project goes through from its start to its completion. Depending on different factors, a project lifecycle often includes Feasibility, Design, Build, Test, Deploy, and Close phases (PMBOK 7, pages 33 - 42). Initiation, planning, executing, monitoring and controlling, and closing are process groups rather than project lifecycle phases. Forming, storming, norming, performing, and adjourning are team development phases according to Tuckman's theory.

**Question 9 = B**

**Explanation:** Kanban is a workflow project management approach that uses a board to display and manage work items in columns, e.g., To do, In progress, Testing, and Done. Kanban is built around four key principles: Visualizing workflow, Limiting work in progress (WIP), Focusing on flow, and Continuous improvement. Scrum doesn't rely on a pull work system, it relies on sprints to execute a selection of predetermined work items. Lean is not an Agile Framework, it's rather a philosophy that promotes removing waste within work processes. Pull is a made-up term.

**Question 10 = B**

**Explanation:** The project manager should start by facilitating the identification and prioritization of evident requirements, hence helping with the elaboration of the product backlog. Next, and since the project is following an agile approach, the project manager should execute work iteratively and incrementally. Since the project is large and deliverables are vague, it might not be possible to make the project scope clearer and remove ambiguity before starting implementation. In that case, the predictive approach would be more suitable than agile. Needless to say that the agile coach's role does not involve clarifying the scope of work, it rather entails helping the project team embrace an agile mindset. Defining all of the iterations needed for completing the project refers to predictive planning. Likewise, project baselines are only specified in predictive projects.

**Question 11**

**Explanation:**

- A. Lean: a set of concepts that includes eliminating waste, amplifying learning, and delivering as fast as possible.
- B. Kanban: a subset of lean which also refers to a framework within agile.
- C. Agile: a subset of lean and an umbrella for several frameworks.
- D. Scrum: one of the agile frameworks.

**Question 12 = C**

**Explanation:** Reviewing the project performance in comparison to plans is part of the monitoring and controlling process group. These processes are meant for tracking, adjusting, and reporting on the project performance, as well



as implementing corrective actions when needed to ensure the project is on track, budget and time-wise. Inspecting is not a process group, it's rather a risk identification activity.

**Question 13 = B**

**Explanation:** The agile project manager should inform the product owner that, consequently, they have to drop lower priority work items from the project. Unlike the predictive approach, agile projects do not require formal change requests to change the scope. However, when new functionalities with higher priority are added, lower priority functionalities might have to be dropped in case the project timeframe can't be extended. The project manager should not have a pretext for delays. Plus, they should discuss what's in their mind directly with the product owner without any implicit hints. On the other hand, it's not appropriate to have two backlogs. The new requirements should be prioritized within the existing backlog. The new functionalities' priority is high, thus they should not be tackled "when time allows".

**Question 14 = C**

**Explanation:** In order to get the most value as early as possible, the product owner should focus on prioritizing product backlog items. Sharing the organization's priorities with the project team is important to help them understand the product owner's choices. Still, the product owner is the one responsible for the product, not the project team. Improving work processes and supporting and serving the project team is the main focus of the scrum master rather than the product owner.

**Question 15 = B**

**Explanation:** In Kanban, the project manager should limit Work In Progress (WIP), meaning work under the "Doing" and "Testing" columns. This helps boost performance, which automatically leads to increasing items in the "Done" list. On the other hand, items in the "To do" list should be increased so the team won't be blocked waiting for the next items to work on.

# **CHAPTER 5**

## Project Planning

# 1. Collecting and Analyzing Project Requirements

After a project gets approved for implementation, and upon deciding on its development approach and framework, you should move on to the planning phase. This should start with collecting and analyzing your project's requirements.

A **requirement** is a condition, capability, or task that must be met in order to successfully deliver a project's final product, service, or result. Requirements are not the same as **specifications** since the latter refers to the detailed, precise, and often technical description or statement of a certain need and how it can be met. For example, if your client wants a train with a 1000-passenger capacity, that's a requirement, but when the train is designed to have two 1st class passenger cars and eight 2nd class cars of 100 seats each, that's a specification.

An accurate analysis of the project requirements and specifications is key for delivering the project on time, within budget limits, and according to the client's expectations, as a majority of projects fail due to poor requirement management. As a project manager, you can use multiple tools and techniques to achieve a proper and valid identification and processing of the project requirements.

Starting with the collection step, you should not expect the project requirements to be delivered to you on a silver platter. In many cases, your client will not be able to express exactly what they want, and here comes your role, and skills, as a project manager to guide and help them formulate their requirements.

In this case, you can deploy the **Specification by Example** technique where you ask your client to provide realistic examples of how they want their product or service to be used. This collaborative approach helps capture and illustrate requirements more easily and accurately than using abstract statements.

**Brainstorming** is another method for identifying requirements. As a data-gathering technique, brainstorming involves a group discussion in which each participant quickly shares as many ideas as they can, and then all elicited inputs are analyzed to generate the project requirements and specifications.

A similar technique is **brainwriting**, which is considered as an individual brainstorming or as a refinement of the brainstorming technique. Brainwriting

gives each participant some time to reflect on the topic or questions individually, by expressing their ideas or primary impressions through writing, before the whole group participates in the main session. This method makes the process of generating ideas more efficient since everyone will be prepared to share their thoughts.

Another common approach for collecting requirements in a group framework is **focus groups**. This involves a facilitated interactive face-to-face conversation, bringing together all concerned parties and subject matter experts to share and discuss their input regarding a particular subject. This can be specifically used when creating the project scope or simply to identify expectations and attitudes toward a proposed product, service, or result.

To take your project requirements' collection process a step further, you can employ the **nominal group technique**, which is quite similar to brainstorming. However, this method allows participants to vote on the generated ideas and rank them according to their usefulness. In order to reach a consensus, other rounds of voting can be held.

If you think that anonymity can play a role in promoting greater disclosure and more accurate input from your concerned parties, you can opt for the **Delphi technique**. This consensus-based approach entails the use of several rounds of surveys, where each round is designed based on the previous round's answers. These surveys are conducted anonymously to ensure that participating experts can express their thoughts about the project requirements unreservedly. The idea is that these anonymous contributions will eventually lead to a consensus with no particular opinions influencing others' input.

Examining similar projects and using them for a comparison of ideas, products, processes, practices, etc. can help a lot in the requirements collection phase. This practice is what is known as **benchmarking**. This proves to be helpful not only on the requirements level, but also for processes, practices, and implementation approaches.

A more creative way of identifying your project requirements is the product box technique. The **product box** is a facilitated workshop where a blank white cardboard box is given to the customer to design, using coloring markers, stickers, etc. in order to present their vision for their future product. This tool helps you identify what matters most to your customer regarding the product features. This workshop can also involve potential end-users who can reveal some useful insights into the product vision in a very concrete way.

In case your project is an addendum, meaning you are adding more features and functionalities to an existing product, the **voice of the customer** technique can come in handy. This technique involves collecting and incorporating customers' feedback, preferences, and expectations into the newly developed features.

Next, the collected requirements should be brought into analysis, as not all requirements are relevant or useful. **Requirement analysis** allows you to further examine each requirement, its associated value and risks, etc. Multiple tools and techniques could be used for this purpose.

For instance, **mind maps** are often used after brainstorming and nominal group sessions to organize and visually display the relationship between the collected ideas.

The **affinity diagram** is another effective tool for grouping compatible ideas into clusters. It often presents them in a hierarchical order, such as in the case of the Work Breakdown Structure (WBS).

To visually illustrate a process, you should use a **flowchart**, also known as a progress flow diagram or process map. This method generates a graphical representation of the logical flow of certain information, decisions, and activities along with their potential risks, inputs, and outcomes.

In addition to mind maps, affinity diagrams, and flowcharts, you can analyze your gathered requirements using a context diagram. Similarly to the previous two analysis techniques, a **context diagram** is also a visual demonstration tool. However, its role is to depict how different elements interact. For instance, it can illustrate how third-party applications, APIs, and users will interact with your product.

After collecting and analyzing your project requirements, you'll have to choose which ones you're selecting for implementation. Sometimes, you will not be able to reach a consensus concerning which requirements to develop, the technologies to use for execution, and many other choices you will have to make during the planning phase of your project. In such cases, you can go for some key **decision-making techniques**.

Voting might be the most obvious choice for collective decision-making. The **voting** method consists in picking the option that gets more votes from the involved parties in the decision-making process, which is both cost and time-efficient. A voting process can result in a decision made by unanimity, majority, or plurality.

**Unanimity** is when everyone involved agrees and votes for the same option. **A majority**, however, consists in going for the option that got the support of more than 50% of the engaged members' votes. Finally, **plurality** is similar to majority as it allows the biggest part of the group to decide, even without reaching a majority. Imagine this; you have 3 options to choose from, the voting group counts 13 members, options 1 and 2 got 4 votes each, and option 3 got 5 votes, then option 3 wins, even though more people (8 members) are opposed to this option, this is how plurality works.

A variation of the voting technique is the **first of five** or the first to five. Using this method requires participants to hold up a closed fist or as many fingers as they want to express their level of support for a certain decision; the more fingers they show the stronger they support the decision. This continues until a decision is made through consensus in order to move on to the next decision.

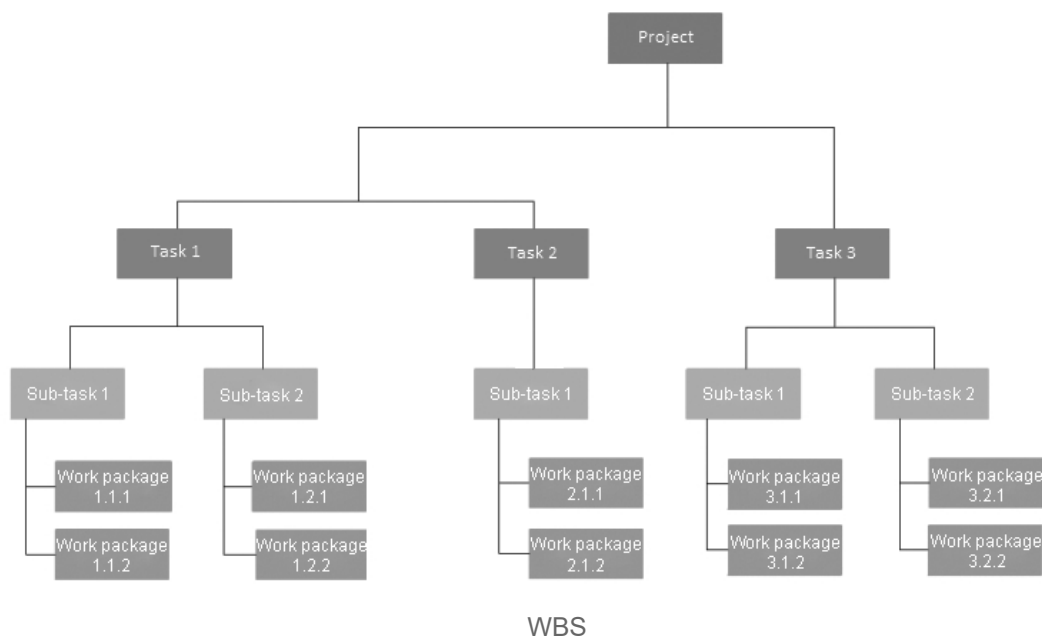
A more simple and fast voting approach is **Roman voting**. It simply implies a straightforward thumbs up to vote "Yes" and a thumbs down to vote "No". Everyone should vote at the same time, and depending on the number of thumbs up or down, a decision is made.

A group can also apply Dot voting to make decisions. **Dot voting**, also known as dotmocracy, multi-voting, sticker voting, sticky-dot voting, sticking dots, and dot democracy, is a group activity in which each member utilizes sticky dots to choose from a range of options. The option with the most dots is the one that gets selected.

## 2. Developing the Schedule of a Predictive Project

Now that you have the overall vision of your product characteristics and features and how you're going to practically concretize these ideas, it's time to set up your work schedule.

If you're adopting the predictive approach for your project execution, your next move should be to hierarchically decompose the total work included in your project scope into manageable work packages. This process is referred to as the **Work Breakdown Structure (WBS)**.



This will help you identify all needs for physical and human resources in order to fulfill the project goals. However, WBS only provides the overall picture of the work that will have to be performed. The project manager along with the project team should develop a **WBS dictionary** to describe and define each of the WBS components and their characteristics in detail.

Next, and in order to visualize the project work, the **network diagram**, aka the **network path**, will do the trick. This type of diagram displays your project work, how its activities are related to one another, and their expected progress and advancement from the time they start until they're fully accomplished.

The identified project activities should be sequenced while taking into consideration their external and internal dependencies, as well as all mandatory and discretionary ones.

An **external dependency** refers to the relationship and dependency an activity has with other out-of-the-project activities. This type of dependency can be neither changed nor altered since it's beyond the team's control. An external dependency means when you can't start certain activities until you get governmental authorization.

**Internal dependencies**, on the other hand, are related to the project or the organization, therefore they can be controlled and adjusted. For instance, a testing activity cannot begin until coding activities are completed.

**Mandatory dependencies**, which are also known as **hard logic**, imply the naturally inherent or contractually required relationship between certain activities due to the project work nature. Similarly to external dependencies, you cannot alter a mandatory dependency. This often involves a physical limitation that imposes a natural order on certain activities. For example, activity B cannot be logically performed until activity A is accomplished, such as in the case of a construction project when you can't start working on the ceiling without finishing work on the foundation.

However, a **discretionary dependency**, or a **soft logic**, preferred logic, or preferential logic, is when the relationship is intentionally set up based on certain preferences, experience, previous lessons learned, or the project's best practices. So, naturally, a discretionary dependency can be subject to changes since it's optional or preferred in the first place.

An activity can have a mandatory external dependency, a mandatory internal dependency, a discretionary external dependency, or a discretionary internal dependency all at the same time, which can all be identified and determined during the sequencing activity.

These dependencies often result in an activity either having a lag or a lead time. **Lag time** or waiting time refers to the amount of time a successor activity can be delayed on purpose, with respect to its predecessor activity. For instance, in order to start painting walls, you'll have to wait 2 days (lag time) for the primer layer to fully dry. However, when an activity is completed earlier than anticipated, allowing you to save some time and advance a successor activity's starting date, then we're referring to **lead time**.

Lag time can be considered as a positive value since it's added to your project duration, while lead time is negative as it decreases the schedule duration, bringing you closer to your project deadline. Too much lead time can cause a rush in the other activities' execution. Too much lag time, however, can lead to too many delays, affecting your overall project delivery time and cost.



All of these variables should be identified, assessed, and reflected in your project schedule.

After visualizing your project activities' logical sequencing, each activity should be estimated in order to create your project schedule. Activities estimation can be performed using the **Critical Path Method (CPM)**. This method initially determines your schedule flexibility by calculating each activity's early start and finish as well as its late start and finish through performing forward and backward passes.

This method helps reveal the project's longest series of tasks, known as the **critical path**, meaning that any delay in activities on the critical path will result in the project end date delay.

The CPM analysis technique also illustrates several potential paths toward a project accomplishment. Activities that are not on the critical path will have some **float or slack**, meaning they can be delayed for a certain time without impacting the project end date.

Similarly to the critical path, the network diagram identifies the **critical chain**, which also represents the longest chain of activities. However, it takes into consideration technical dependencies and resource availability.

Therefore, you might need to apply some **resource optimization techniques**, such as resource leveling and resource smoothing, to adjust resource allocation before the schedule is approved or baselined.

**Resource leveling** consists in altering the duration or the sequence of activities according to your resources' availability to avoid any overallocation. Resource leveling is not only used to ease the burden of certain resources, it can be also applied when a scarce or key resource has a limited availability duration or may not be available at a certain time. This can occur when this resource is simultaneously involved in another project for instance. The use of this method often results in changes in the critical path.

The implementation of **resource smoothing**, as opposed to resource-leveling, aims to attain a consistent resource utilization over a certain period of time using the activities free and total float in order to avoid affecting the critical path or the completion date. Unlike resource leveling which targets resources over or under allocation, resource smoothing addresses the issue of unevenly allocated resources.

Luckily, there are some tools to develop the network diagram and your project work schedule. You can create a **Gantt chart** to depict the schedule's

activities duration and sequence. This bar chart provides a graphical presentation of the schedule with activities listed on vertical bars, their start and finish dates are displayed across the top of the chart, and their durations are shown as horizontal bars. This type of chart is commonly used as it's easy to read by everyone using project management software such as Microsoft Project.

Along with the mentioned elements, a bar chart can also display your project milestones. A **milestone** is used as a measurement of your progress towards the ultimate project goal and as an indicator of whether or not your project is on schedule. It represents all significant events or points during the lifecycle of your project. Since milestones are just a display of the project progress status, they have zero duration.

### 3. Developing the Schedule of an Adaptive Project

In the previous section, we examined how schedule estimations in predictive projects focus on developing a structured, linear schedule that aims to produce a predetermined end result within a specific time frame. This, however, can't be the case for evolving projects implemented under changing conditions. Thus, adaptive planning is the most suitable way to prepare for your work execution, as it allows flexibility in managing the course of your project over an undetermined timeline. Needless to say that adaptive schedule planning uses different estimation techniques than the ones we detailed in the previous section.

Even though the outputs of an adaptive project are not determined from the start, your team needs to know what they're working towards. This can be achieved by setting a clear **Definition of Done (DoD)**, i.e., a set of established criteria that a product or release must meet in order to be considered ready for use. These criteria represent your product's quality checklist.

However, it's not enough for your product to meet its Definition of Done to be directly delivered to the client or end-users. Individual features, tasks, or user stories, should meet their corresponding **acceptance criteria**. These criteria comprise the required, agreed-upon conditions for work items to be approved by the product owner.

While predictive planning starts with high-level requirements that are decomposed into manageable work items using the Work Breakdown Structure (WBS), adaptive projects start with high-level themes or epics that are further decomposed into user stories and tasks.

An Agile project work elaboration can proceed through identifying its broad **themes**, which typically represent large groups of value that are connected and united under a common area of focus like a certain functionality or attribute.

Themes are then divided into more detailed hierarchical and logically organized work series called **epics**, that have particular business outcomes and that are generally too big to be completed within an iteration.

An epic is made of high-level **features**, representing a set of functional requirements, product functions or behaviors, or customer requests that can be described in a short sentence. The next step would be decomposing epics into multiple detailed and executable user stories.

A **user story** is a brief description of a specific outcome for a certain end-user, making up a granular work item. A user story can be expressed as follows: As a <user role>, I want to <goal>, so that <benefit>.

The product owner is responsible for creating user stories with the help of the development team. In order to ensure common understanding, the product owner presents 3 to 6 personas for the development team to bear in mind when creating the product. A **persona** is a tool to visualize a product's potential user profile, including their personal characteristics, goals, motivations, behaviors, and even their personal information such as their careers, skills, family status, etc. The ultimate target is to identify their needs and how the product fulfills them.

When dealing with tremendous, interrelated requirements, the agile project manager can apply **story mapping**, which visually organizes work into models and tracks the value chain of each work element by following a user story, its corresponding iteration, as well as its parent epic. This technique allows the comparison of a project's initial requirements and the identification of any omissions, presenting a holistic view of what the team is building and why. In predictive projects, this technique is known as the **Requirement Traceability Matrix (RTM)**.

After we went through how work is decomposed and how it's visually presented in adaptive projects, let's move on to the schedule preparation for execution. Now that user stories are individually identified that doesn't mean the team can proceed with implementation straightaway; user stories should be ready first.

By ready, we mean that a user story should fulfill its **Definition of Ready (DoR)**. A DoR refers to a checklist of user-centric criteria that must be met in order to consider a user story ready for execution, thus moving it from the backlog to the sprint. A ready user story must be clear, feasible, and testable: clear for all team members, feasible as it can be completed in a single sprint, and testable to determine if it functions as expected.

Ready user stories are pulled out from the backlog to a sprint or an iteration. If you're managing a long-term project, work can be carried out over numerous iterations, which can be grouped under different releases. A **release** can comprise a collection of two or more consecutive iterations. In this case, you'll have to develop a release plan to determine the exact business value that will be delivered at the end of each release. The release plan also sets dates and provides a forecasted timeline of the release based on the product roadmap.

A **product roadmap** is a high-level map of a product's vision and development strategy. As an Agile artifact, this roadmap is created and maintained by the product owner to communicate the product view in the short and long terms. The product roadmap is not a plan, it's rather a guide as it depicts the overall big picture and not the practical tangible steps to achieve it.

Since adaptive planning involves regular deliveries, frequent deploying or shipping should be expected. The moment a product increment gets shipped to end-users is called **Go Live**.

Go Live often calls for a **blackout period**, where the product development work or the whole business needs to be paused for a predefined period in order to dedicate time for rolling out the new product increment.

## 4. Estimation Techniques

Regardless of your project management approach, there are a variety of techniques that you can use to estimate work items along with expenses. Choosing the right estimation method provides you with a reasonably accurate idea of your project's cost and duration. Such estimations during the planning phase, and throughout the whole project life cycle, are essential to ensure your project efficiency in terms of time, effort, and cost.

Among these basic techniques is the **preliminary estimate**, also known as a rough estimate, screening estimate, or approximate estimate, which only provides an abstract, introductory schedule or cost estimation. This method is usually used in the preliminary phase of the project planning when there aren't many details available to make a more accurate, in-depth assessment.

Since there are often many unknowns at the very beginning of a project, the preliminary estimate could take a probabilistic form as in the case of the **Rough Order of Magnitude Estimate** which has an accuracy range of -25% to 75%.

Preliminary estimates mainly rely on historical information from similar projects, therefore it's considered a **top-down** or **analogous estimate**. The latter uses the values and characteristics of previous similar projects as a reference to evaluate the effort and budget needs of the new project.

To narrow down uncertainties, you can create a blueprint, prototype, mockup, design, outline, etc. depending on the practice field. Such artifacts provide more insight, permitting you to come up with a **conceptual estimate**. This estimate can also help identify potential cost overruns, allowing you to review the concept and opt for other alternatives.

In predictive projects where all activities are defined upfront, a **bottom-up estimation** can be performed. It entails separately estimating the cost of each activity, its duration, and even the resources it requires to find out the estimation of the whole project. Even though it's time-consuming, this technique can provide you with the most accurate estimate.

The **parametric estimating** technique could be used in certain cases to get a precise estimation too. This technique builds a numerical relationship between current or historical data and relevant project parameters to perform estimates accordingly. For example, if you know that chain-link fencing costs \$20 per foot, then a project to fence 500 ft would cost \$10,000.

Both bottom-up and parametric estimating can be used to perform a definitive estimate. Unlike the preliminary and conceptual methods, a **definitive estimate** is used late in the planning phase or early during execution to provide the most exact estimation of a project's cost. In a predictive work environment, this estimate is what you'll be comparing your project performance against later on, i.e., the project baseline.

Since estimate, by default, involves uncertainty, definitive estimate accuracy can still vary between -5% and +10%. However, in order to produce a single value guesstimate, the definitive estimate commonly uses a **single-point estimating** method. For instance, a single-point estimate provides a fixed estimate of \$100k as the cost of the project, while a ranged estimate gives an approximate \$95k to \$110k cost range, thus providing best and worst-case scenarios.

Even though single-point estimating is more required by decision-makers as being more exact, ranged estimates prove to be more flexible and realistic when it comes to creating the project schedule or budget.

Most importantly, as a project manager, you should not solely rely on your own experience. Try involving knowledgeable experts in the estimation process as much as possible. As a qualitative forecast, **expert judgment estimating** relies on the specialized experience, knowledge, or training of such experts in order to be able to produce an accurate cost or duration estimate. The project team, firm or independent consultants, and subject-matter agencies, are all considered experts who can help you identify your project resources and budget needs.

In addition to range estimating and single-point estimating, a third form known as **multipoint estimating or three-point estimating** can be performed. As the name indicates, three-point estimating uses three estimates to determine an activity's duration or cost. These three points are:

- 1) Most Likely (ML), which provides the most realistic prediction of the required expenses, time, and effort to complete a certain work item
- 2) Optimistic (O), which presents the best-case scenario for the activity's duration and cost
- 3) Pessimistic (P), exhibiting an assessment of the worst-case scenario for the activity

Based on what is convenient for your project, you can calculate an average or a weighted average, using the triangular distribution formula  $(O + ML + P) / 3$  or a beta distribution formula  $(O + 4 * ML + P) / 6$ , to define the expected duration and cost of an activity or the project.

The three-point estimation formula using a beta distribution (weighted average) is known as **PERT**. It's considered more accurate than the triangular distribution as it puts more emphasis on the most likely estimation.

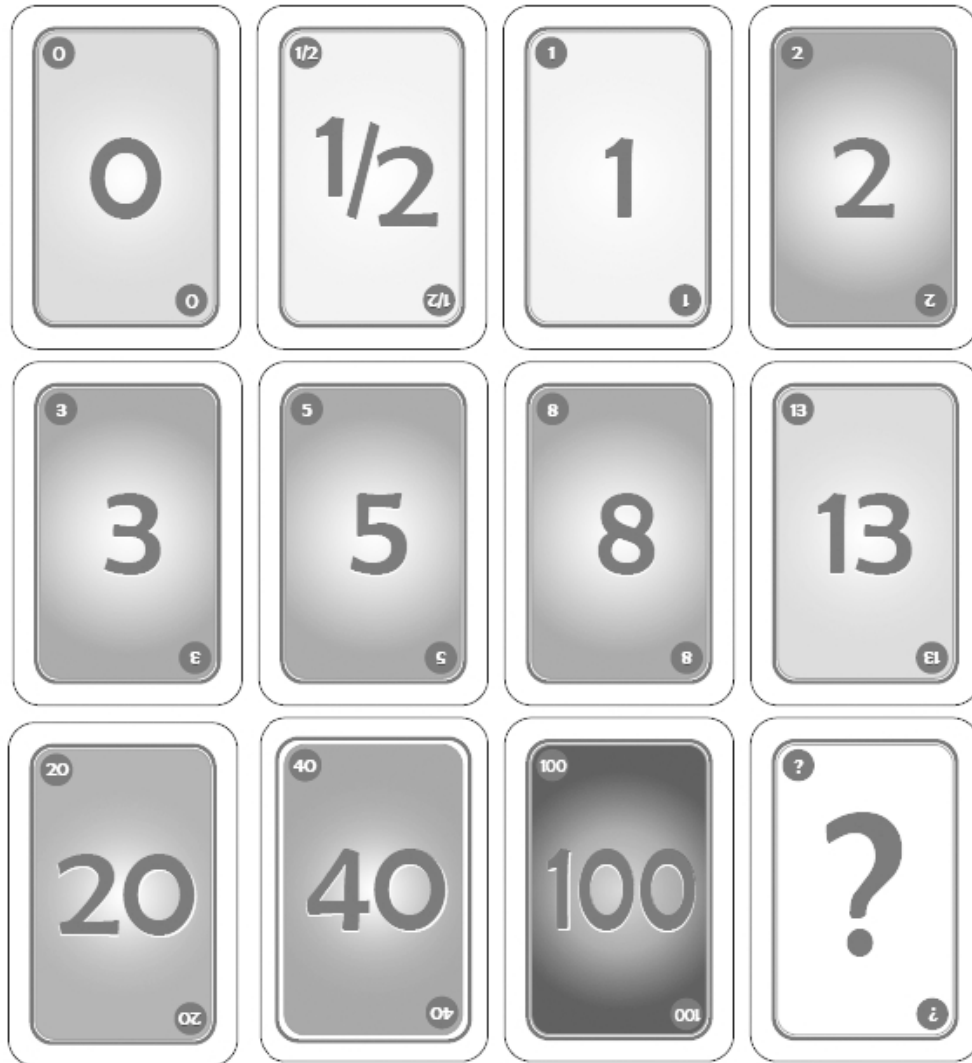
When managing a project according to a predictive approach, you can separately evaluate each activity's duration using **absolute estimates**. This method is characterized by a specific estimation of the required effort to complete a particular work item. This task-level estimation attempts to assign an absolute forecasted number of hours or days for an activity, without referring or comparing it to a similar previously-finished task.

However, applying absolute estimation at the beginning of a project when there is a lack of details and information can be impractical as you might have to make a lot of adjustments later on to adapt your plans to reality. Therefore, the agile approach introduced **relative estimating** as a way of evaluating the size of a task by comparing it against similar project activities.

Relative estimating can use different measures to determine the size of a work unit such as story pointing or T-shirt sizing. Story points involve a unitless, arbitrary measure of the required effort for implementing a task or user story. **Story pointing** implies assigning a number that indicates the level of difficulty of the story's implementation, taking into consideration multiple factors such as the task's complexity, its associated unknowns, and the required amount of effort to complete it.

Story pointing often uses the Fibonacci sequence (1, 2, 3, 5, 8, 13, 21). For instance, the average user story can be allocated 3 story points, and accordingly, other user stories and tasks get weighed and estimated in comparison to that task.





Story Points Sequence

Some teams prefer using non-numerical scales such as **T-shirt sizing**, especially for epics. So instead of assigning 1 point to the smallest story and 13 to the biggest, you use XS (extra small) and XL (extra large) and everything in between for sizing your tasks.

Determining the size of a work item, known as a user story in agile, should be performed by all of the cross-functional team members. Story sizing estimates typically take place during product backlog refinement and sprint planning sessions, using certain agile estimation techniques such as dot voting, which we already examined under the Requirements collection and analysis section, as well as planning poker.

As a gamified, card-based estimation method, **planning poker**, also known as scrum poker or pointing poker, promotes consensus by involving the whole

team in the estimation process, where they can vote and discuss different estimations.

The process goes as follows: the product owner initiates the planning poker session by reading a user story and its explanation out loud, if any of the attendees have a question they'll answer it, and a discussion may occur on how to handle this user story and how many people are getting involved in its execution, etc. Then, a deck of poker cards is handed to each participant. Next, each member privately selects a card to signify their estimate of the task. Once everyone selects a card, they all reveal their estimations at the same time.

It's common for estimates to vary in the first round, therefore, participants with the highest and lowest estimates have to explain the logic behind their choices, and then a second round of estimation follows. Estimates usually start to converge after the second round. If that's not the case, other estimation rounds should take place until reaching a consensus.

The planning poker technique is considered a variation of the **Wideband Delphi** method, which implies performing individual estimates over multiple rounds, where team members discuss estimations after each round until convergence is achieved. The term "wideband" is used to indicate a greater interaction and way more communication between the participants compared to the traditional Delphi Method.

In some cases, the project team might not know how to approach a certain user story or activity, making it hard to estimate. Therefore, they can dedicate a specific period of time to conducting some research to learn more about a certain issue or the viability of a particular solution. This timeboxed interval or research activity is called a **spike**.

Spikes can be used whenever the team needs to address high levels of uncertainty. Therefore, they should not be used for each user story or issue. When a spike is needed, it should be added to the project backlog, prioritized, and evaluated similarly to any other user story.

## 5. Prioritization Techniques

Identifying and estimating your project work is not enough to proceed with the execution phase. No matter how often they change, you want your team to always be working on the right priorities. Implementing work components and product features with no prioritization whatsoever will create chaos, drain your team, and lead to missed goals and ultimately project failure. Effectively identified and managed priorities, on the other hand, result in increased productivity, help eliminate waste, lead to customer satisfaction, and ensure alignment with the overall project objectives.

Therefore, a well-done work prioritization can be considered the foundation for successfully implemented projects. Tasks and activities prioritization can be done through multiple techniques, such as the Kano model, MoSCoW, 100 points method, etc.

The **Kano model** is an agile method for assessing and prioritizing product functionalities based on their implementation cost versus their potential to satisfy customers. With Kano, features are classified into three categories:

- 1) *Basic, threshold features* are the functionalities that are expected by customers and must be included in order for the product to be functional and competitive. The absence of such features leads to dissatisfaction.
- 2) *Performance features, also called one-dimensional features*, are the ones that the more you invest in, the more your customer's satisfaction increases. These are the features that will make the customer choose your product over similar ones in the market.
- 3) *Excitement features* are the ones that have a dramatic, huge effect on your customer delight but won't be missed in case they were not included in the product. These features are attractive delighters that often involve a unique innovation or functionality that aims to surprise users.

The Kano model also identifies two other types of features that, unlike the previous ones, you should keep off of the product roadmap; indifferent and dissatisfaction features. As the names suggest, *indifferent features* are ones that customers don't care much about their presence in the product, while *dissatisfaction features* are those that when added to the product, result in customer discontent.

Another agile prioritization technique is the **MoSCoW prioritization** method or MoSCoW analysis. MoSCoW is an acronym for four terms: Must have,

Should have, Could have, and Won't have. The o's were added to make the acronym easier to pronounce.

MoSCoW classifies features into four categories:

- 1) "Must have" refers to non-negotiable, mandatory requirements that the customer must have in the final product in order to be satisfied, making them critical to a project's success.
- 2) "Should have" describes important high-priority functionalities that should be added to the product if possible but they're not vital.
- 3) "Could have", also known as "nice to have", involves all desirable, but unnecessary requirements.
- 4) "Won't have" represents the features that customers don't want to be implemented as they're not quite essential, but might reconsider in the future.

By identifying requirements and categorizing them into these four groups, MoSCoW focuses on allowing the team to deliver the most essential and urgent needs early on in the project. Therefore, before conducting the MoSCoW analysis, you should identify the product stage since a "should have" feature for a Minimum Marketable Product (MMP) can be considered as a "won't have" for a Minimum Viable Product (MVP).

For prioritization purposes beyond product features, **paired comparison analysis**, aka pairwise comparison, should be your go-to method. This prioritization technique helps you determine the importance of a number of options that are relative to one another, making it easier to set your priorities right.

In order to use paired comparisons, it is best to create a matrix or a table to compare items against each other. After completing the comparison of each pair of work items, you add up each option's total score to end up with a list of prioritized work items.

Another prioritization system that can be used in a group environment is the **100-point method**, also called 100-dollar, fixed sum, or fixed allocation. This technique mainly aims to prioritize the backlog items, user stories, or epics by giving each participant 100 points that they can distribute across the available options according to their importance.

When all points are allocated, all votes are added up to determine each item's final count, resulting in the prioritized list. This weighted distribution of points will reflect the most strategically important things your team needs to work on.

If you want to add another dimension to your prioritization process, such as an evaluation factor indicating the required effort to complete each work item, the **prioritization matrix**, also named criteria matrix can help you do that. This matrix is divided into four quadrants where the horizontal axis represents effort and the vertical axis represents value.

Each participant should start by rating each work item on a scale of 1-10 according to its business value and impact on the project. The same scale should also be used to measure the item's required level of effort. Once all work items are rated, you'll be able to place your project tasks into the appropriate quadrant on the matrix:

- Quadrant 1 involves work items with high impact requiring low effort. These are typically your project's high-value, critical and urgent tasks. These work items must be tackled first.
- Quadrant 2 involves work items with high impact requiring high effort. These are important but not urgent work items. These must be tackled after completing Quadrant 1 items.
- Quadrant 3 involves work items with low impact requiring low effort. You can do these tasks later as they usually don't contribute to your end result.
- Quadrant 4 involves work items that are neither urgent nor important. These activities should be your last priority or you might even consider eliminating them.

A more simple and common agile practice to prioritize and manage tasks is **timeboxing**, which involves determining what to deliver within a certain, established time frame. This process entails categorizing and controlling the completion of tasks in a defined time period while ensuring an efficient delivery without compromising quality.

In order to appropriately implement timeboxing, you should start by choosing the work items that must be completed, determine a time limit for their realization, and then control their execution within the defined timebox. Work on the tasks should be stopped when the time period is complete to allow the reviewing of the accomplished work during the timebox. This technique will help your team tackle tasks in an organized manner without wasting time on superfluous aspects, hence improving their focus on the most important priorities.

## 6. Tailoring Planning Activities

Since every project is unique in terms of nature, size, complexity, risks, etc., the planning techniques and methods detailed in this chapter sections must be tailored to adapt to your specific needs and be suitable to achieve the desired outcomes.

As a practice, **tailoring** is a necessity for choosing and tuning standard planning activities and processes to suit your project's given context and environment. This often involves deliberately reviewing, altering, eliminating, or adding the employed processes according to your project data in order to help your team appropriately plan the project work and deliverables.

You can start by performing an **assumption and constraint analysis** to verify the validity and consistency of the project assumptions and constraints as well as their incorporation in the project plans and documents. This analysis determines if an inaccurate or incomplete assumption presents a risk, or if a limited or removed constraint can allow for more opportunities. In both cases, this can have an impact on your project or process execution.

When tailoring your planning activities, you should also consider your project's **Enterprise Environmental Factors (EEF)**. These are constraining or influencing elements or conditions that are out of the project team's control. EEFs create boundaries for the project that can either help or impede its success. All rules, organizational procedures, industry standards, and regulations that the project team is obliged to follow are considered Enterprise Environmental Factors. These factors can be internal or external. Internal EEFs are confining factors that are unique to the organization such as its culture and governance. External EEFs, on the other hand, are confining factors that are out of the project and organization's control such as laws and regulations. Some EEF elements are mandatory, while others just represent good practice or cultural norms.

Particularly in large corporations, and as internal Enterprise Environmental Factors, standards and policies fall under constraints as they can sometimes constitute restricting or limiting factors. A **policy** is a set of formulated, established, and adopted high-level management instructions and guidelines, aiming to guide decisions within an organization to help it achieve its long-term goals.

Policies do not entail how decisions must be taken, it rather defines certain mandatory regulations, generally legal-wise, of what's acceptable and expected within the organization to reflect its core culture and objectives.

Policies drive standards. A **standard** is an established document or model that designates the required rules and processes for supporting a founded policy. Unlike a policy, standards may have a limited duration since they're often put in place to tackle organizational or environmental changes.

Since every organization has to work within certain EEFs, the latter are very important inputs for the planning phase, as they should be assessed along with their potential impact and reflected in the project plans. You must know the organizational culture, norms, and policies to ensure your project's success.

This equally applies to **Organizational Process Assets (OPA)**. OPAs are specific to the performing organization, as they mainly constitute a set of created and dedicated resources to assist and promote better management of their projects. Organizational Process Assets include defined approaches, plans, procedures, policies, processes, forms, templates, contracts, and knowledge bases. Ideally, OPAs are reviewed and considered during project planning.

To sum it up, EEFs are all established guidelines that might affect, positively or negatively, the way you manage your project, while OPAs are assets that are destined to improve and promote better management of the project. Both EEFs and OPAs can be subject to updates in case of any lessons learned, whether on the level of the project or the organization.

Since certain projects require procurements, part of procurement management involves referring to the organization's policies concerning the matter as well as evaluating the market to determine from whom you're acquiring your product or services needs and on what terms and conditions. Vendors often offer comparable services or products. However, there may be times when you find yourself with limited choices. This happens in three cases: an oligopoly, a sole source, or a single source.

An **oligopoly** refers to the market structure where only a few sellers are available, and one seller's actions directly affect the whole market condition as well as the other sellers' prices and actions. In this case, large firms usually control most of the market. A **single source**, on the other hand, is when your organization prefers working with a specific seller. This can be based on the positive past experience with the vendor, for instance. However, with a **sole**

**source**, you don't really have another option, since it mainly means that only one qualified seller exists in the market.

When assessing your project needs, you might end up deciding that some facets can be served with no need for procurement. This can be determined through a **make-or-buy analysis**. This method involves gathering data concerning a service or product's requirements to accordingly decide whether it should be purchased or internally manufactured. The make-or-buy analysis takes into consideration cost and time efficiency when comparing different alternatives as well as the organization's current resource availability and their skills and capability to make the needed product or service in-house.

Once you complete the make-or-buy analysis, you'll be able to make your decision to either acquire the needed solution from outside or create it yourself. And then, if you happen to lead a big project with multiple vendors, you need to define your procurement strategy, selection requirements, selection criteria, and how all procurements will take place throughout the project phases, all in a **procurement management plan**. This plan is part of your overall project management plan and it implies a detailed description of how your team will acquire goods and services for the project needs.

Besides procurement, your project resources require adapted planning too. If your project work is being executed by a small team, you can rely on a **Responsibility assignment matrix (RAM)** to visually define and demonstrate the roles and responsibilities of different team members and the nature of their involvement in performing the project activities.

The **RACI** chart, an acronym for Responsible, Accountable, Consult, and Inform, is an example of the Responsibility Assignment Matrix, which showcases resources assignment to work items, more specifically who is responsible, accountable, consulted, or informed and associated with each deliverable, task, or decision. This chart proves to be an efficient tool to get everyone on the same page.

A RAM matrix and a RACI chart might not be enough to plan resource assignments in big projects. Therefore, a **resource management plan** is required to cover the various resource allocation, timeframes, release criteria, compliance and safety, training needs, recognition and rewards, etc. Similarly to the procurement management plan, this is also a component of the project management plan. Such a plan details the implemented processes for acquiring, allocating, monitoring, and controlling resources throughout the project lifecycle.



A properly defined resource management plan allows the project manager to avoid unexpected hurdles such as resource shortage by anticipating gaps ahead of time. It can also be efficient in preventing burnout and overallocation by giving you insight into your team's workload. This plan can be considered a safety net since it can be proof of how you used the resources you had.

One of the resource management plan components is the **Resource Breakdown Structure (RBS)** which mainly represents a hierarchical list of the allocated project resources, decomposed by category, type, or phase. This structure is used for planning large projects with dozens or hundreds of resources.

Another tool that falls under the resource management plan is the **resource calendar**. This can be created to display the availability of team members as well as equipment, by taking into account other working and non-working times such as other commitments within the organization, vacations, night shifts, etc.

To identify your most or least active resources, you can use a **resource histogram**. This bar chart shows the utilization frequency of physical and human resources throughout your project life cycle. As a statistical tool, a resource histogram contributes to accurate resource planning and effective quality management.

Depending on your project properties and requirements, you can use a **quality management plan** to set forth the processes you're going to use to achieve the project quality objectives. For example, software projects might need a **test plan** to delineate their test strategy, objectives, and schedule, as well as the exact tests that will be performed, and the required and assigned resources to carry out these tests.

To put more emphasis on quality, software companies can use multiple testing approaches including **Test-Driven Development (TDD)**. TDD promotes a zero-defect mindset as it entails writing tests before their corresponding code to allow a clearer understanding of the associated feature, as well as a continuous validation of work on progress.

All of the mentioned tools for tailoring your project planning in this section are not exhaustive, tailoring methods are limitless the same way project types, requirements, and deliverables are.

# Practice Test

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## Question 1

A scrum team initiates a sprint zero to perform some preliminary work before the actual start of their new project. All of the following items can be defined by the scrum team during this stage, except:

- A. Baselined product backlog
- B. Product roadmap
- C. Product vision statement
- D. Release plan

## Question 2

When an agile team was discussing the technical choices of their new project during the zero sprint, a senior team member recalled a similar past project that went through some big challenges and ended up being over budget and behind schedule. What should the project manager do next?

- A. Look for the performance details of the mentioned past project in the Organizational Process Assets (OPAs)
- B. Look for the performance details of the mentioned past project in the Enterprise Environmental Factors (EEF)
- C. Look for the performance details of the mentioned past project in the issue log
- D. Since the mentioned past project followed a predictive approach, its performance details are irrelevant

## Question 3

In the project initiation phase, the sponsor asked the project manager to provide an approximate cost estimate for the project by the end of the day. What should the project manager do in this situation?

- A. Create the product backlog items, estimate how many iterations are required to complete the items, then sum up the cost estimate of each iteration
- B. Create the WBS and sum up the cost estimate of each work package
- C. Create the cost management plan
- D. Provide an estimate based on similar past projects

## Question 4

In one of the project initial meetings, a stakeholder informed the project manager that the video editing software they plan to develop should include a free subscription plan. They explained that this plan should only allow users to

edit videos of less than 5 minutes and that all of their exported videos should be watermarked. Where should this information be captured? (Select two)

- A. Project charter
- B. Product backlog
- C. Project scope statement
- D. Scope management plan

#### **Question 5**

While reviewing an important Epic, the self-organizing team had different interpretations of how it should be broken down, which revealed a lack of common understanding of the project's purpose. What should the project manager do?

- A. Ask the team to check the release plan
- B. Ask the team to check the acceptance criteria of the Epic
- C. Remind the team of the sprint goal
- D. Remind the team of the project vision

#### **Question 6**

A project manager is assigned to a farm fencing project of 300 ft. Since they have already managed two similar projects in another region, the project manager knows that a chain-link fence costs \$10 per foot for materials, and between \$10 and \$15 per linear foot for labor, depending on the workers' experience and common rates in the region. What is the best way to estimate the labor cost per linear foot?

- A. Three-point estimation
- B. Parametric estimating
- C. Bottom-up estimating
- D. Analogous estimating

#### **Question 7**

A product owner selected a number of user stories with a total of 110 points for the next release. Knowing that the team's velocity is 20 story points, what's the estimated duration to complete the release?

- A. 5 sprints
- B. 5.5 sprints
- C. 6 sprints
- D. It's not possible to calculate the estimated number of sprints to complete a release in Agile

#### **Question 8**

To see where each team member stands regarding a certain decision, a project manager uses the fist of five voting technique. When the team starts voting, one member holds up five fingers. What does it mean?

- A. They want to intervene in order to further discuss the decision
- B. They are totally against the decision
- C. They totally support the decision
- D. They want to refrain from taking part in the voting

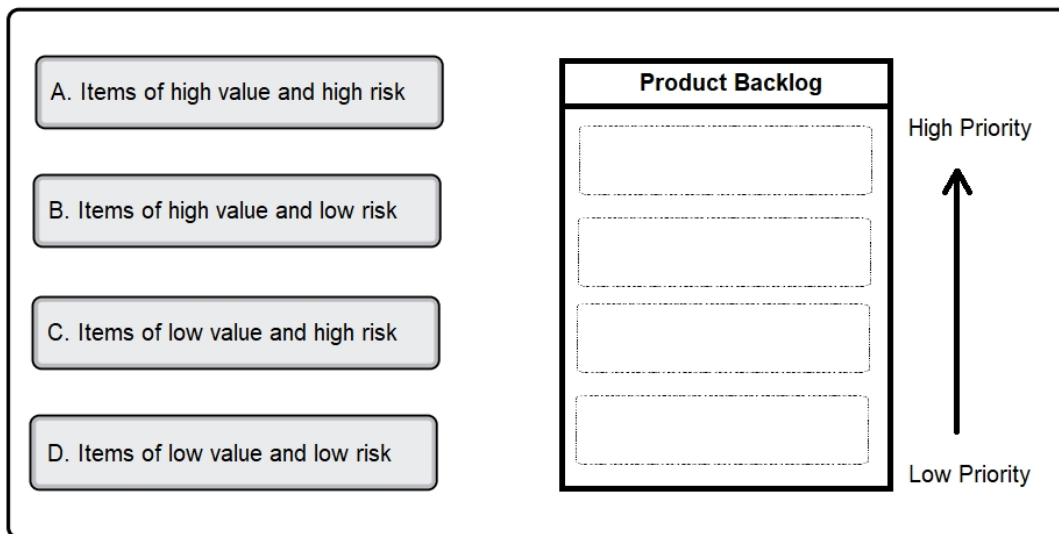
**Question 9**

A product owner new to the agile approach created the following user story: “As a customer, I want a new functionality so that I can achieve a 50% increase in sales”. The project manager found the user story to be deficient. So, they reached out to the product owner to explain to them that:

- A. The user story should follow a common structure
- B. The user story should be specific and testable
- C. The user story should not include financial values
- D. The user story should be time bounded

**Question 10**

A project manager is facilitating a meeting attended by his project team as well as key stakeholders to prioritize all product backlog items according to their business value and risk level. Drag and drop each items’ category in its right placement in the product backlog:



**Question 11**

A product owner and the team members have different interpretations of a particular user story. To resolve the disagreement, the project manager suggests the creation of personas. What’s the most probable reason for creating personas?

- A. To use it as a wireframe to help clarify project outcomes
- B. To engage stakeholders who don’t know much about the project
- C. To help the development team empathize with the users of the solution
- D. To identify and describe real users of the solution

**Question 12**

After creating the network diagram, the project manager identified three critical paths. What should the project manager do next?

- A. Approve the network diagram and closely monitor all three critical paths
- B. Approve the network diagram and closely monitor the longest path among the three
- C. Re-examine the network diagram since it's supposed to only have one critical path
- D. Re-examine the network diagram since it's not supposed to have more than two critical paths

**Question 13**

An Agile team wants to examine the visual overview of all of the product's required features and functionality. Thus, the project manager suggests they look at:

- A. Themes
- B. Epics
- C. Product backlog
- D. Story map

**Question 14**

An agile project manager is concerned about the amount of time their team spends on planning. Which of the following planning activities the team shouldn't be involved in?

- A. Iteration planning
- B. Daily planning
- C. Release planning
- D. Portfolio planning

**Question 15**

After completing the creation of the scope statement, a project manager wanted to make sure that all of the project deliverables were identified and could be managed effectively. So, they opted for the \_\_\_\_\_ method to develop the WBS in order to capture all of the project's details.

- A. Scope decomposition
- B. Bottom-up estimating
- C. Rolling wave planning
- D. Checklist analysis

## Answers

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### **Question 1 = A**

**Explanation:** There are no baselines in agile since the scope is variable by nature. Baselining is used in the predictive approach to refer to a finalized plan (cost, schedule, scope, etc.) that would be followed during project execution and used for evaluating the actual performance. During sprint zero, the scrum team can work on the product vision statement, product roadmap, product backlog, and release plan.

### **Question 2 = A**

**Explanation:** Organizational Process Assets (OPAs) include organizational processes and procedures, and corporate knowledge base. To know more about the past project's performance, the project manager could check the concerned project files such as its scope, schedule, cost, and quality baselines, in addition to its administrative documentation, stakeholder register, issue log, and any other relevant documents. These form the corporate knowledge base, and only checking the issue log might not be sufficient to figure out why the previous project went through a lot of difficulties. Additionally, you cannot find the details of the past project's performance in the Enterprise Environmental Factors (EEF) since the latter represent the conditions that have an influence on the project but are beyond the team's control. Even though the new project is agile and the previous one is predictive, it's recommended to take advantage of its documented lessons learned. Eventually, the challenges that the previous project went through might not be even linked to its adopted approach.

### **Question 3 = D**

**Explanation:** Since the sponsor requested the cost estimate on short notice, in an early stage of the project with little to no information available to conduct cost estimations, the most practical method for the project manager to respond to the sponsor's query is to rely on similar past projects' data to estimate their current project cost. This entails using analogous estimating to calculate the project costs based on the known costs of a similarly completed project. Along with historical data, this technique relies on the project manager's expert judgment. The only person responsible for creating the product backlog items is the product owner, so the first option can't be realized by the project manager. Developing the Work Breakdown Structure (WBS) is not an option too, since it requires the project team's involvement in the process and it's improbable for it to be done in one day.

**Question 4 = B, C**

**Explanation:** Since the described scenario does not include any indication as to which approach is being used for the project implementation, both possibilities should be considered: If it's an adaptive approach, then the stakeholder requirements should be incorporated in the product backlog. All product features, changes, bug fixes, and all other types of activities that the team should work on to deliver the final outcome should all be added to the product backlog. However, if the project is following a predictive approach, then the communicated requirements should be included in the project scope statement. This document should comprise all project scope elements such as requirements, assumptions, acceptance criteria, etc. The project charter is the document that officially authorizes the existence of the project, and it only includes a high-level description of the project rather than detailed requirements or features. The scope management plan describes how the scope will be defined, developed, monitored, controlled, and validated, rather than what's in the scope.

**Question 5 = D**

**Explanation:** The project manager should remind the team of the project's vision since the team seems to lack a common understanding of the project's purpose. The sprint goal only states and clarifies the vision of the iteration, not the overall project vision. Likewise, referring to the release plan can only help the team understand the goal of that specific release. Epic's acceptance criteria are the conditions that have to be met to be approved by the product owner. Even though these conditions can help the team understand the Epic and how to break it down, they can't help them get a clear understanding of the project purpose.

**Question 6 = A**

**Explanation:** The three-point estimating is the triangular distribution of pessimistic, optimistic, and most likely estimates. This technique is used when there is insufficient historical data or when there is only judgmental data. Since the two similar projects were performed in another region, the project manager can't precisely define the labor cost using analogous estimating. Parametric estimating can be used to estimate the cost of the 300 ft fence after figuring out the labor cost per linear foot. Plus, bottom-up estimating can't be used in this situation since the labor cost depends on the workers' experience and the applied rates in the region, not on the volume and decomposition of the required work.

**Question 7 = C**

**Explanation:** A release of 110 story points takes 6 sprints to be completed by a team that has 20 story points' velocity. Even though dividing 110 by 20

equals 5.5 sprints, the number of iterations should be an integer since the predetermined timebox of a sprint should not be changed. In Scrum, it's possible to calculate the estimated number of sprints as long as the velocity of the team and the estimation of the workload are known. But, you need to keep in mind that this is an estimation rather than a commitment since changes could happen along the way.

**Question 8 = C**

**Explanation:** The fist of five or fist to five is a voting technique that agile teams use to help them achieve consensus during decision-making meetings or sessions. This method is used as follows: The facilitator states the decision or action the team is going to vote on and then asks each one of the attendees to hold up a number of fingers that corresponds to their level of support for the stated decision. A closed fist signifies full objection whereas five fingers mean full support for the decision. Until everyone holds up three or more fingers, the voting goes through multiple rounds to achieve consensus.

**Question 9 = B**

**Explanation:** The user story written by the product owner is not specific and cannot be tested. Even if it's written in a user story format it's vague and unclear. The product owner must specify what new functionality they were looking to develop. It's possible to include financial values in a user story as long as they contribute to making it more clear and more understandable. A goal can be time-bound, i.e., SMART goal, but a user story is not bounded by time.

**Question 10**

**Explanation:** Items of high priority and high risk should be on top as completing them sooner generates more new knowledge, which eliminates uncertainty and reduces risk. Items of high value and low risk should be tackled next. These items are great for achieving quick wins. The project team can then consider working on low-value and low-risk items. Finally, items of low value and high risk should be put off and placed at the bottom of the product backlog since they are not worth the effort. To sum up, the right order is: A, B, D, and then C from top to bottom.

**Question 11 = C**

**Explanation:** A persona is a fictional representation of the ideal potential users of a product or service. This description helps the team understand and empathize with the users' need for the solution. Thus, the team can better adapt the solution to help and satisfy its users in real-life situations. Persona does not have a role in stakeholder engagement, nor is it a wireframe for



clarifying project outcomes. Even though a persona involves a set of real-life characteristics, it does not identify or describe the real users of the solution.

**Question 12 = A**

**Explanation:** The project manager should approve the network diagram and closely monitor all three critical paths. Theoretically, there is no limit on how many critical paths a network diagram could have. If a project has more than one critical path, then all critical paths must have exactly the same length.

**Question 13 = D**

**Explanation:** A story map is used by the agile team to get a visual overview of the product development “Big Picture” including an outline of its features and functionalities (PMBOK 7th edition, page 285). The Product Backlog lists all of the product’s required features and functionalities, but they’re not displayed visually. Themes and epics only represent high-level requirements with no specification of the exact features that will be developed.

**Question 14 = D**

**Explanation:** Agile teams should not be involved in portfolio planning since it falls under the sponsor or product owner’s responsibilities. Portfolio planning or portfolio management involves determining which projects are a good fit for the organization, in which sequencing they’re going to be managed, and for how long. Agile teams are only concerned with these three levels of work planning: Release planning, iteration planning, and daily planning. Release planning handles user stories that will be developed in the new release of the product. The next level is iteration planning which is conducted at the start of each iteration. Finally, daily planning or daily stand-up meetings are used to coordinate work and synchronize daily efforts.

**Question 15 = A**

**Explanation:** Scope decomposition is a planning method used to decompose and subdivide the project and scope deliverables into more manageable, small work units. The decomposition level depends on the complexity and size of the project (PMBOK 7th edition, page 84).

# **CHAPTER 6**

## Performing the Project Work

# 1. Monitoring Project Work

When it comes to project management, planning is just the first step in a phase, an iteration, or a whole project. After figuring out what should be done, when it should be done, and who should do it, it's time to start the actual implementation of all the predefined steps. Work execution is often the longest, most demanding, and most critical phase of your project.

Since your team will be taking care of almost all of the project activities, your focus as a project manager will be to make sure that everything goes according to the predefined plan. Continuously tracking, reviewing, and reporting your team performance, project progress, and deliverables conformance to requirements is what project monitoring and controlling revolve around.

The execution phase and the monitoring and controlling phase both happen in synchronization. By **monitoring** work, you keep an eye on everything going on with your project. It allows you to anticipate issues, rectify any deviation from the plan, and take corrective actions when needed before everything goes out of control.

As a project manager, you can use multiple tools and methods to gather the needed data for your monitoring purposes. For instance, if you want to assess how work is progressing and determine whether your project performance is improving or deteriorating over a specific period of time, a graphical analytical technique such as **trend analysis** can help you do that.

This method employs mathematical models on historical data in order to identify trends and anticipate any potential variance from the established schedule, budget, and scope. Therefore, it allows you to take the necessary preventive or corrective actions to adjust your project performance and reach the desired outcomes.

Trend analysis helps detect opportunities based on recurring patterns and established trends, hence you can be ahead of things and act according to what the situation entails. It can be also used to identify any threats, such as the potential need for additional budget or resources.

Making a thorough estimate or prediction of the project's performance is known as **forecasting**. Therefore, trend analysis is considered a forecasting activity as it mainly involves examining historical data to identify patterns and use them to extrapolate future performance.

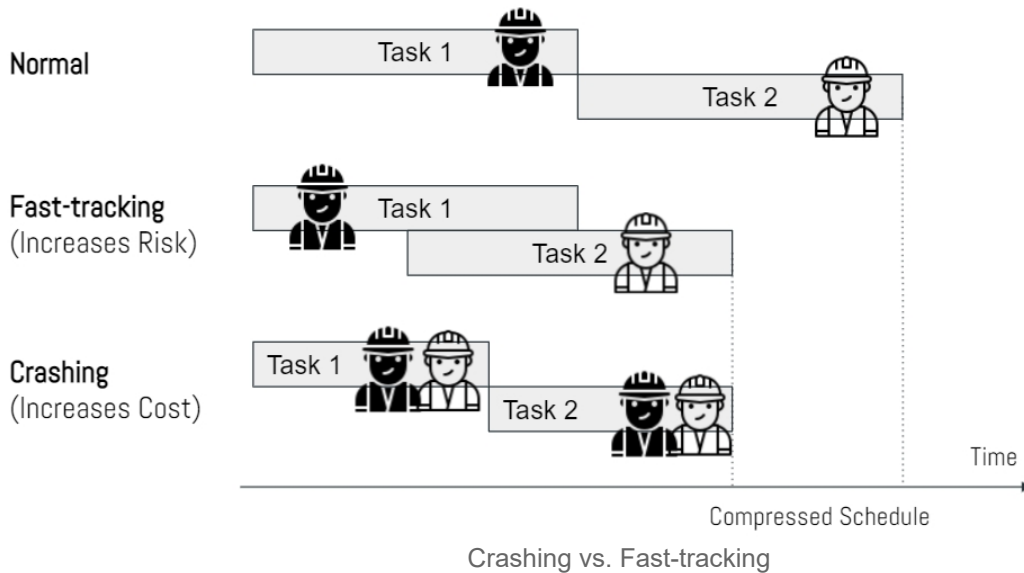
Forecasting is used in predictive projects to ensure that they are successfully following their planned schedule and budget. However, since the schedule and the budget are fixed in adaptive projects, forecasting is performed on the iteration level using burnup or burndown charts. There are many other tools for forecasting; you can rely on the judgment of subject matter experts, for instance, to generate qualitative forecasting.

Since almost every forecasting method needs historical data as input, you should ideally consider forecasting when at least 20% of your project is complete. Moreover, make sure to update your forecasts as the project progresses and more data becomes available. This way, you'll take into consideration the latest, most accurate information about your project performance when making any decisions.

Upon analyzing your project performance in comparison to the set target, and in case a deviation is detected, corrective procedures are needed. In predictive projects, you can resort to crashing and/or fast-tracking as schedule compression techniques, depending on the situation. **Crashing** the project schedule aims at shortening the schedule duration by adding more resources.

Even though crashing might succeed in bringing the project schedule into alignment with the plan, it may result in increased costs and risks since labor expenses will rise. Therefore, such measures go beyond the project manager's authority, requiring the approval of the Change Control Board (CCB) or the project sponsor.

**Fast-tracking**, on the other hand, involves concurrently performing certain activities or phases that were supposed to be done sequentially, with the goal of reducing the overall schedule duration. However, both schedule compression techniques might result in similar issues such as increased quality risk and rework. If you have the choice, you should go for fast-tracking, since it can be a huge money and time saver when properly implemented.



Monitoring project execution also involves controlling any changes that might need to be implemented. In predictive projects, issuing a change request is required to perform any alterations on the schedule, budget, or scope of work. A **change request** is a formal proposal to modify any of the project's predetermined deliverables or baselines.

Change requests are often made by the client when they want to make alterations to the agreed-upon project deliverables or when they wish to integrate additional features or functionalities. Change requests can also arise internally when the project team identifies additional work items that need to be carried out.

In adaptive projects, however, the scope of work can change in response to new requirements without the need for a formal change request. In this change-driven approach, the project is split into iterations, and at the end of each iteration, the customer reviews the accomplished work on the product. Then, the customer's feedback is used to define the detailed scope of the next iteration.

Going back to the traditional linear approach, when writing a change request, all associated details should be thoroughly explained so all parties would be on the same page on what is expected to be altered. All submitted change requests should be documented in the change log. A **change log** represents a record of all the submitted change requests and their status for future reference. This log can include the particular party that issued each request, the reviewing process each change request goes through, the specific dates of each change (submission and approval dates for instance) along with its associated impact on the project.

The change log is part of the **integrated change control**, which represents the whole process of reviewing, analyzing, and implementing change requests. This process handles changes in a methodical approach as it studies the impact of each proposed change on the project in order to decide whether to approve it or reject it and then ensures its successful implementation.

On the other hand, changes that do not go through the structured, formal control and approval process are referred to as **scope creep**, requirement creep, or feature creep. This implies incorporating out-of-scope elements into the project without adhering to the established change management process.

Scope creep can originate from the client or from within the team. It can occur due to client requests, poor communication or misunderstanding, incomplete or inadequate scope creation, insufficient project monitoring, etc..

To avoid scope creep, you have to set up an appropriate change management process, clearly manage and establish your client expectations, create a thorough statement of work, efficiently communicate with stakeholders, and regularly monitor and control project work to ensure its alignment with the planned scope.

Another case of deviation from the original project plan occurs when your team performs work that was neither requested nor approved by the client, aiming to deliver an added value. This is called **gold plating**.

Gold plating often happens when the team ends up with more extra time or money in hand, thus they invest it in additional features to make the client happy, or when certain team members want to show off their skills. Even when it's originally well-intentioned, gold plating should be avoided similarly to any other type of scope creep.

Aiming to please the client and provide an exceptional customer experience, marketers and executives often call for the use of **customer obsession**. However, as a project manager, you should be aware of the thin line between customer obsession and gold plating. Being customer-obsessed should mean paying close attention to their needs and offering advice in order to achieve the project business value as well as their requirements rather than trying to deliver beyond the predetermined scope.

To make sure your team is focused on only delivering the defined, agreed-upon value, you can first and foremost try to avoid **multitasking**. Even though it's commonly described as a skill, multitasking can reduce your team's effectiveness.

Contrarily to when a member is 100% dedicated to performing a single assignment, multitasking can slow work progress, result in a loss of concentration, and damage a team's capacity to perform in a stable consistent manner. Moreover, multitasking can lead to poor work quality, missed deadlines, and work prioritization based on urgency rather than importance.

To prevent this from happening, you can apply the **Pareto principle**, also known as the **20/80 rule**. This method states that 80% of outcomes result from only 20% of all the effort made. The Pareto principle helps the team focus on the crucial work items that will produce the most value.

To increase the efficiency of your team, you should consider studying **Parkinson's law**, which states that "Work expands to fill the time available for its completion". Your team members might unintentionally allocate a certain activity more time than its execution requires, which makes them procrastinate its completion to the last possible moment, in what is known as the **student syndrome** phenomenon.

However, you should not confuse student syndrome with the recommended behavior of making decisions at the last responsible moment. Even though it involves a certain kind of procrastination, the **last responsible moment** entails putting off decision-making to the latest possible time in order to allow your team to consider more options, scenarios, and aspects. This approach allows you to avoid any premature commitments or making irreversible decisions early on the project.

## 2. Managing Project Knowledge

**Knowledge** can be defined as the combination of information, experience, values, and beliefs enabling people to have insight and understand new experiences and information, hence allowing them to achieve their objectives and goals. In project management, knowledge reflects the way processes are performed and projects are progressing.

Since all projects produce data, this data should be cultivated, managed, and preserved to be useful information. This process is known as **knowledge management**. It essentially entails managing existing and new knowledge throughout the project lifecycle, by identifying, refining, documenting, sharing, and archiving it to use it in the current and future projects, and to be part of organizational process assets.

Project knowledge management does not only mean documenting lessons learned at the end of the project, which is a common misconception, but it also means creating methods to retrieve relevant information that helps you achieve the project's business value. For example, conducting a regular weekly meeting with a customer and noting everything in the meeting minutes is considered a knowledge management process.

This activity processes two types of knowledge: tacit and explicit. **Tacit knowledge**, also known as implicit knowledge, is the kind of knowledge that can be difficult to express, articulate, and share such as personal experience, know-how, values, beliefs, and insights. This type of knowledge is challenging to codify, thus it can't be transferred through writing or verbalizing. However, tacit knowledge can be shared by connecting to people through conversations and interactions. For instance, job shadowing, workshops, networking, and interviews are all methods for sharing implicit knowledge.

On the other hand, **explicit knowledge**, aka formal or codified knowledge, can be quickly and easily expressed and transferred using words, facts, figures, numbers, or pictures. During the project lifecycle, explicit knowledge is developed, shared, documented, and distributed through databases, reports, manuals, registers, etc. Even though explicit knowledge is easy to share, it doesn't mean it's also easy to understand or apply; since it often lacks context, it's open to interpretations.

In order to ensure that both types of knowledge are actively captured, shared, integrated, and documented, during all project phases, you need to use



multiple tools and techniques to motivate stakeholders to transfer their experience and ideas to others. Depending on the project's nature, size, and complexity, the knowledge management strategy can be made of a mixture of methods including but not limited to training events, work shadowing, focus groups, networking, storytelling, meetings, etc.

**Storytelling**, for example, is a common approach for conveying tacit knowledge. Telling stories can help crystallize hard-to-explain ideas, allowing a better understanding and interaction between people. One of the characteristics that make storytelling an effective medium for knowledge management is its narrative nature which makes information easier to remember in comparison to less vivid, abstract means such as manuals and plans.

To handle tacit knowledge in a systematic way, you should rely on different forms of meetings as a recurring setting for sharing experiences. In order to ensure a meeting's efficiency, it should be properly managed, led, and controlled by preparing an agenda and assigning a facilitator.

An **agenda** sets the meeting objectives by defining its topic, listing the activities that should be carried on, determining the timeframe or duration of the meeting, and ensuring the invitation and attendance of the appropriate participants. A meeting agenda represents a guide for all participants to prepare their input regarding the predetermined discussion items.

While an agenda structures the meeting, a facilitator is needed to ensure that the agenda is being respected. A **facilitator** should be someone who's able to guide the meeting to a successful conclusion by ensuring the effective participation of all attendees, achieving a mutual understanding, and a full buy-in of the adopted decision or solution. Facilitation is crucial to promote and encourage a constructive discussion through decoding the knowledge embodied in the different contributions.

Among informational meetings where knowledge sharing occurs are kick-off and status meetings. The **kick-off meeting** takes place at the beginning of the project, phase, or iteration, as the name indicates, with the attendance of the project team members as well as other key stakeholders such as the sponsor. The goal of this meeting is to get everyone on the same page concerning goals and expectations, establish a common ground, and formally announce the start of work execution.

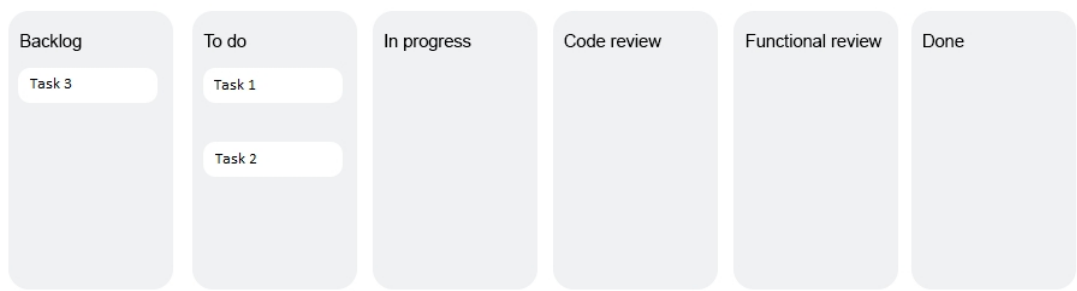
The **status meeting**, on the other hand, is held on a more regular basis, to track and review the project's current progress by analyzing its performance

data. In projects following a predictive approach, risks can be also tackled during status meetings. This often results in issuing change requests to implement preventive or corrective actions, requiring additional meetings to evaluate the new alterations and discuss lessons learned. In adaptive projects, however, status meetings are often replaced by a predetermined meeting at the end of each iteration, known as the sprint review meeting.

To prevent dedicating too much time to meetings, you can opt for an **information radiator**, also known as **visual control** or **Big Visible Charts (BVCs)**. This artifact represents a visual display of the latest information concerning work items, for the team to check out without any need for work disruption or time waste.

For a colocated team, this timely knowledge-sharing tool could be exposed in a central, visible place, where all concerned parties in the organization can easily access it to check it or update it when needed. Large or distributed teams, on the other hand, can rely on virtual information radiators using web-based applications such as Trello.

Information radiators come in the form of visual charts, burn charts, and task boards. **Kanban board** is the most commonly used task board for visually displaying work progress. For example, it can be used to classify work items in three separate columns indicating tasks that are ready to be started (to do), tasks in progress (doing), and completed tasks (done).



Kanban Board Sample

This workflow board can be put in place to manage both the product and sprint backlogs by showing the particular tasks of each work stage and their path towards completion. Sticky notes of different colors are often used to represent each type of work, while dots are used to indicate a task’s duration.

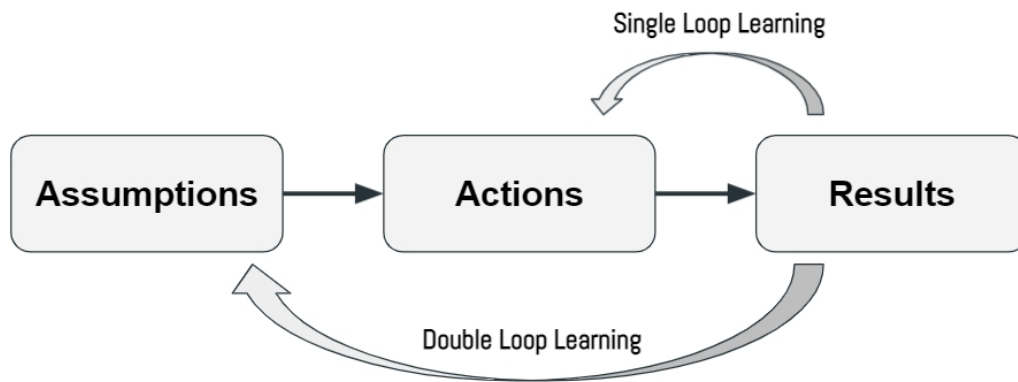
Acting as a focal meeting point, a kanban board can allow team members to gather up in order to discuss project work and review its progress. This approach enables the team to optimize their workflow by identifying

bottlenecks, blockers, dependencies, and overallocation, which in return results in increased efficiency and an overall reduced level of stress.

Putting a knowledge management strategy in place promotes learning within the project and organization. As a growth factor, organizational learning can be further encouraged by adopting a suitable learning process. Among the different types of learning an organization can opt for to improve its performance are single-loop or double-loop learning.

**Single-loop learning** entails continuously adjusting actions when what is realized does not match expectations. You can use this learning process to solve any identified problems by adapting current practices in order to figure out or improve the situation.

While single-loop learning means changing your team's behavior and actions to fix or avoid issues, **double-loop learning** deals with the underlying causes of the identified problems. This process questions the fundamental assumptions, aiming to go beyond the apparent symptoms of an issue to reveal and tackle its root causes. These root causes can be the organization's policies, processes, and norms, for instance.



Simple vs. Double Loop Learning

Double-loop learning allows a deeper understanding of work operations which leads to better decision-making. Double-loop learning requires self-awareness and honesty to identify and openly discuss mistakes with other parties, as well as taking responsibility in order to be able to change problematic methods, norms, policies, and even objectives.

All of the knowledge acquired throughout the project, whether it involves positive or negative aspects, is called lessons learned. These lessons are captured, examined, and integrated into the project practices during periodic

reviews such as retrospectives or **lessons learned meetings**. The goal is to make sure to replicate good practices and prevent repeating errors.

Lessons learned meetings should be conducted on an ongoing basis to grasp and incorporate lessons as early as possible, otherwise, you risk repeating the same errors during your project. Regularly identifying and going over lessons learned can help you improve the way you handle current and future projects. Additionally, this practice allows organizations to develop and enhance their way of selecting, planning, and executing projects.

You can opt for multiple tools to increase the efficiency of these meetings, such as the 4Ls technique or the ESVP method. **4Ls** is a brainstorming technique that is usually used by project teams to review their performance and explore potential ways of improvement. You can apply the 4Ls technique by inviting everyone in the meeting to identify the things that they *Loved*, *Loathed* (hated), *Learned*, and *Longed for* (desired) in the last iteration or in the project as a whole.

The quality of your meetings depends on the attendees' investment in the process, and since people often have a short attention span, recurring meetings such as retrospectives can be inefficient. To deal with this issue, you can use the **ESVP** method by classifying participants into four categories: Explorer, Shopper, Vacationer, and Prisoner.

Implementing ESVP requires participants to anonymously identify themselves as one of the four categories according to the way they feel during the meeting:

- Explorer indicates that they're fully engaged and they feel excited about hearing new ideas of improvement and about what comes next.
- Shopper represents those who are positively invested in the process.
- Vacationer is someone who considers or treats the meeting as a break or "vacation" from their work, they're only interested because they have a distraction from their work.
- Prisoners are those who are attending the meeting only because they are obligated to do so, they're not interested in participating or in whatever the meeting results in, they're just waiting for it to end.

The key for this method to work is to clearly reassure participants that their votes will not be revealed and that ESVP is only used to help the facilitator improve future meetings. The facilitator can also act on the results during the current meeting. For example, if a lot of participants fall under the Prisoners category, the facilitator can announce a 10 minutes break and inform attendees

that those who have something else to do, don't have to come back after the break.

To document lessons learned for future ulterior use, a **lessons learned register** should be created. This log presents ongoing documentation of what has and has not worked in the project, including challenges, issues, risks, and opportunities, and how everything was handled, which can be used in the current project as well as future ones. The lessons learned register can include the category and description of the situation, as well as its associated impact and actions. It's important to constantly update the lessons learned register whenever new knowledge is captured.

### 3. Conducting Procurements

The execution of a project's scope naturally requires human and physical resources. The process of acquiring the needed physical resources is called **conducting procurements**. This can take place at any time during your project, whenever a need arises or circumstances change. However, it's preferable to identify and set your project requirements during the planning phase to help you conduct procurements more smoothly.

Procurement planning implies identifying what, how much, and when to procure. After defining the project or iteration scope, the project team will be able to determine what will be developed in-house, and what will be purchased from external sources. After determining the project procurement needs and specifying the appropriate approach to handle them, the next step involves the actual process of obtaining, selecting, and awarding a seller.

To do that, the project team has to advertise the opportunity by developing and distributing **bid documents**, then set a bidder conference to ultimately select a seller. Bid documents comprise all the created documents with the purpose of soliciting quotations or proposals from potential sellers. These documents should be created with enough details to generate an accurate, consistent, and comprehensive response from prospective sellers, and enough flexibility to allow sellers to make suggestions for other potential ways to satisfy the same requirements. The appropriate development of these documents facilitates the buyer's evaluation of these responses at a later stage.

Depending on the procurement nature, value, and associated risks, the level of complexity and detail of the bidding documents can vary. They can for example take the form of a Request For Proposal (RFP), Request For Quotation (RFQ), or Request For Information (RFI).

A **Request For Proposal (RFP)** document is often created when dealing with a complicated scope where the seller is required to provide a suitable solution. An RFP is also used when other factors besides price weigh in when selecting a seller to award them the contract. This is the most formal request among bid documents as it has strict procurement rules for content, timeline, and seller responses.

When you don't have enough information and understanding about what products or services exist in the market, you will not be able to properly create an RFP. In this case, you should first issue a **Request For Information (RFI)** to

gather enough details regarding what sellers' have to offer and their capabilities in relation to your needs. RFIs help you produce a comprehensive and accurate RFP and identify potential sellers.

On the other hand, when the solution is standard and the price is the only determining factor in the seller selection process, you should go for a **Request For Quote (RFQ)** instead. An RFQ often requires sellers to include detailed information on how they intend to satisfy procurement requirements and/or how much it will cost.

In some cases, after distributing bid documents, the buyer hosts a **bidder conference**, also known as a pre-bid conference, contractor conference, or vendor conference. The goal of this meeting is to provide sellers with any required additional information about the procured product or service, respond to their questions, and clarify any ambiguous points or details. This allows bidders to have a full, clear, and common understanding of the buyer's needs, hence they'll be able to develop accurate and adequate proposals and submit them by the specified date in the bid documents. Bidder conferences allow all sellers to have an equal chance of getting the contract by ensuring that no bidders receive preferential treatment.

In response to bid documents, sellers submit their proposals. A **proposal** document comprises the details on how they're going to provide the required service or product. A proposal can take the form of a quote or a Statement Of Work (SOW).

A **quote** presents the seller's offered price for providing the required product or service. Quotations are generally used when sellers' evaluation is essentially based on their proposed prices.

**Statement Of Work (SOW)**, on the other hand, covers other considerations such as the technical approaches and competencies, project timeline, budget, vendors' experience and references, etc. The SOW can be revised when needed until it's incorporated into a signed agreement with the buyer when the seller is ultimately selected.

When you receive a large number of proposals, you will need to establish a **screening system**. This technique implies short-listing prospective sellers based on certain criteria, such as prices, experience, technical capabilities, or location. Sellers that do not meet given conditions from the selection process are discarded or screened out.

Assuming the screening system results in a shortlist of more than one eligible seller who can satisfy the project procurement needs, you can rely on

several techniques to make a final selection. For instance, you can set up a **weighting system**, also known as a **scoring model**, to evaluate vendors against a predetermined set of criteria. This technique uses qualitative data to minimize personal preferences in the decision-making process.

To implement a weighting system, each evaluation criterion should be assigned a numerical weight depending on its importance in comparison to the other criteria. Potential sellers are then rated according to each criterion and the one with the highest score is awarded the contract. This scoring model ensures the selection of the best seller since weights are determined before proposals are reviewed, thus the process is guaranteed to be free of bias.

As explained, using a scoring model is based on established evaluation criteria for rating proposals. **Evaluation criteria**, or **source selection criteria**, represent various values such as technical capacities, delivery approach, relevant experience, financial stability, etc. In the case of evaluating quotes, the only evaluation criterion that is taken into consideration is the price each seller offers.

When you're determining your selection criteria, you may want to put more emphasis on the seller's past work as it can reflect the quality of their performance in your project. For example, if your organization is intending to acquire a Customer Relationship Management (CRM), you can ask bidders for evidence of their successful implementation of the solution in at least two similar organizations.

In addition to selection criteria, you may also need to set exit criteria before formally choosing and engaging a seller. **Exit criteria** are the conditions to be fulfilled in order to consider the seller's proposal in the first place, otherwise it gets rejected. Unlike selection criteria which are more flexible as it is not mandatory to meet each and every one of them, exit criteria must be fulfilled for a proposal to be put into assessment and evaluation. Exit criteria could also be used even after granting the contract to the bid winner; in this case, not meeting exit criteria puts an end to the seller's contractual engagement.

Often, exit criteria are associated with the seller's relevant past experience and their ability to fulfill requirements. Yet, a conflict of interest can be considered as an exit criterion too. A **conflict of interest** occurs when a certain party in the project puts their personal interests above the project interests. For instance, when a seller is a relative of one of the procurement decision-makers or when the latter receives gifts from a potential vendor, these situations demonstrate an obvious conflict of interest.



When conducting procurement, you should subjectively make your decision concerning which seller to choose. If you happen to be put in a situation that might be perceived as a potential conflict of interest, you should disclose it to stakeholders to ensure transparency and that no one gets an unfair advantage or special treatment.

Upon evaluating prospective sellers and choosing the most qualified one in terms of fulfilling the project procurement requirement, the primary output would be signing a contract directly or choosing to go for other forms of engagement such as agreements, purchase orders, memorandums, or even verbal agreements. This mainly depends on the specific method your organization follows to procure goods or services from a vendor.

A **Purchase Order (PO)** is a unilateral form of contract that is issued by the buyer to the seller to specify the type, quantity, prices, etc. of the products or services they intend to purchase. In case the buyer and seller have not yet finalized all of the contract terms of their contract and they need to get started with work, they can temporarily use a **Letter Of Intent (LOI)**, also known as a term sheet or an agreement in principle. This letter is issued from the buyer to the seller to put on record that the seller was awarded the contract and to express their intent to procure their project needs from them.

A Letter Of Intent (LOI) is not a contract; it is considered a preparatory document prior to officially signing the contract. A Letter of Intent outlines the basic terms under which the seller will conduct their work such as the total compensation, payment schedule, liabilities, etc. The two parties discuss these terms and document the agreed-upon terms and whether they are binding or non-binding.

In the U.S, an LOI may also be known as a **Memorandum Of Understanding (MOU)**. An MOU is a formal, legally non-binding agreement document. It indicates both parties' common intention of doing business together and outlines this agreement's terms and conditions as well as each party's role and responsibilities. A Memorandum Of Understanding is the first step in the establishment of a business relationship that often results in a legal agreement or contract in due course. This type of agreement can be used when two parties have similar goals, for instance, so they agree to establish a partnership to solve a problem or support each other's activities in a certain area. An MOU is nothing more than a formalized handshake.

Unlike an MOU, a **Memorandum Of Agreement (MOA)** is a conditional, legally binding agreement, where it is anticipated that both parties adhere to the defined terms; the seller provides the agreed-upon products or services for

which the buyer transfers the designated funds. The outlined terms in the MOA describe the cooperative relationship between the buyer and the seller and the appointed objectives. An MOA is more formal than a verbal agreement but less formal than a contract.

On the other hand, a **Service Level Agreement (SLA)** is often established as a formal commitment between a buyer and a service provider. SLAs are usually used in situations where it's crucial for the vendor's work to be delivered or completed on time or within a certain level of quality. A Service Level Agreement should cover the involved services and the way they're managed; a list of the services, both provided and excluded, service availability, the duties of each party, escalation procedures, reporting and conflict resolution process, as well as an indemnification clause, should all be included in the agreement.

Service agreements often focus on the desired service quality, therefore penalties are predetermined in the agreement as part of the steps the customer would take if the service quality level was not upheld. Failure of the provider to meet the agreed-upon requirements gives the buyer the right to terminate their services without any implications.

An SLA can be legally binding when included in a contract between a company and an event planning agency, for instance, or it can be an informal internal agreement between a company's IT department and its other departments for example.

When the buyer's supplies' requirements are uncertain at the time of the agreement in terms of quantities, prices, etc. the two parties can opt for a **Basic Ordering Agreement (BOA)**. This form of engagement can be used when a certain type of supplies or services are anticipated to be purchased from the seller, regardless of the purchase details. However, a BOA covers a pre-negotiated method for determining the pricing, issuing, and delivering of future purchases.

This type of agreement is often used in construction or engineering projects which have significant physical requirements. A Basic Ordering Agreement contains the terms and clauses applying to future purchases, a description, as specific as possible, of the provided supplies or services, and pricing, issuing, and delivering methodology for future orders. A BOA provides a lot of flexibility as it is possible to modify without any implications on the previously issued orders.

Regardless of the type of established contract or agreement, the buyer should set up monitoring and control processes to ensure the conformity and

quality of the delivered products and/or services. Inspections, statistical sampling, and audits are among the tools that can be used to control the procurement process and verify the seller's compliance with the determined requirements and engagement terms.

An **inspection** is a structured review of the seller's performance through examining, measuring, and validating deliverables' conformance to the required quality level. Inspections can be conducted by the project manager, the project team, or by specialized inspectors when dealing with large, sophisticated projects. In infrastructure projects, this activity can simply involve a site walkthrough.

Both the buyer and the seller can conduct inspections for similar purposes: each party wants to ensure that their legal rights are protected and that the other party is fulfilling its contractual obligations. Inspections serve as a risk identification tool by investigating sellers' performance and making changes and corrections before any potential issues arise and impact the project's progress.

Procurement quality can be also monitored through sampling tools such as statistical sampling, systematic sampling, stratified sampling, cluster sampling, judgmental sampling, etc. **Statistical sampling**, for instance, is an inspection technique that involves randomly choosing a part or a percentage of certain deliverables to measure their quality as a representative of the whole delivered products or services. Statistical sampling helps reduce the costs of quality control by performing this simple process on a consistent basis to be able to identify potential conformance issues.

While inspections tackle what has been already done, you can use audits for higher-level performance control. **Procurement audits** review a project's procurement processes to assess their compliance with regulations, internal policies, etc. Audits assess the efficiency of acquiring products and services needed for your project accomplishment. The project manager or a third party can take care of performing procurement audits. Even though inspections and audits are both used to identify problems and review quality, they should not be performed interchangeably; carrying out an inspection does not mean that an audit can be dispensable and vice versa.

## 4. Using Different Contract Types

In the previous section, we examined how procurements are conducted, starting with obtaining seller responses to the tools and techniques for selecting a seller, and ultimately awarding a contract.

A **contract** is a formally established document between two parties, legally obligating the seller to provide their products and/or services according to certain conditions, and the buyer to pay for the acquired results according to the predetermined methods and schedule.

Contracts give clarity to business relationships, prevent misinterpretations and misunderstandings, protect the rights of both sides, and document their obligations to create a reference for review and verification whenever needed. The details of an agreement can be mutually altered during the project lifecycle as long as the contract did not reach its closure.

The components of a contract vary depending on multiple factors. However, it is mainly made of an offer, an acceptance, and a consideration. It defines each party's rights and obligations and details the work scope as well as all agreed-upon terms and conditions. Also, it often includes the predetermined deliverables, milestones, and schedule, pricing and payment terms, quality criteria, warranty terms, incentives and penalties, insurance details, termination clause, and dispute resolution methods.

Since legal commitments often generate some risks for the performing organization, contracts are managed according to its policies and procedures. In small projects, procurements in general and contracts more specifically are developed by the project team. On larger, more complex projects, contracting is more centralized as the organization assigns someone who has expertise in contracting to ensure agreements are effectively managed. This person is known as a contract administrator or contract officer.

A **contract administrator** is responsible for developing, managing, and reviewing the organization and the project's contracts and agreements. They typically have extensive knowledge of contract law and business finance. A contract administrator works on finding the best way to protect the project's rights through negotiating contract clauses, analyzing associated risks, and creating strong documents with the organization's best interest in mind.

Throughout the contract duration, the contract administrator collaborates with the project manager to ensure sellers meet their obligations. The role of

the contract administrator starts with the contract awarding phase and continues until its closure. They ensure that contractual engagements are followed and work on preventing errors, disputes, and miscommunication.

As mentioned previously, before being part of a formal engagement, both parties negotiate the contract clauses to establish a common understanding and commitment to the comprised obligations and rights. A **negotiation** implies discussing the contract details until reaching a mutual agreement and a win-win situation. Both sides rely on their interpersonal skills to get the best deal; the buyer wants to get the most value, while the seller wants to secure a reasonable profit.

Negotiations mainly include scope, schedule, and price as well as the agreement structure, payment, technical approach, applicable law, and any other factors that seem to be pertinent to the procurement and contract types. The final agreement should reflect all agreed-upon details in order to conclude negotiations.

To minimize financial, legal, and operational risks, certain organizations rely on trial engagement before committing to long-term contracts. A **trial engagement** implies contracting one or several sellers to accomplish certain deliverables on a trial basis. According to their performance, the organization takes the decision on whether or not to engage the candidate seller in a full commitment to provide the project procurement needs.

This type of engagement allows the buyer to take enough time to evaluate their options while project work is simultaneously advancing. When a decision is made to opt for a contract, the choice of the contract type should depend on the project environment and approach, the work/scope's level of uncertainty and complexity, the procurement size, risk tolerance and assumption, etc. Opting for the right kind of contracts for your project helps you reduce risks and get the most value for the time and money spent on procurements.

Almost all types of contracts fall under one of two broad categories: Fixed-Price contracts (FP) or Cost-Reimbursable contracts (CR). There is also a third hybrid variation known as Time and Materials contracts (T&M).

**Fixed-price contracts (FP)** have a fixed agreed-upon total price for a well-defined product and/or service. This category of contracts is suitable for clear, detailed, and predictable work scope and requirements that are not likely to change. In this case, the seller proposes a fixed price quotation taking into consideration the associated potential risks they're assuming. Fixed-price contracts are the least risky contract type for the buyer. The fixed fee of this

contract depends neither on the spent time and effort nor on the used resources.

Opting for this kind of agreement, the seller often accepts a high level of risk of losing money due to cost overruns. However, they can make a maximum profit if they finish work with less cost. Sellers can also be granted financial incentives for exceeding requirements, by completing the project ahead of schedule, for instance. Fixed-price contracts set the exact details of the provided products and/or services, as well as the time and price of delivery. Therefore, once signed off, a change request must be issued to make any alterations to the contract scope, terms, or conditions.

There are several variations of the fixed-price contract including Firm Fixed Price Contract (FFP), Fixed Price Incentive Fee (FPIF), Fixed Price with Economic Price Adjustment (FP-EPA), among others.

**The Firm Fixed Price contract (FFP)**, also known as lump-sum contract, is the most commonly used form under the FP category. In this contract, an exact price is determined at the outset, regardless of any potential factors that might lead to an increase in the cost of completing the defined work. Unless the scope changes, the seller assumes all risks associated with materials' cost increase, etc. Naturally, this type of contract is favored by buying organizations due to the relatively low risk they're subject to.

**The Fixed Price Incentive Fee contract (FPIF)** is similar to the FFP contract in that a fixed price is set in return for the seller's pre-determined services or products. However, both sides agree on certain performance metrics that, when reached, the seller can get an extra financial incentive. These performance criteria or KPIs are typically associated with technical performance or schedule. For example, the seller gets \$200k for the provided service, plus \$10K if they complete work one month ahead of schedule. Still, all potential costs above the defined price are the seller's liability. In this type of contract, the seller risks losing all of their profit in case of a significant underperformance.

The **Fixed price with Economic Price Adjustments contract (FPEPA)** is another form of fixed-price agreements. This contract type is usually used for long-term commitments where the seller is likely to be providing their products or services over a considerable number of years. An FPEPA does define a fixed price like other contracts under this category. However, it also allows for fee adjustments in case of changed conditions, such as inflation, cost increases or decreases for certain commodities or services like electricity, shipping, labor, materials, etc. that could have an impact on the vendor's ability

to complete the assigned work. This contract type is commonly used in the construction field.

The second most common agreements category is **Cost-Reimbursable contracts (CR)**. Unlike the FP category, this type is used when the scope of work is not well defined or when it's subject to significant or frequent changes during the contract execution. With a high level of uncertainty and ambiguity, a fixed-price contract is out of the question, making a cost-reimbursable contract the most suitable and best possible arrangement.

Cost reimbursable or cost-plus contracts have two payment components: full reimbursement of all actual costs, plus a fee amount that can vary depending on predetermined criteria. The seller in these kinds of agreements gets paid for all legitimate costs that were incurred to complete the work, plus a fee, an award, or an incentive representing their profit.

The seller mainly provides the buyer with a cost estimation that the latter can use for budgetary planning. However, the provided estimation is not binding; the buyer commits to pay the seller for all work and material costs no matter how different from the initial estimation they might end up being. These costs involve direct costs that are incurred for the purpose of accomplishing project work and, indirect costs that involve administrative or overhead costs for example. The fee or award part of the payment is defined according to particular performance metrics. Therefore, target costs and incentives are specified upfront.

Since the buyer is obliged to reimburse whatever the seller's bill consists of after finishing work, they are the ones who bear all risks. The Cost-Reimbursable contract category includes the Cost Plus Award Fee contract (CPAF), Cost Plus Fixed Fee contract (CPFF), Cost Plus Incentive Fee contract (CPIF), as well as different other variations.

With a **Cost Plus Award Fee (CPAF)** contract, the seller earns the majority of their profit based on the buyer's subjective evaluation of their performance and whether they satisfied the established and incorporated criteria or goals in the contract. This award is of course paid along with the reimbursed legitimate costs, and it acts as a motivation for the seller to provide their best performance. Performance KPIs must be clearly defined for this type of contract to be effective and to ensure fair payment to the seller. For instance, the buyer reimburses an amount of \$8M for the work cost, and \$1M as a fee, plus an additional amount of \$500k as a predetermined award because the project didn't exceed the \$10M cost estimation.

Unlike CPAF, the **Cost Plus Fixed Fee contract (CPFF)** determines a fixed fee amount at the very beginning of the contract which is not subject to any changes. All allowable costs are reimbursed in addition to a profit amount that often represents a percentage of the seller's cost estimation. Unless the work scope changes, and regardless of the seller's performance, the fixed fee is unalterable. Let's say the seller files \$8M as project cost. They will get this amount fully reimbursed plus a predetermined fixed fee of \$1M. However, if the fee was defined as a percentage of cost estimates, 15% for example, the seller should get a \$1.2M fee along with costs reimbursement.

The **Cost Plus Incentive Fee contract (CPIF)** is another version of cost-reimbursable contracts. The CPIF contract implies payment of all incurred costs plus a predetermined incentive fee based on the seller's performance in certain areas. However, this type of contract sets target costs and fee: if final costs end up being greater or less than the seller's estimations, then both sides share the difference, whether they're savings or overrun costs, according to a pre-negotiated formula (e.g 80% for the buyer and 20% for the seller). Let's say the contract allocates 20% of the savings for the seller if the total cost does not reach \$10M. When the seller files \$8M as project cost and \$1M as a predetermined fixed fee, they get reimbursed a total of \$9M plus an award of \$200k (an incentive representing 20% of the saved amount since the project cost didn't reach \$10M).

In CPIF contracts, the reward fee is meant to motivate the seller to save as many costs as possible to earn a higher incentive. This type of contract often results in sellers meeting and even exceeding performance metrics.

For projects with an unfixed scope and where it's difficult to specifically determine the needed time and material to complete work, you can opt for a hybrid of fixed-price and cost-reimbursable contracts, which is the **Time and Material contract (T&M)**, also known as time and means or unit price contract. T&M contracts are often used for work with a small scope or high uncertainty, where sellers are paid for their services per unit, whether it's per hour, day, item, etc.

This hybrid contract is usually used for short-term engagements to acquire experts, increase manpower, etc., or for small procurement of commodities. Due to its simple terms and conditions, Time and Material contracts are common in Agile projects. It simply requires agreeing on an hourly rate for labor and/or unit cost for material (e.g., \$80/hour). Thus, we can consider risks to be shared between the two sides of this contract.



On the other hand, if your project requires an indefinite quantity of products and services, the **Indefinite Delivery Indefinite Quantity (IDIQ)** contract would be suitable for your needs. IDIQs are most common in big and/or governmental, architectural, engineering, or IT projects that need a lot of supplies and/or services. Even though these types of projects often use the IDIQ contract because they can specify their needs, they do define a minimum and maximum quantity or limit for the acquired goods and services, as well as an exact contract period and work scope. The term indefinite does not mean that procurement is done with no established thresholds.

No matter how different all of the explained contract types are, they all include certain common clauses. Almost all contracts, regardless of their use and nature comprise force majeure, litigation, and claims administration clauses.

The **Force majeure** is a French term that means superior force which is also known as **acts of God**. This clause removes liability for any natural disasters such as hurricanes, earthquakes, floods, etc, hostile outbreaks such as war, civil unrest, etc, and all powerful, unexpected, and unavoidable events or circumstances that are beyond the engaged parties' control, and that can impede, impact, or prevent them from fulfilling their contractual obligations.

This clause details vary from contract to contract, depending on the project and procurement nature. However, it mainly implies that upon the occurrence of certain specified events, that are outside the contracted parties' control, they are excused from, or entitled to suspend performing their obligations with no encountered liabilities.

However, if the buyer or seller fails to meet the contract terms or the agreement requirements, both sides have the right to follow legal procedures. When both sides fail to collaborate in order to resolve claims and work out their differences, litigation might be the only solution. **Litigation** is a technique for dispute resolution that simply implies going to court when things escalate and alternative methods won't lead to an agreement. Litigation should be the last resort. Therefore, both parties can try to resolve issues using more cooperative methods.

When discussions and negotiation don't seem to be helpful, arbitration and mediation can be the next step to avoid going for litigation. A **claims resolution guideline** or **claims administration** should be part of the contract in order to outline an agreed-upon set of steps or actions when issues arise. Both arbitration and mediation involve the intervention of a third party known as an arbitrator or a mediator for an assisted or indirect negotiation process.

**Arbitration** is when a neutral third party intervenes to assess the legal aspect of a disagreement or dispute between contracting parties and makes a decision depending on each side's case, arguments, and supporting evidence. This method can involve one or more arbitrators, who take care of arranging a meeting with the two parties to examine the issues. After hearing both sides, and checking their written submissions of evidence and everything associated with the dispute, the arbitrator makes a written arbitral decision, which is also known as an arbitral award. This decision is final, and it can be filed in court to enforce its application.

On the other hand, **mediation** involves a neutral third party attempting to narrow discrepancies in good faith. A mediator assists disputing parties in discussing the conflict and reaching an agreement, in a fair and honest face-to-face discussion. Unlike arbitrators, a mediator can't take any legal decisions in favor of one party. Mediators help the two sides of the issue understand each other's points of view and interests but they can not force them into following or accepting a certain solution.

## Practice Test

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### Question 1

A few days after introducing a new release to the market, the Product Owner received a complaint from a user, claiming that the product has an annoying defect. What should the Product Owner do next?

- A. Create an item to fix the defect, add it to the product backlog, then prioritize it
- B. Ask the development team to fix the defect immediately since the product is already released
- C. Estimate the effort required to fix the defect, then decide what to do accordingly
- D. Ask the development team to roll back the last release in order to work more on exploring undetected defects

### Question 2

During the project execution phase, the Change Control Board (CCB) approved a change request that no one on the project team knew how to implement. What should the project manager do to deal with this issue? (Select two)

- A. Document the issue in the issue log
- B. Hire a subject matter expert
- C. Formally request the CCB to revoke their decision
- D. Ask the team to do more research on how to implement the approved change request

### Question 3

Halfway through a sprint, the development team realized that they planned for more work than they could possibly complete. What should the project manager advise the development team to do next?

- A. Ask the product owner to remove some work items from the sprint backlog
- B. Collaborate with the product owner to reprioritize the product backlog items
- C. Continue work and put off discussing this issue to the sprint retrospective
- D. Inform the product owner during the sprint review that some features could not be completed

### Question 4

A project manager is leading a software project. The project team has finished all of the tasks in the iteration backlog early and decided to work on code clean-up for the rest of the iteration. In spite of their intention to decrease technical debt, which will save the customer maintenance fees in the future, neither the customer nor the project manager seems to be happy. What could be the reason behind the customer's dissatisfaction?

- A. They wanted to avoid scope creep
- B. They wanted to avoid gold plating
- C. They wanted to prioritize the scope
- D. They wanted to minimize costs by ending the iteration earlier

#### **Question 5**

A newly assigned interim project manager got a call from one of the project vendors claiming that they had already completed 50% of the agreed-upon work and asked for payment. What should the project manager refer to in order to check whether they need to pay the vendor or not and how much should they get paid?

- A. Request for proposal
- B. Contract
- C. Response to bid
- D. Procurement management plan

#### **Question 6**

A project has been hampered by many quality issues, putting the project at risk. Which meeting should the project manager conduct with the team to figure out how to avoid or deal with such problems in the future?

- A. Kick-off
- B. Lessons learned
- C. Risk review
- D. Team building

#### **Question 7**

At the end of a sprint retrospective, a team member stated that the meeting output is almost the same as the previous ones and suggested canceling it or at least reducing its frequency. What should the Scrum Master do in this case?

- A. Extend the sprint timebox in order to allow for more improvements to be discussed in the retrospective
- B. Reduce the frequency of retrospectives to once every two sprints
- C. Go with voting, and if all team members agree, then skip retrospectives
- D. Keep the same frequency of retrospectives and reflect on how to make them more relevant and actionable

#### **Question 8**

During a construction project, the construction team finds out that the designed model for the swimming pool requires some raw material that is no longer available in the local market. However, there is an alternative with the same price and probably a better quality. What should the project manager do next?

- A. Update the resource management plan to replace the old material with the new one
- B. Submit a change request in order to get formal approval for using the new material
- C. Order a sample of the new material and check its compliance with the quality management plan
- D. Use the new material right away since it has the same price and probably a better quality

### **Question 9**

After multiple negotiation sessions, all terms and details were agreed upon and the seller finally got the 18-month building project contract for \$715,500. What type of project is used in this scenario?

- A. Time and Material
- B. Fixed Price
- C. Cost Reimbursable
- D. Cost Plus Incentive

### **Question 10**

During the execution of a construction project, the supplier informed the project manager that delivering the new order of steel bars may have a 3-day delay. What should the project manager do next?

- A. Negotiate the delay with the vendor to get it reduced
- B. Look for another vendor
- C. Evaluate the impact of the delay
- D. Update the project schedule

### **Question 11**

At the end of a sprint retrospective, a team member stated that the meeting output is almost the same as the previous ones and suggested canceling it or at least reducing its frequency. What should the Scrum Master do in this case?

- A. Extend the sprint timebox in order to allow for more improvements to be discussed in the retrospective
- B. Reduce the frequency of retrospectives to once every two sprints
- C. Go with voting, and if all team members agree, then skip retrospectives
- D. Keep the same frequency of retrospectives and reflect on how to make them more relevant and actionable

### **Question 12**

After baselining the scope and during project execution, a key stakeholder, who is a member of the Change Control Board (CCB), requested a new service. Taking into consideration that the project manager is convinced that this new service can add value to the project, what should they do?

- A.** Implement the change request since the key stakeholder is a member of the CCB
- B.** Implement the change request since it will add value to the project
- C.** Submit a change request according to the change control system
- D.** Record the change request in the change log

### **Question 13**

A scrum master is facilitating a retrospective meeting when a team member suggested changing the sprint timebox from three weeks to two weeks. What should the scrum master do?

- A.** Investigate the cause behind the team member's suggestion to tailor the process
- B.** Accept the implementation of any suggestion provided by self-organizing team members
- C.** Decline the team member's suggestion since it can reduce the team's velocity
- D.** Decline the team member's suggestion since the sprint timebox is set at the beginning of the project and should never be changed

### **Question 14**

During one of the meetings with their remote team, a project manager was not able to clearly hear a particular team member. At first, the project manager thought that it was an internet or equipment issue. But when asked, the team member turned off their cooling fan and the voice became more clear. What kind of knowledge is being used by the team member to fix the problem? (Select two)

- A.** Implicit knowledge
- B.** Explicit knowledge
- C.** Codified knowledge
- D.** Tacit knowledge

### **Question 15**

A project manager is assigned to lead a huge construction project. When conducting procurements, they wanted to ensure that all potential providers fully and clearly understand the project procurement requirements and specifications. How can the project manager achieve this?

- A.** Conduct face-to-face meetings with each seller
- B.** Conduct a negotiation meeting with each seller

- C.** Conduct a virtual meeting with each seller
- D.** Conduct a bidder conference

## Answers

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### **Question 1 = A**

**Explanation:** In Scrum, any change request, whether to implement a new requirement or fix a defect, should be inserted in the Product Backlog and then prioritized by the Product Owner. If the defect is critical, the Product Owner can prioritize it to be tackled in the upcoming sprint. The fact that the product is already on the market doesn't mean that discovered defects should be immediately fixed. Additionally, going to an older version (i.e., rollback) is not a wise decision taking into consideration that only one defect was detected. Finally, the product owner is not the one responsible for estimating efforts; it's the responsibility of the development team.

### **Question 2 = B, D**

**Explanation:** Hiring a subject matter expert and conducting more research will help your team implement the change request. This is considered a problem-solving approach since it entails finding solutions to the encountered issues or challenges. Uncertainty can be reduced by collecting more information through conducting research, engaging experts, or performing a market analysis (PMBOK 7th edition, page 229). Neither documenting the issue in the issue log nor asking the CCB to revoke their decision could help resolve the issue.

### **Question 3 = A**

**Explanation:** First, the development team should collaborate with the product owner in order to remove some work items from the sprint backlog. The sprint backlog is a living artifact that should be updated whenever something new is learned or discovered. Afterward, in the sprint retrospective, the team should discuss how they can improve their estimations. The agile team should be proactive and should not wait for the sprint review in order to inform the product owner that they couldn't complete the affected work. Reprioritizing the product backlog items won't help solve this problem. This activity is often undertaken during the refinement sessions with the purpose of making user stories ready for the next iterations.

### **Question 4 = C**

**Explanation:** The probable reason for customer dissatisfaction is there are more prioritized items in the product backlog that the team could have worked on instead of the code clean-up activity. Stakeholders are the ones responsible for defining and prioritizing the scope and requirements for the project team



(PMBOK 7th edition, page 14). Since the customer didn't ask for the code clean-up work, then it could not be considered as scope creep. What the team did is "gold plating", which implies doing additional activities that were neither agreed upon nor included in the iteration backlog, with the intention to please the customer. By definition, gold plating entails providing extra value to the customer. However, the customer can get more value by prioritizing the product backlog. In such a scenario, the customer expects to get notified when the project team completes all of the iteration backlog items. In an adaptive approach, the scope is variable while the project cost and schedule are fixed. Consequently, the customer would not be interested in ending a pre-approved iteration earlier.

**Question 5 = B**

**Explanation:** The contract is the document the project manager should refer to in order to verify the payment procedure. A contract is a mutually binding agreement that obligates the seller to provide the required services and the buyer to pay a predetermined amount on an agreed-upon date or schedule (PMBOK 7th edition, page 191).

**Question 6 = B**

**Explanation:** Lessons learned meetings are collaborative retrospective sessions for discussing, documenting, and soliciting feedback about the project's successes and missteps. These meetings are a must for the project team to learn from previous mistakes and improve future processes and projects. Lessons learned meetings should be held whenever needed, to review the way a project has been progressing, note important learnings, and set new ways for amelioration. Team building activities aim to increase collaboration among team members. Kick-off meetings are meant for communicating the objectives of the project and ensuring the stakeholders' commitment to the project. Risk review meetings are used to verify the status of existing risks and identify new ones (PMBOK 7th edition, page 180). However, capturing lessons learned from current or closed risks commonly happens in the lessons learned meetings.

**Question 7 = D**

**Explanation:** The sprint retrospective is one of the main scrum events, which aims to help the team adjust and improve their work processes over time. The scrum master's role is to maintain scrum practices, therefore they should neither cancel the retrospective meeting nor reduce its frequency. On the other hand, extending the sprint timebox denotes smoothing the problem rather than trying to solve it. Instead, the scrum master should reflect on why the retrospective meeting is not driving the intended value to the team. The scrum master may need to better facilitate the meeting, engage team

members, solicit and collect more feedback, check various metrics, and use different investigation techniques such as the why-why method to help them take future actionable measures accordingly. The scrum master can also use ESVP, for instance, which is a short activity for assessing participants' engagement. This technique entails asking team members to describe anonymously their attitude toward the retrospective as being an Explorer, Shopper, Vacationer, or Prisoner.

**Question 8 = B**

**Explanation:** The project manager should submit a change request to the Change Control Board (CCB) according to the procedures described in the change management plan. The project manager should not use the new material unless the CCB approves the change request. The CCB may decide to further investigate the new material, import the old material from another country, or even change the swimming pool design. In the case of using a new material, the resource management plan should be updated.

**Question 9 = B**

**Explanation:** Fixed price contracts are used for projects with clear requirements where a price is fixed in return for the seller's services and/or products. Time and Material (T&M) contracts set a quote for hourly wage plus the cost of materials instead of quoting a fixed price for the entire project. Cost Reimbursable contracts, on the other hand, reimburse the contractor for the actual costs they incur to provide their services and/or product, plus an additional fee. A Cost Plus Incentive contract, for instance, is a cost-reimbursable contract that incentivizes the contractor to bring their best performance by completing the project under budget or before deadlines.

**Question 10 = C**

**Explanation:** The project manager should evaluate the impact of the delay before making any decision. A delayed activity doesn't necessarily result in the whole project delay. For instance, if the activity is not on the critical path and it has a lag of more than three days, then the delay won't probably have any impact on the project. Therefore, there is no need for negotiating the delay or looking for a new vendor to get the order delivered on time.

**Question 11 = D**

**Explanation:** The sprint retrospective is one of the main scrum events, which aims to help the team adjust and improve their work processes over time. The scrum master's role is to maintain scrum practices, therefore they should neither cancel the retrospective meeting nor reduce its frequency. On the other hand, extending the sprint timebox denotes smoothing the problem rather than trying to solve it. Instead, the scrum master should reflect on why

the retrospective meeting is not driving the intended value to the team. The scrum master may need to better facilitate the meeting, engage team members, solicit and collect more feedback, check various metrics, and use different investigation techniques such as the why-why method to help them take future actionable measures accordingly. The scrum master can also use ESVP, for instance, which is a short activity for assessing participants' engagement. This technique entails asking team members to describe anonymously their attitude toward the retrospective as being an Explorer, Shopper, Vacationer, or Prisoner.

**Question 12 = C**

**Explanation:** Regardless of the fact that the change was requested by a member of the CCB, the project manager should submit a change request according to the procedures defined in the change control system. This system describes how modifications to project deliverables should be undertaken (PMBOK 7th edition, page 332). The change request is not submitted yet to the CCB, so it should not be recorded in the change log. After submitting it, the change log should be updated to track the status of the change. The project manager should not implement the change without getting the CCB's formal approval. Being convinced of the change's value or having the consent of one member of the CCB is not sufficient to move forward with the implementation.

**Question 13 = A**

**Explanation:** The scrum master should investigate the cause behind the team member's suggestion to tailor the process. This might reveal other problems that the team is facing and that can be fixed by taking a different action rather than changing the sprint timebox. The scrum master's role is to create and maintain good working processes. Therefore, they should examine and challenge new ideas along with the team members before moving on with their implementation. Changing the sprint timebox is possible during the project, it should not be frequently done. Such a decision should be made thoroughly and should involve the product owner too since the scrum events' frequency will be changed too. Often, the higher the risk and the unpredictability, the shorter the sprint should be. Consequently, rejecting or accepting such a decision should not be based on the team's velocity.

**Question 14 = A, D**

**Explanation:** Tacit knowledge, aka implicit knowledge, is the know-how embedded knowledge that the team member acquires through experience, insights, intuitions, etc. Unlike explicit knowledge, this type of knowledge is difficult to extract and codify.

**Question 15 = D**

**Explanation:** The best way to clearly explain a project's procurement needs and how the whole process is going to take place is through a bidder conference. This event allows all potential providers to get a better common understanding of the project as well as clarifications to any of their inquiries, allowing them to submit properly prepared proposals. Bidder conferences ensure that all sellers have an equal chance to win the contract. Therefore, individual or virtual meetings contradict the conference's main goal, along with being less practical and efficient. Negotiation meetings are conducted with the selected provider to discuss their contract terms.

# **CHAPTER 7**

## **Delivering the Project Scope and Meeting Quality**

# 1. Delivering Project Scope

Effective project delivery entails properly managing its scope, regardless of whether it's outlined upfront, or evolves along the way with more discovered details. Adaptive work environments are characterized by low **scope stability**, meaning that requirements are expected to undergo many changes throughout the project life cycle. In this case, the product owner manages the product backlog by prioritizing and validating the work of each iteration.

In a predictive work environment, however, scope stability is often high, which should be maintained through an accurate scope definition during the planning phase. Additionally, establishing control mechanisms is a must for addressing changing elements and unruly, bloating requirements. **Scope control** consists of monitoring and tracking the project scope and managing any changes to its baseline throughout the project lifecycle. As a project manager, you need to ensure that project work stays within the defined scope and that when there is a need to make changes, the established change control process must be followed.

After checking whether the delivered project or product scope meets initial requirements using the scope control activity, it should be then formally approved by the client in what is known as the **validate scope** process. Validate scope involves stakeholders' formal acceptance of project deliverables. This process is inspection-driven with the purpose of determining whether project work meets the requirements defined in the product documentation, the project scope, or in the contractual agreement, etc. The client's acceptance of the project deliverables requires a formal sign-off.

Validate scope is not only performed at the end of the project, it can also take place at the end of a phase or when a major deliverable is realized. The scope is validated through an inspection that is performed by the project stakeholders. This inspection, review, audit, or walkthrough, involves examining deliverables against documented standards.

Whereas client approval leads to formal documentation of deliverables acceptance, a non-validated scope either leads to project cancellation and failure, or the implementation of corrective actions to repair identified defects. After issuing a change request and correcting deliverables, the product goes through quality control and scope validation again to get customer acceptance.

Keep in mind that formal approvals are more common in predictive environments. In an adaptive environment, the sprint review is conducted to demonstrate the accomplished work, solicit feedback, and foster collaboration rather than seeking formal approval through an acceptance document sign-off.

To avoid scope validation failure, save time, and prevent frustration, a project manager should engage the client from the beginning and work closely with them throughout the project. This also helps the team better understand what the customer wants, making it easier to produce accurate deliverables. Since scope validation is all about the client's acceptance of the project deliverables, acceptance criteria should be outlined and defined meticulously.

**Acceptance criteria** are a set of required standards, capabilities, or conditions, that must be met for project deliverables to be accepted. These acceptance criteria can be either explicit or implicit and they can be elicited from stakeholders, organizational policies and standards, contracts, regulatory bodies, etc.

Acceptance criteria often take the form of a **checklist**, in order to verify, in a structured way, that the predetermined set of acceptance criteria are met when validating the project deliverables.

When implementing your project scope, your main focus should be on delivering valuable outcomes rather than producing mere outputs. You should first of all be able to distinguish between value and outcomes versus outputs. **Outcomes** are why the project is being executed in the first place, what the client wants, and what you need to achieve as the project manager. Unlike outputs, outcomes are often intangible making them hard to measure. **Outputs**, on the other hand, are the project activities or work items that are performed in order to achieve outcomes. Outputs are easily measurable since they often represent tangible results.

Simply put, the act of just completing project activities means you created an output. However, completing these activities does not mean that project outcomes were also achieved. The project value or outcome is what the whole business case of the project is built on. Therefore, work processes should focus on finding the best solution for the client's problem. Think of it this way; a project is a means to an end, it is not chosen just for the sake of executing it, it's selected to achieve a certain desired result, which is valued by the project's sponsor.

Value delivery often fails due to the misconception that completing the project automatically leads to delivering value. This can also be due to the fact

that determining whether outcomes were achieved or not often rely on the perception of the client, making it hard to measure or prove that project outputs did achieve and meet this perception.

To reduce the potential occurrence of this problem, you can create a **value stream** in order to identify which project activities and actions do deliver value to your customer. **Value stream mapping** is a lean technique for visualizing and measuring value-adding activities versus non-value-adding activities, which helps you identify and remove waste from your production system. Value stream mapping can also help you improve your work processes by identifying the required information and materials for producing value.



## 2. Meeting the Required Quality

Delivering a project is more than just delivering its scope and requirements. Apart from the triple constraint that should always be at the top of your priorities, quality is a focal concern that should not be forgotten while managing your project. Meeting every project milestone, delivering the project on budget, or completing it within the schedule can prove to be insufficient if the deliverables don't meet the required quality.

**Quality** can be defined as the degree to which deliverables fulfill the customer, end-user, or stakeholder's defined requirements and needs. When measuring quality, several dimensions and aspects should be considered including the deliverables' conformance to the predetermined acceptance criteria, their fitness for use, their performance reliability and consistency, their resilience, efficiency, sustainability, etc.

Quality should not be confused with **grade** as the latter refers to the rank or category assigned to a product. A low-grade product may be acceptable but a low-quality product is not, as it often presents a problem. Regardless of its grade, a product should never have low quality. For instance, a laptop with limited features (low grade) is acceptable and appropriate for use, as long as it has zero defects (high quality). On the other hand, a laptop with numerous features (high grade) but with many obvious defects (low quality) is unacceptable and inefficient.

As a project manager, you have to support your team towards delivering outputs that meet the required levels of both quality and grade. In order to consistently maintain high levels of quality, you have to set up **Quality Assurance** processes. These prevention-driven processes can be performed internally to ensure adherence to the quality standards set by the organization, or externally when an external formal audit, authorization, or approval of the quality standards is required to verify compliance to certain regulations.

Here is the difference between standards and regulations: a **standard** often represents a document of guidelines or rules that are established by a recognized authority or body, general consent, or custom, in order to be followed as an example or model. However, compliance with standards is neither enforced nor mandatory. **Regulations**, on the other hand, are mandatory requirements that entail how a project, product, service, or process must be carried out and completed.

Regulations often come in the form of a set of laws and industry regulatory requirements that are enforced by certain governing bodies whilst standards are practice recommendations and expectations set by the performing organization and government in relation to production, workmanship, environmental considerations, etc. Both standards and regulations must be fully understood and planned into the project to ensure quality is up to code.

One of the most widely recognized standards that most organizations follow in order to meet their quality criteria is the ISO 9000 Series. ISO stands for International Organization for Standardization, the worldwide federation of national standards bodies. **ISO 9000 series** involve a set of defined international quality standards that companies can implement to manage and assure quality in a more formal process-oriented approach.

ISO 9000 is a method for helping organizations internally establish, embed, and follow their own quality management procedures and system. This entails putting in place documented procedures for the performed project work, for instance. ISO 9000 can be applied in almost all sectors and in all types of organizations, regardless of their size.

Aside from ISO 9000, an organization's quality policy can follow another formal approach such as Six Sigma, in order to satisfy its quality demands. **Six Sigma** is a business or project management methodology that functions as a quality improvement approach for processes, products, or services by finding, addressing, and eliminating defects that can hinder efficiency or result in too many errors. By using the Six Sigma methodology, your project is expected to have 99.99969% defect-free products, meaning only 0.0000034% of your products will probably have defects.

This quality approach relies on data statistical analysis to better understand customers' requirements, enhance a company's financial performance, improve processes across different departments such as product development, production, marketing, administration, etc., and above all reduce defects and waste to a minimum in order to achieve quality goals.

Besides following certain quality standards like the ISO 9000 series or Six Sigma, your project must adhere to particular regulations, depending on the field, location, etc. These regulations can be either De jure or De facto. **De jure regulations** are formal binding standards, practices, or norms that have been legally approved, recognized, and endorsed by a formal authority or organization such as the state.

In order to create de jure standards, organizations go through formal, well-documented processes that can be complex and even rigid. The produced regulations and practices undergo periodic audits and thorough ratification in order to eventually get legal approval and acknowledgment by official bodies or authorities.

**De facto**, market-driven, industry, or professional regulations, on the other hand, represent the type of standards that get widely adopted by a certain industry due to their reliability and efficiency in achieving their purpose, which eventually leads to their collective support, acceptance, use by critical market forces. Anyone is able to create a De facto standard as long as it gains enough popularity to be widely adopted and used. In case it gets approved by an official standards organization, a De facto regulation can become a De jure one.

Quality assurance through adopting applicable standards and regulations is not enough to meet your project quality goals nor to guarantee high-quality deliverables. In order to verify that your project outputs do comply with all these standards, specifications, and requirements, you should undertake **Quality Control** or **Quality Audit** activities. While Quality Assurance examines processes, Quality Control is an inspection-oriented process that is performed to review outputs and identify potential defects.

Quality control monitors not only the project's final deliverables but also all project performance and work results in order to ensure it meets all relevant quality standards. This assessment helps you detect and correct defects that can make the product unfit for use or that may lead to its refusal by stakeholders, before shipping the product and carrying out scope validation.

Along with implementing quality audit processes, you can perform certain practices such as Kaizen to work on improving your project quality. **Kaizen** is the Japanese term for improvement, and it represents a quality and resource management philosophy aiming to carry out small continuous improvements over time in order to reduce costs and increase productivity.

KAIZEN focuses on creating a team atmosphere that ensures employee satisfaction, making their job more fulfilling, and naturally leading to increased efficiency levels. These gradual improvement practices also have a broader impact on products' quality and the organization's business performance. Kaizen promotes consistency with a belief that small changes are more efficient and easier to incorporate and accept than extensive changes.

The results of the Quality Audit can either show that the project deliverables are precise and accurate, or reveal hidden problems and defects that require

rework. **Precision** measures a deliverable's degree of exactness. Precise deliverables are not necessarily close to a defined requirement, estimation, or value, their measurements or value should be close to one another in order to be considered precise.

**Accuracy**, however, describes a deliverable's closeness to a target value or requirement. Unlike precision, accuracy assesses correctness in relation to an acceptable value. Keep in mind that accuracy is independent of precision; meaning that a precise deliverable is not necessarily accurate and vice versa. Therefore, you should aim to produce deliverables that are both accurate and precise. However, if Quality Control reveals any gaps, it means that your project has issues.

Issues revealed by quality control can manifest in a variety of forms. In software projects, for instance, technical debt is one of the most common quality issues. **Technical debt**, also known as design debt or code debt, is the behavior of delaying necessary project work in order to meet a deadline or settling for a more time-friendly work solution in order to produce a deliverable faster.

Taking the easier route often results in rework along with raised costs since technical debt leads to defective, low-quality, or less stable codes or products that require high maintenance costs. The longer it takes for technical debt to be detected and addressed, the harder it gets to implement changes later on.

When issues are detected, and in order to be able to implement corrective actions, you need to perform a **root cause analysis** to determine the underlying reason behind certain defects, variances, or risks. This method allows you to go beyond showing problematic symptoms to figure out their cause, making it easier to implement the appropriate solution. Not only does it help with problem-solving, but root cause analysis also plays a role in risk mitigation by diagnosing potential quality risks before more serious issues occur, allowing you to correct or eliminate problem areas in an early stage.

In order to carry out a root cause analysis, you can use different quality management tools such as the cause-and-effect diagram, the Why Why diagram, and Check sheets.

The **cause-and-effect diagram**, also called the Ishikawa diagram, why-why chart, and fishbone diagram, is a visual tool for identifying and illustrating the different factors that are contributing to a particular quality issue and the relationships between these variables within a certain process. This iterative interrogative technique helps the project team investigate the cause-and-effect

relationships, generate different opinions on how to address the issue, and make an educated decision regarding the solution they're implementing to ensure quality.

The **tree diagram**, aka the tree analysis, analytical tree, hierarchy diagram, or systematic diagram, breaks down broader issue categories into more specific, hierarchical subcategories and branches to help you develop a more detailed and logical, step-by-step solution. This tool is useful for breaking down generalities and portraying the relationships between their components.

When investigating a quality issue, you can use a check sheet for an easier data-gathering collection process. A **check sheet** or a tally sheet is handy when it comes to assembling and organizing the available information and facts into categories while inspecting potential defects. This data can include the time of the defect occurrence, its duration, its potential cause, etc. This data can be later translated into other analytical formats such as histograms and diagrams.

### 3. Managing the Cost of Quality

Delivering work according to quality standards and requirements unavoidably gives rise to certain quality costs in your project. However, doing things right is more cost-efficient than doing mistakes and fixing them later on.

Delivering results that meet customer needs and expectations usually has some downsides such as the costs and overhead it adds to your project. Therefore, since quality comes at a price, you should set realistic quality objectives to avoid impeding the successful delivery of your project. You should find the right balance where you define and stick to realizable quality objectives to avoid defect risks without going over the roof.

To strike the appropriate balance, you first have to understand the different costs that quality requires or creates. The **Cost of Quality** is the amount of money spent by the performing organization to ensure the project deliverables satisfy quality standards. This includes all invested, planned for, and incurred costs throughout the project lifecycle.

Cost of quality comprises costs associated with appraising deliverables for requirements conformance, preventing requirements nonconformance, and failing to meet requirements.

Put more simply, quality costs are divided into money spent to avoid failure and money spent because of failure. Proactive quality costs that are dedicated to avoiding failure are called the **Cost of Conformance** or cost of compliance. This category represents the organization's investment to ensure the good quality of the created products and/or services. This includes all resources devoted to achieving the quality target of a project to prevent quality issues and the additional costs they result in when attempting to fix them.

Compliance costs fall under two categories: Prevention Costs and Appraisal Costs. **Prevention costs** represent the cost of preventive actions taken to satisfy the expected level of quality. This type of cost is meant to prevent defects and failures or end up with a product or service of poor quality. Prevention activities that are carried out to stop errors before they happen include training, quality assurance, documentation, supplier evaluation, safety measures, reviews, etc.

The other type of conformance cost is called **Appraisal cost**, which involves the cost of the periodic assessment of the product quality. This comprises testing, inspecting, auditing, evaluating, and measuring the

deliverables, product, or service the project is producing. Appraisal costs are set up to implement a series of activities to determine work results' degree of conformance to quality requirements.

This can involve the evaluation of the purchased materials and equipment as well as work processes setup, to ensure that they conform to specifications. Appraisal costs also cover the assessment of the quality system to ensure its proper functioning. These costs are invested and spent throughout the whole production process. While prevention costs focus on quality assurance, appraisal costs are invested in quality control. Due to their proactive nature, prevention and appraisal costs together make the cost of good quality.

When activities conducted under appraisal costs reveal errors, correcting these errors requires and results in another type of quality cost. **Cost of Non-Conformance**, also known as Failure costs, or the Cost of Poor Quality, is the incurring cost for correcting detected defects and occurring failure. This means that money was lost due to failure in meeting quality requirements, which results in more spending during or after the project to fix issues.

Corrective actions under this category target internal and external failures. **Internal Failure Costs** are spent on fixing failures that are identified by the project before the customer receives the defective product. This includes the cost of the labor and materials used for the production of rejected deliverables as well as the cost of fixing these defects.

Waste, rework, scrap, and refactoring all fall under internal failure costs. **Waste** presents performed work that consumed time and resources without adding any value. Removing such activities from the workflow stream has no negative impact whatsoever on the project productivity or results. Therefore, identifying and eliminating waste plays a key role in running a successful project and decreasing internal failure costs.

According to lean practices, fixing a defective, non-conforming product or service can be done either through rework or scrap. **Rework** or rectification is the action taken to correct errors or defective product components to bring everything into compliance with quality requirements. Rework can involve different activities such as part replacement, disassembly, reassembly, etc. **Scrap**, on the other hand, represents a defective product, component, or material that gets rejected or discarded because it cannot be used or repaired.

In the software industry, **refactoring** is a corrective action that is part of internal quality costs. It's a quality technique that consists of restructuring an existing program's source code by improving its internal structure without its

external behavior. Refactoring is one of the solutions used to address technical debt.

The second type of nonconformance cost is **External Failure Costs**. Unlike internal failure costs, these costs occur when the client is the one finding defects or issues after receiving the final product or service. This has a way more negative impact than internal failure since it involves the cost of liabilities, repairs, returns, and warranty work as well as the indirect effect on the business reputation, sales, etc.



## 4. Managing Project Delivery

Successfully delivering a project definitely requires more than luck. We went through how project planning, quality management, and stakeholders engagement are all decisive factors when it comes to pulling off your project. Still, it might seem like a daunting mission to carry out a project from start to finish, especially if it involves a certain level of complexity.

Therefore, following some common management processes, best practices, and techniques can help you deliver your project on time, within budget, and more importantly according to requirements. For instance, no matter how simple a project may seem and regardless of the approach you're adopting, a project should be implemented in stages.

It is highly recommended to subdivide a project into phases in order to have more control over its management and alignment with its predetermined goal and objectives. A **phase** represents a collection of project activities or tasks that have a logical sequence and a common objective. Each phase typically ends at a specific milestone that signifies reaching a predetermined goal or completing a particular deliverable, reflecting and contributing to the overall project progress.

Managing a project through phases has a significant impact on error reduction as it allows you to have a clear overall view of the project work and the activities' interrelationships. Moreover, using multiple phases gives you multiple opportunities to assess your project performance, your team performance, and most importantly your deliverables' conformance with requirements and alignment with the scope, and take corrective or preventive actions in subsequent phases if needed.

Since each phase has a set of appropriate exit criteria, a phase review takes place to determine whether the completed phase met those criteria or not before proceeding with the next one. **Stage gate, phase gate, phase entrance, phase exit, or phase review** is a formal meeting for checking the generated deliverables through the preceding phase. This acts as a quality control checkpoint for evaluating deliverables against performance targets, contractual obligations, and all relevant predefined measures presenting a phase's exit or acceptance criteria.

These meetings are attended by the project sponsor as well as concerned stakeholders and team members in order to get their approval to proceed to the

following project phase. This happens when you prove that your project is on track and that its business case is still valid. A stage gate meeting can either result in allowing work to continue by moving on to the next phase, or deciding to perform certain modifications when deliverables are found to be non-conformant to requirements. However, in some unfortunate cases, decision-makers put an end to the project.

A **kill point** is when a phase review creates an opportunity for the performing organization to terminate a project when it doesn't seem to bring any added value or achieve any of its promised objectives. The committee of experts, senior managers, and stakeholders that attends stage gate meetings to review and evaluate the phase performance, and accordingly, decide whether the project should continue or should be canceled is called the **murder board**.

During a phase review, the project team can use modeling to present an MVP or a prototype constituting the achieved work of the completed phase. **Modeling** involves creating a prototype, storyboard, diagram, etc. as a simplified representation of a particular system, deliverable, or solution. Modeling can be a shortcut to prevent wasting too much time and resources building complex projects based on guesses and abstract concepts; it allows project managers to ensure their deliverables' accuracy in an early stage of the project through identifying implementation gaps, potential miscommunication, and any changing or additional requirements.

A **prototype** is a form of modeling that consists of a primary or partial version of the required product or solution. As a tool or a method, prototyping can help you obtain early feedback on requirements and have a better understanding of client expectations before committing to fully creating the final deliverable. This can also help stakeholders experiment with a model of what the final product would look like or how it would function, allowing them to adapt, confirm, or refuse certain requirements or features.

When enough feedback has been gathered, you can move on to the design or building phase with sufficient comprehension of the customer's requirements. Apart from ensuring deliverables' accuracy and stakeholders' satisfaction, prototypes can also help with risk mitigation and cost reduction. Examples of prototypes include but are not limited to software or application mock-ups, 3D models, small-scale products, simulations, and even brochures.

The **Minimum Viable Product (MVP)** is one of the most commonly used forms of prototypes. An MVP comprises a product's basic functionalities and features and it's often presented to early users with the purpose of soliciting

feedback and validating the project or product's initial idea early in its development lifecycle.

After being delivered to a subset of early adopters, an MVP induces enough feedback to inform ongoing and future improvements. Without significant costs or risks, you can test several hypotheses and collect detailed user information about your customer's wants and needs through the use of an MVP.

Upon delivering the final product, different use cases can be created to test whether the product is Fit for Purpose or not. A **use case** is an artifact for describing and exploring the different ways an end-user can interact with a certain product or system. This artifact identifies how a system, equipment, device, business process, etc. responds to the user requests, either resulting in successful interaction scenarios or failing use scenarios.

A product, service, solution, or process that is **Fit for Purpose** is one that satisfies its initial intended purpose, its users' needs, and its clients' expectations. This quality review takes into consideration a set of defined, agreed upon, and controlled criteria that often test the product's ease of use, completeness, continuity, uniqueness, and even optics to finally decide its fitness for purpose.

A product's Fit For Purpose often gets confused with its Fit for Use. **Fit for Use** refers to a product that is usable and capable of meeting business, technical, or operational goals in its current form or state. That does not mean that the product cannot be subject to further improvements when it's found to be Fit for Use. In fact, frequent evaluations and periodic improvements are required to perfect the generated deliverables.

For this purpose, the PDCA method can help you identify improvement areas and act on them. A **Plan-Do-Check-Act (PDCA)**, aka Deming Cycle, is a planned management cycle for continuously controlling and improving processes as well as products. This four-step tool entails planning for a certain change or improvement, implementing it, checking its impact, and acting according to its results, meaning either continuing or discontinuing the use of that change.

## Practice Test

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### Question 1

A solar-powered car project is almost finished when the project manager receives an approved change request to replace a defective component of the car batteries. What should the project manager do?

- A. Record the problem in the issue log
- B. Meet with the change control board to discuss the matter
- C. Repair the defective component
- D. Replace the defective component

### Question 2

A project manager is wrapping up a one-year project. Which of the following activities should be prioritized?

- A. Updating the change log
- B. Releasing the project resources
- C. Completing the knowledge transfer activities
- D. Celebrating the project completion

### Question 3

A project manager is leading a project using an adaptive approach. During the sprint review, the product owner asks for an acceptance document to sign off in order to demonstrate their approval of the deliverables. What should the project manager do?

- A. Create an acceptance document and share it with the product owner to sign off
- B. Ask the product owner to create a task in the product backlog and prioritize it, so that the development team can create the acceptance document
- C. Ask the product owner to create the acceptance document and sign it off
- D. Inform the product owner that an acceptance document is unnecessary

### Question 4

A project manager closed all contracts related to their construction project, except one that concerns setting up security cameras. The only thing left for this contract is to go through a quick inspection by an expert in order to check out wireless connection, night vision, cloud storage, etc. Knowing that the security cameras are working fine and that the project needs to be closed as soon as possible, what should the project manager do?

- A. Close the contract and the project with no inspection
- B. Close the contract, but keep the project open
- C. Close the project, but keep the contract open
- D. Keep the contract and the project open

**Question 5**

A project manager is leading a team that is not familiar with the adaptive approach. After several weeks, the project has reached a point where there is an accumulation of Work In Progress (WIP). What should the project manager do to figure out whether the team is properly following procedures?

- A. Perform a process evaluation
- B. Review the notes of the previous retrospective meetings
- C. Check the Kanban board
- D. Check relevant Key Performance Indicators (KPIs)

**Question 6**

An organization asked the project manager to send a report on the cost of quality. The report stated that the total cost was \$30,000, detailed as follows:

Item	Training	Rework	Inspection	Scrap	Warranty charges
Cost	\$10,000	\$10,000	\$5,000	\$3,000	\$2,000

According to the above table, how much is the appraisal cost of the project?

- A. \$2,000
- B. \$3,000
- C. \$5,000
- D. \$10,000

**Question 7**

Mid project, a project manager is notified by the information security department that they just came to know about the design changes that were made lately. They also expressed their concern about these changes' compliance with the organization's standards since they did not take part when these changes were made. What should the project manager do to overcome this issue?

- A. Undo all design changes since the information security department wasn't involved in the process
- B. Allow the information security department team to attend all of the following daily stand-ups to ensure all made changes comply with security requirements
- C. Ask the security department to raise the issue to the product owner

- D. Conduct a meeting with the information security department to go over all design changes and ensure their compliance with the organization's standards

### **Question 8**

During the sprint review of the project's last iteration, the product owner expressed their satisfaction with the product and described it as "fit for purpose". However, a senior team member stated that another iteration is needed to fix some bugs and improve the user experience. The sponsor, who is also attending the meeting, said that further work on the product will resume if they get more funding in the next quarter. What should the project manager do next?

- A. Close the project, but keep one developer to fix any major bugs
- B. Keep the project open since work could be resumed in the next quarter
- C. Continue work on fixing bugs to satisfy the client, then close the project
- D. Release all resources

### **Question 9**

The project sponsor informed the project manager that they have doubts about whether the resulting product will satisfy business demands. Therefore, they are looking to keep costs to a minimum. What should the project manager do?

- A. Identify and implement the requirements for making a Minimum Viable Product (MVP)
- B. Gather all requirements and execute the project using an incremental approach
- C. Not involve all stakeholders in scope definition in order to limit requirements
- D. Sign with the sponsor a fixed cost contract in order to limit project costs

### **Question 10**

During project execution, the sponsor informed the project manager that the produced water-proof watches should be tested in real underwater conditions in order to fulfill the acceptance criteria. When the sponsor's advice was applied, 10% of the already produced watches did not pass the test. What should the project manager do next?

- A. Consider this as an internal failure and correct defects without submitting a change request
- B. Consider this as an internal failure and submit a change request to fix the defective products
- C. Consider this as an external failure and correct defects without submitting a change request

- D. Consider this as an external failure and submit a change request to fix the defective products

### **Question 11**

A project manager has made certain that all of the required tasks have been accomplished. However, upon an external post-completion audit, a significant penalty was imposed on the performing organization. What could the project manager have done differently to make sure that no liabilities arose following the audit?

- A. Verify that all of the tasks indicated in the scope statement were completed
- B. Verify that all identified defects were fixed
- C. Ensure that all documents were updated before closing the project
- D. Ensure that all closing formalities were followed as per the defined contractual procedures

### **Question 12**

A construction project manager signed a firm-fixed contract with a supplier to procure various construction materials. On the agreed delivery date, the supplier delivered all materials to the construction site. What should the project manager do next?

- A. Inspect the materials to ensure their compliance with the requirements stipulated in the contract
- B. Start work using the provided materials to avoid having any delays
- C. Start work using part of the materials while inspecting the rest
- D. Pay the supplier and close the contract

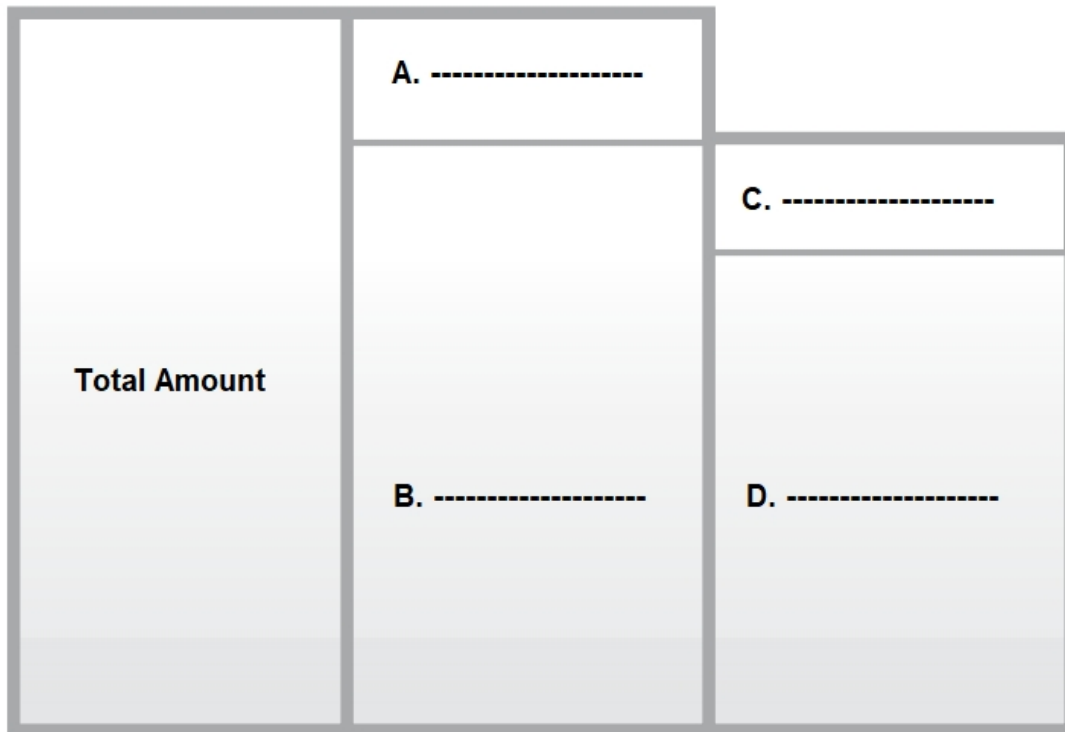
### **Question 13**

A project manager is leading a team of engineers to build a packaging machine. The machine went through exhaustive internal verification. But when the client received it, they gave the project manager a call asking whether the machine meets requirements or not. What should the project manager do next?

- A. Confirm that the product was internally tested and formally close the project
- B. Perform the control quality process and use the contingency reserve to fix any detected issues
- C. Collaborate with the client to get their formal approval that the product complies with the requirements
- D. Send an engineer to the client's site to double-check the product requirements

### **Question 14**

Place the following project budget components in the right position in the figure below: Project budget, cost baseline, contingency reserve, and management reserve.



**Question 15**

When working on a new feature, a team member finds out that the original code does not comply with the organization’s coding standards. What should the team member do in this case?

- A. Ignore the code compliance work as it will be considered as Gold Plating
- B. Ask the Product Owner to get a new item added to the product backlog dedicated to technical debt
- C. Start refactoring the code and update the time estimate of the feature
- D. Discuss with the rest of the team members and add a new technical task to the sprint backlog



## Answers

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### **Question 1 = D**

**Explanation:** Since the project manager has received an approved change request, they should ensure its appropriate implementation. Since the change request specifically entails the replacement of the defective component, the project manager shouldn't repair it instead.

### **Question 2 = C**

**Explanation:** Because projects are temporary endeavors, most of the acquired knowledge is lost once the project is completed. The project manager should be attentive to knowledge documentation and transfer to allow the organization to gain and retain the knowledge and experience obtained through running projects (PMBOK 7th edition, page 78). Once this activity is completed, a celebration could take place and resources can be released. On the other hand, the change log should be updated to monitor the change requests' status.

### **Question 3 = D**

**Explanation:** A sprint review is conducted to demonstrate the accomplished work, solicit feedback, and foster collaboration rather than seeking formal approval through an acceptance document sign-off (Essential Scrum by Rubin, Kenneth S, page 372). Besides, formal approvals are more common in predictive environments.

### **Question 4 = D**

**Explanation:** The project manager should keep both the contract and the project open until the seller performs the inspection. Closing a project entails conducting several processes and steps including closing out all contracts. Closing a contract in return requires verifying that the seller has delivered their work as predetermined in the contract.

### **Question 5 = A**

**Explanation:** Process evaluation involves quality assurance activities and process audits to ensure procedures and processes are being followed and are generating the intended outcomes (PMBOK 7th edition, page 72). Process evaluation can also include reviewing the notes of the previous retrospective meetings as they can reflect the type of issues that were encountered in the past and how they were handled. Therefore, process evaluation involves more than just reviewing the previous retrospective meetings notes. KPIs and the

Kanban board can only determine whether WIP is beyond the acceptable level, without identifying the causes. Finally, process evaluation can take place during a retrospective meeting or a lessons learned session, and it can require further investigation that could go beyond those meetings.

**Question 6 = C**

**Explanation:** Appraisal costs, also known as inspection costs, are part of the Cost of Conformance as they represent the costs of identifying defective products before they are delivered to clients. This comprises testing, inspecting, auditing, evaluating, and measuring the deliverables, product, or service the project is producing. Appraisal costs are set up to implement a series of activities to determine work results' degree of conformance to quality requirements. Meaning the project appraisal cost involves inspection costs which are \$5,000. Training falls under prevention activities. Rework and scrap costs, on the other hand, are part of the Internal Failure Costs, whereas Warranty charges fall under External Failure Costs.

**Question 7 = D**

**Explanation:** The project manager should first try to resolve the issue through collaboration by conducting a meeting with the information security department to go over the design changes and implement the appropriate process to ensure their compliance with security requirements. If certain design changes are found to be critical and unfixable, then those should be reverted. The product owner could be involved in the problem resolution process, but transferring the issue to them wouldn't work since compliance with the organization's standards requires understanding security concerns and setting up the appropriate processes by the project manager and their team. Standup meetings are used for daily work synching between team members, not for examining changes.

**Question 8 = D**

**Explanation:** Since the client requested the project closure, even though they are aware of the bugs and the required improvements, the project manager should proceed with the decision. Properly closing the project entails releasing all resources. Continuing work on bugs after the project closure is inappropriate. Plus, working on bugs to satisfy the client is considered gold plating. A project cannot be kept open until receiving new funding. It should be closed and, when funding is obtained, a new project should be launched in the next quarter to fix bugs and do whatever the customer requires.

**Question 9 = A**

**Explanation:** The Minimum Viable Product (MVP) is used to define the scope of the first release by identifying the requirements that would deliver

value to customers (PMBOK 7th edition, page 243). An incremental approach is not suitable for the described scenario since the client won't get a usable product until the end of the project. It's not appropriate to exclude certain stakeholders in order to limit requirements. The project manager should involve all stakeholders in the process of collecting and prioritizing product features. Finally, a fixed-cost contract will not solve the problem in the described scenario since the main concern of the sponsor is verifying the product's business demand.

**Question 10 = B**

**Explanation:** When the product quality is tested by the project team and it reveals certain defects, the defective products are considered an internal failure. Therefore, all defects must be addressed and fixed internally before delivering the final product to the customer (PMBOK 7th edition, page 184). A change request must be issued in order to make any sort of change on the project whether it's a corrective action, preventive action, or a defect repair.

**Question 11 = D**

**Explanation:** In the project closing phase, the project team including the project manager, should implement the associated processes to formally complete or close a project (PMBOK 7th edition, page 171). It's important that the closing process is done formally by following the defined procedures to avoid any future liabilities. Procedures are either established by the organization for internal projects or mutually determined by the customer and the provider in the project contract or master level agreement (PMBOK 7th edition, page 76). Completing project work by accomplishing all tasks in the scope, fixing defects, or updating documents, is not sufficient to avoid penalties. These activities, among others, should be formally approved by the customer first.

**Question 12 = A**

**Explanation:** Before using any of the procured materials, the project manager and the project team have to conduct an inspection to ensure their compliance with the specifications and standards stipulated in the contract. If the materials pass the inspection, then the supplier should be paid and the contract should be closed.

**Question 13 = C**

**Explanation:** At this stage, the main objective of the validate scope process is to work with stakeholders to get their formal approval of the project scope and deliverables. Confirming that the product has been internally tested on your part is not sufficient since the client should validate that the product does meet their requirements. Scope and quality control are supposed to be

performed before the product is shipped. In this situation, the client just asked whether the product met requirements or not and didn't report any problems. Thus, the proper next step is to go over all of the product specifications with the client to formally validate them before closing the project.

**Question 14**

**Explanation:** The project total amount is composed of the management reserve and the project budget, which in turn is composed of the cost baseline and contingency reserve (PMBOK 7th edition, page 63). Therefore, A = Management reserve, B = Project budget, C = Contingency reserve, and D = Cost baseline.

**Question 15 = B**

**Explanation:** The team member should discuss the matter with the Product owner and get technical debt added to the product backlog as an item. Not doing anything is considered as low ownership, while doing the changes right away, by including them in the sprint backlog, will compromise the current iteration since the work is not planned beforehand. Gold plating consists in implementing "nice to have" features or functionalities that were not requested by the customer. In this case, code compliance is considered a technical debt that should be addressed in order to avoid bigger future quality issues. Communicating the issue to the product owner so that it can be prioritized, rather than doing it right away prevents it from being classified as gold plating or scope creep.

# **CHAPTER 8**

## Assessing Project Performance

# 1. Taking Performance Measurements

Determining whether your project is successful or not can prove to be a bit challenging since involved parties can view success differently. Therefore, a clear selection, definition, and documentation of measurable objectives are critical. Project performance measurements often evaluate basic aspects such as budget, schedule, and quality against predefined estimates and criteria.

Any other elements you choose to measure should reflect the unique needs of your organization and the nature of your project. You should also take into consideration what matters to you, your team, and your stakeholders in order to get the needed data for creating a clear vision of your project status. Since data is what drives many decisions, effective evaluations largely depend on having the right data, hence using the right project management metrics and Key Performance Indicators (KPIs).

A **metric** is a direct or indirect measurement of a project or product attribute to show its performance in realizing a certain benefit. Metrics are considered to be the linkage between planning, delivering, and measuring a project's work. For instance, product metrics are related to the developed deliverables. Budget and schedule metrics, on the other hand, are usually associated with prior estimations.

To put it more clearly, performance measurement evaluates the degree to which the delivered work is meeting the metrics identified in the planning phase. These metrics often fall under business value, baseline performance, delivery, resources, stakeholders satisfaction, or forecast categories.

It's important to measure "just enough" KPIs to avoid being overwhelmed with different measurements and losing sight of what really matters. This entails identifying and getting rid of vanity metrics. A **vanity metric** is a measure that shows certain results that reflect no real value or performance insights nor does it provide any useful information to help you evaluate important aspects and make educated decisions.

In order to identify vanity metrics and only be guided by proper KPIs that actually relate to your project goals, you must select **SMART** KPIs. SMART is an acronym that stands for Specific, Meaningful, Achievable, Relevant, and Timely. These terms can have other alternatives, such as Strategic, Measurable, Agreed to, Reasonable, and Time-bound.

Establishing a metric can often involve setting a threshold. A **threshold** is a predetermined value representing an acceptable limit, that when reached, requires taking certain actions. This value can be an upper or lower limit depending on the context it is used in or the purpose it is used for.

The raw data that you collect concerning your project activities' status, incurred costs, actual durations, and any measurable aspects is called **work performance data**. This data helps you examine your work performance and determine whether it's going according to expectations, trending positively, or going off track. Examples of work performance data include your team's velocity, number of change requests, number of defects, etc.

Work performance data in their raw, pre-analysis state are useless. In order to make use of these collected measurements, you must analyze and process them to get your **work performance information**. This information is what allows you to make informed project decisions such as taking preventive or corrective actions, crashing or fast-tracking the schedule, submitting change requests, etc.

Certain data are easy to interpret. For instance, if your team's velocity is 40 points and they only achieved 20 points in the last sprint, then it's obvious that there is something wrong that requires further investigation. However, in most cases, data interpretation necessitates the use of data representation tools, such as Histogram, Pareto chart, Run chart, Control chart, Scatter diagram, and Bubble chart.

A **histogram** is a vertical bar chart graphically representing a variable's frequency of occurrence. Histograms can be used to display the frequency of occurrence of errors or issues in a project, for instance. In such a case, if defects are ranked in descending order, the histogram is then considered a **Pareto chart**. Being able to visually view defects' frequency of occurrence, the project team can easily single out and address the biggest issues first. Pareto charts follow Pareto's Law, aka Pareto's Principle, stating that the majority of defects are the result of a limited number of causes, which is typically referred to as the "80/20 rule" or "80/20 principle".

On the other hand, when you need to track trends over a period of time, you can resort to run charts and control charts instead. A **run chart** is a line graph of data plotted over time. You can use this type of chart to identify trends and predict your project's future performance. However, since run charts don't comprise control limits, they can't be used for predicting a process' stability. For this purpose, control charts are your go-to for detecting any deviations.

A **control chart** is a more advanced version of a run chart. In addition to plotting one line of data, it exhibits lower and upper control limits. This enables you to detect values that are out of the control limits, investigate the causes, and eventually take corrective actions. A control chart can also reveal a second pattern known as **the rule of seven**. This pattern implies that if seven or more consecutive measurements fall on one side of the mean then there's an assignable cause that needs inspection.

Run charts and control charts are used to track one particular variable. So, when a correlation between two or more variables is needed, you can turn to scatter diagrams or bubble charts. A **Scatter Diagram** shows the relationship between two variables, which can help you determine whether one variable affects the other. Two variables can either have a positive or a negative correlation, or no correlation at all:

- 1) A positive correlation is when one variable's increase leads to increasing the other variable too.
- 2) A negative correlation is when one variable's increase leads to decreasing the other variable.
- 3) No correlation, aka Zero Degree Correlation, is when data points are so randomly scattered that it's impossible to draw a line across them.

Likewise, a **bubble chart** is a variation of scatter charts in which data points are replaced with bubbles. The larger the bubble the more significant is the parameter's value. For example, a bubble chart can be used to simultaneously display risk probability, impact, and category.

On top of helping with decision-making, charts can also play a role in your communication with project stakeholders. In many cases, performance measurements must be gathered into **work performance reports**, such as status reports, memos, or dashboards, and conveyed to stakeholders. Status and progress reports can include trend lines and forecasts, burndown charts, defect and risk summaries, as well as information about earned value which we will examine in the following section.



## 2. Earned Value measurements

In a predictive environment, projects go through meticulous planning to define the scope, schedule, and cost beforehand. The final and approved estimation of each of these three elements is known as a **baseline**; scope baseline, schedule baseline, and cost baseline.

A baseline is used as a reference to monitor project progress and compare its actual performance to its planned performance. This process of performance measurement is called **Earned Value Management (EVM)** and it's aimed to predict and identify variances. EVM comprises a number of formulas that play a role in monitoring the performance of predictive projects. These formulas involve three key values: Earned Value, Planned Value, and Actual Cost.

**Earned Value (EV)** is an indication of the project status as it measures the budgeted value of work realized to date, helping you figure out whether your project is on track, behind or ahead of schedule, and over or under budget. For example, if a project has a budget of \$50,000 and the work completed to date represents 10% of the entire project work, then the EV is \$5,000.

Earned Value = % of completed work X BAC (Budget at Completion).

However, the amount of money that has been actually spent to date is called **Actual Cost (AC)**. Calculating the AC is so simple that it doesn't require any special formula. For example, if a project has a budget of \$50,000 and \$10,000 has been spent on the project to date, then the AC is \$10,000.

**Planned Value (PV)**, on the other hand, is the authorized budget for accomplishing the planned work. For example, if a project has a budget of \$50,000 and after two months, 50% of the project work is supposed to be done, then the PV at the end of the second month is \$25,000. The planned value of the entire project equals the **Budget at Completion (BAC)** which represents the sum of all budgets estimated for the work to be performed.

When the initial estimate to complete the project, i.e., BAC, is no longer valid, you need a new estimate based on the current status of the project. This new estimate is known as **Estimate at Completion (EAC)**. There are multiple approaches to calculating the EAC. One of these approaches is based on Earned Value and Actual Cost. If a project has a budget of \$50,000, for instance, an Actual Cost of \$30,000, and work progress of 50%, then the EAC is \$55,000.  $EAC = AC + (BAC - EV)$ .

In the above example, the **Estimate to Complete (ETC)** is \$25,000, constituting the expected cost needed to complete the remaining work of the project. To find out the ETC, you just have to subtract the AC from the EAC:  $ETC = EAC - AC$ .

When you find out that your project's EAC is not identical to its BAC, you are then facing a **Variance at Completion (VAC)**. By definition, a variance is the difference between what was estimated and what is occurring. To calculate the VAC, you just have to subtract the EAC from the BAC:  $VAC = BAC - EAC$ . Continuing with our previous example where the BAC is \$50,000 and the EAC is \$55,000, meaning the VAC is -\$5,000. A negative variance means an unfavorable situation as a result of actual costs being higher than budgeted costs.

Variance analysis also covers Cost Variance and Schedule Variance. **Cost Variance (CV)** is the difference between the budgeted cost of the completed work (EV) and its actual cost ( $EV - AC$ ). For example, if a project has a budget of \$50,000, an actual cost of \$30,000, and work progress of 50%, then the EV is \$25,000 and the CV is -\$5,000. A negative cost variance indicates that the project is over budget.

The **Schedule Variance (SV)**, on the other hand, is the difference between the budgeted cost of the performed work (EV) and the planned cost of the scheduled work, i.e., planned value:  $SV = EV - PV$ . Let's say a project has a budget of \$50,000, an Earned Value of \$25,000, and work progress of 50%, but the project team estimated in the project planning that at this point of time, the project would achieve a 60% work progress, then the PV is \$30,000 (60% x \$50k) and the SV is -\$5,000. The project is behind schedule since the Schedule Variance is negative.

In addition to variances, project performance could be measured through indexes. The **Cost Performance Index (CPI)** determines how the project is performing budget-wise. The equation for calculating the Cost Performance Index is  $CPI = EV / AC$ . A project with a budget of \$50,000, an actual cost of \$30,000, an EV of \$25,000, for example, has a 0.83 CPI (\$25k / 30k). Since the CPI is less than 1, then the project is over budget.

On another note, calculating the **Schedule Performance Index (SPI)** helps you find out how your project is performing schedule-wise. The equation for the Schedule Performance Index is as follows:  $SPI = EV / PV$ . For instance, a project that has a budget of \$50,000, a planned value of \$30,000, an EV of \$25,000, has an SPI of 0.83 (\$25k / 30k). An SPI that is less than 1 indicates that the project is behind schedule.

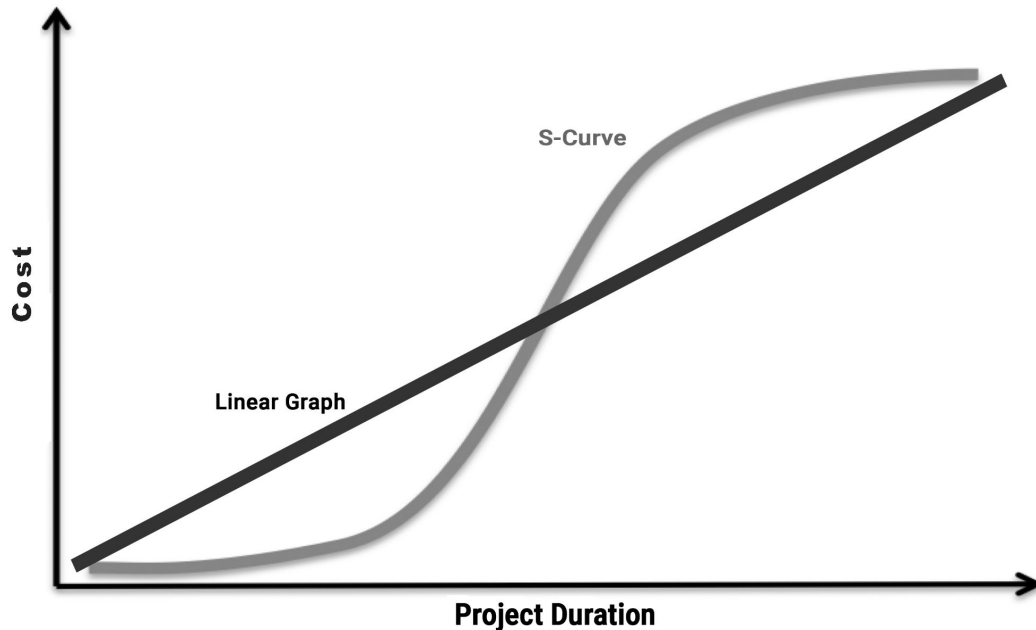
As a project manager, you should keep in mind that performance monitoring is not limited to calculating the EV, AC, PV, EAC, ETC, variances, and indexes; you should consistently report these metrics to relevant stakeholders to provide visibility into project progress, and most importantly to identify and present the required preventive or corrective actions when the project is likely to deviate from its planned cost or schedule.

### 3. Measuring Project Performance in Agile

Agile performance metrics have one main distinction from predictive performance metrics: while traditional measurements mostly focus on predictions and outputs, Agile measurements focus on outcomes. Agile KPIs allow you to make data-driven decisions based on a realistic overview of your project progress, known as **empirical measurements**, which ensures higher customer satisfaction and optimized productivity.

Unlike predictive projects, Agile is characterized by a variable scope and fixed cost and schedule. Based on the project's allocated budget, the cost of each iteration can be pre-determined, hence the number of iterations can be also known beforehand. For example, if a project has a budget of \$50,000 and the cost of a two-weeks iteration is \$10,000, then the project will run for 5 iterations or 10 weeks. Therefore, if the agile project doesn't require many procurements, project expenses can be demonstrated with an increasing **linear graph**. Referring to the above example, after each iteration, project costs increase by \$10,000 at the end of each iteration until the whole budget is consumed and costs reach \$50,000 by the end of the project.

In contrast, the cost evolution of a predictive project over its life cycle usually follows the form of an **S-curve**. At the very beginning, the project team is just starting to engage in the execution phase, keeping costs to a minimum. Therefore, the curve takes its S shape when expenses accelerate rapidly during the mature phase of the project and keep a steady rate towards the end.



To evaluate the project's overall progress, you can rely on the **Cumulative Flow Diagram (CFD)**. This analytical chart provides a global visualization of backlog features, realized features over a given period of time, and features in the development phase. A CFD diagram can also include features going through quality assurance or testing and even features in an intermediate state, which were designed but not yet developed, for instance.

The cumulative flow diagram is an advanced version of the feature chart. The latter displays completed features using a burnup chart or remaining features using a burndown chart. Whereas, the cumulative flow diagram puts emphasis on three key metrics: Throughput, Work in progress, and Cycle time, providing you with quantitative and qualitative insight into your workflow to help you identify improvement areas.

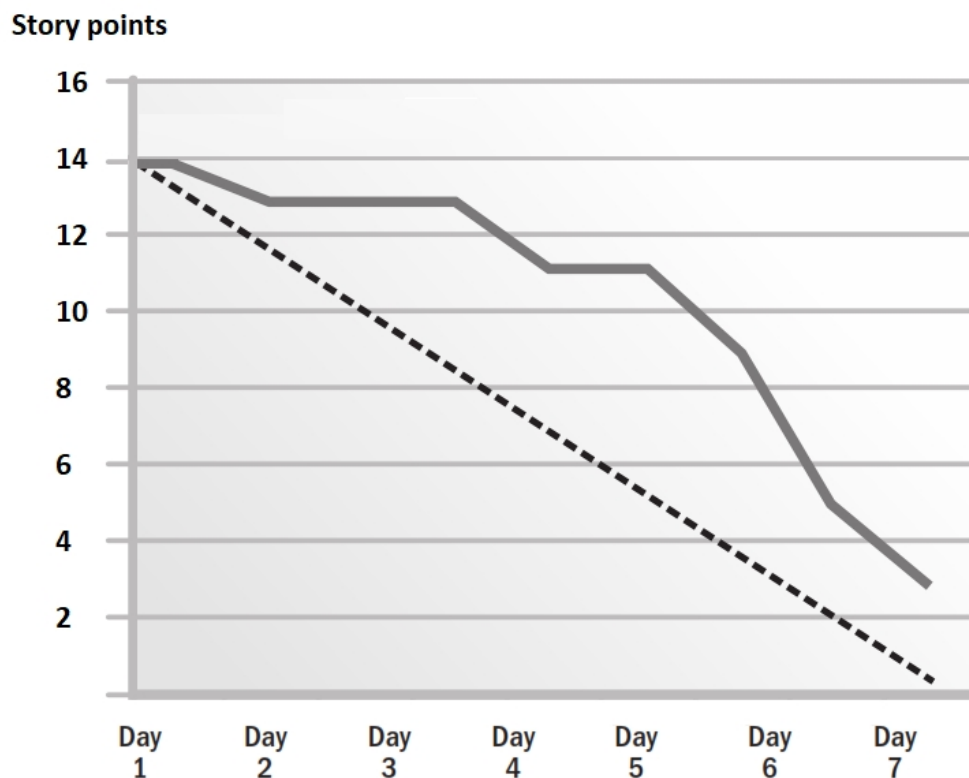
Throughput represents the number of items passing through a production process. A **throughput chart** shows accepted deliverables over a given period of time either in the form of a scatter diagram or a bar chart. The latter displays the delivered tasks by the project team in a specific time frame (month, week, or day) in which the horizontal axis represents the timeline, while the vertical axis shows the team's throughput.

This allows you to grasp your team's productivity by conducting a **throughput analysis** to assess the number of completed items in a fixed time frame. Using this analytical method, you can evaluate other metrics in relation to your team's performance such as velocity, completed features vs. remaining

features, etc. which allows you to gauge your project progress and even estimate likely completion dates.

You can conduct more in-depth measurements such as ideal hours, lead time, cycle time, etc in order to assess your project performance. **Lead time** represents the duration of a task from its creation to completion. **Cycle time**, on the other hand, represents the duration it takes the team to finish a user story from the time they start working on it to the time they deliver it to the end-user. A cycle time chart can be created to show the average cycle time of the completed work items over a specific time period. For example, the product owner adds a user story to the kanban board. After one week, the development team starts working on it, and takes one week to deliver it. In this case, the user story's lead time is two weeks while its cycle time is only one week.

The burnup or burn-down chart is another important metric used by the agile team throughout the iteration to identify the amount of workload, i.e., story points, achieved or figure out how many items remain to complete. A **Burn-down chart** demonstrates the remaining work the project team has to complete, illustrated with a line that goes downwards, as the name suggests. A **burn-up chart**, on the other hand, displays the amount of work completed, represented with a line going upward.



## Burndown Chart

Along with cost and schedule KPIs, you should track your project's quality metrics. For that, you can perform a **regression analysis** to verify that recent deliverables don't have a negative impact on the existing features of the product. If a lot of regressions are found, you should reinforce the quality or testing processes of your project.

**Escaped defects** is a quality metric that reveals the number of defects per unit of time, per sprint, or release, that the agile team missed or did not find, and which happen to be detected by end-users after the product release. Escaped defects can be quite costly to correct. Therefore, the cross-functional team should strive to see this metric decrease by defining the root cause of escaped defects to prevent their recurrence.

## 4. Assessing Project Business Goals

To make sure your project is aligned with its business case, you should examine whether it's delivering value by using both financial and non-financial metrics. Business goals measurement often addresses the project's revenue, profitability, customer satisfaction, etc. Financial measurements, for instance, include Cost-Benefit Ratio (BCR), Return on investment (ROI), Net present value (NPV), and payback period.

The **Cost-Benefit Ratio (BCR)** shows the relationship between a project's costs and benefits to determine whether it's delivering a positive net present value in comparison to the initially invested cost, meaning if its benefits outweigh its costs. If the BCR is greater than 1 then benefits are greater than costs and the project is expected to deliver a positive net present value to the organization.

A **Net present value (NPV)** helps you determine whether a project's anticipated financial gains will outbalance its present-day investment. As money loses its value over time due to inflation, NPV tries to answer the question "Taking into consideration the annual discount rate, how much money will I make if I proceed with this investment?". A positive NPV indicates that a project will be profitable, whereas a negative NPV indicates an anticipated financial loss, meaning the project might not be even considered in the first place. NPV is calculated using the following equation:  $NPV = FV \div (1 + r)^n - INVESTMENT$  where FV = Future Value, r = Rate of Interest, n = number of time periods

For example, an investment of \$100,000 that has a yearly cash flow of \$60,000 will not generate \$20,000 revenue after two years as you might think. If the rate of interest is 10%, then the  $NPV = \$60,000 / (1 + 0.1) + \$60,000 / (1 + 0.1)^2 - \$100,000 = \$54,545 + \$49,586 - \$100,000 = \$4,131$ . Even though the NPV is positive, which means that this investment is profitable, it's not considered an attractive investment opportunity since the profit is fairly low when you consider the interest rate.

The **Internal Rate of Return (IRR)** is another benefit measurement method that is closely related to the NPV. Simply put, the IRR of an investment is the discount rate that would cause that investment to have an NPV of zero. IRR tries to answer the question "If I proceed with this investment, how much would be the annual rate of return that I would receive?". When comparing different potential projects, the one with the highest IRR is often the best choice.



The **payback period**, on the other hand, is a simpler alternative to NPV. The payback method calculates the required period of time (months or years) to earn back your investment. In other words, how long it will take for your project revenues to break even with its total investment. After recovering its investment, meaning after the payback period is over, a project starts generating profits. The payback method does not take into account the time value of money. For this reason, payback periods that are calculated for long investments have a bigger risk of being inaccurate.

Alternatively, you can measure your project's **Return On Investment (ROI)**, also known as Return on the invested capital, in order to figure out how much financial return your project will generate compared to its cost. ROI is calculated using the following formula:  $\text{Net Profit} / \text{Total Investment} * 100$ .

Let's say you're purchasing a house for \$200,000 and spending \$20,000 on renovations, to eventually sell it for \$250,000. In this scenario, you invested a total amount of \$220,000 (\$200,000 + \$20,000), your net profit is \$30,000 (\$250,000 – \$220,000), and your ROI is 13% ( $\$30,000 / \$220,000 * 100$ ).

In case you lose money in an investment, the ROI formula results in a negative value. Here's a simple example, let's say you lost \$10,000 after investing \$50,000:  $\text{ROI} = -\$10,000 / \$50,000 * 100 = -20\%$ .

Apart from the above metrics, you can opt for non-financial measurements to assess your project's business goals. These include schedule, effectiveness, and market metrics. **Time to Market (TTM)**, for example, represents the required time to create a product from the idea stage until its release. In other words, TTM is the time duration it takes the project team to launch the final product to the market for sale.

Measuring customer satisfaction is also a crucial part of evaluating the project's business goals. You can do this through the use of a Mood Chart or Net Promoter Score. **Mood charts**, track the daily mood of your project stakeholders, using emojis, colors, or numbers to express how they're feeling. This method can help you anticipate and identify issues and areas of improvement when it comes to customer satisfaction.

**Net Promoter Score**, on the other hand, allows stakeholders to assign a numerical score that ranges from -100 to +100 to indicate their satisfaction level with your project, product, or service, as well as their willingness to recommend it to others. High promoter scores reflect high customer satisfaction and loyalty levels.

## Practice Test

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### Question 1

A project manager is examining the investment efficiency of two potential projects. Knowing that the discount rate is unknown, what should the project manager do?

- A. Select the project with the highest ROI
- B. Select the project with the lowest ROI
- C. Select the project with the highest NPV
- D. Select the project with the lowest NPV

### Question 2

A project manager is leading an agile project using a virtual team. Their daily 15-minute standup is at 9 am. In the last meeting, the project manager noted a 5-minute delay. Then, the team spent another 5 minutes chit-chatting before they actually started the meeting. At the end of the standup, an additional 5 minutes were spent brainstorming an issue that had surfaced the day before. What is the total cycle time of this event?

- A. 10 minutes
- B. 15 minutes
- C. 25 minutes
- D. 30 minutes

### Question 3

After facing multiple quality issues, the project manager decided to identify top priority defects by applying the 80/20 rule (aka the Pareto Chart). What should the project manager do next?

- A. Find out the impact of each quality issue
- B. Find out the frequency of each quality issue
- C. Find out the urgency of each quality issue
- D. Find out the cause of each quality issue

### Question 4

An organization in need of accounting software conducts a make or buy analysis. The organization decides to go for in-house development since the analysis shows a payback period of fewer than 3 years. However, when acquiring resources, the project manager finds out that the developer's rate included in the make or buy analysis is only half the current rate in the market. What should the project manager do first?

- A. Submit a change request

- B. Inform the sponsor about their findings
- C. Nothing; as long as the project's SPI and CPI are on track, this shouldn't be a problem
- D. Update the make or buy analysis report

#### **Question 5**

Two agile teams are working on developing the same product. Team A is made of 5 members and uses 2-week sprints, while Team B involves 4 members and uses 3-week sprints. Team A completed all sprint backlog items with a velocity of 50 story points. Team B, on the other hand, reached 70 story points, without completing all of the sprint backlog. Which team has better performance?

- A. Team A, since they completed all sprint backlog items
- B. Team A, taking into consideration their velocity, they can achieve 75 story points in a 3-week sprint, which is better than what team B achieved
- C. Team B, since they have a better velocity
- D. Team B, since they achieved more story points with fewer team members

#### **Question 6**

During a project status meeting, the project manager updated the sponsor on the project performance by informing them that the SPI is 0.75 and the CPI is 1.05. What does this indicate?

- A. The project is over budget but on schedule
- B. The project is within budget but behind schedule
- C. The project is on schedule and within budget
- D. The project is behind schedule and over budget

#### **Question 7**

An organization assigned a new project manager to replace the one who recently left. What should the new project manager do first?

- A. Consult the issues log and the lessons learned register to check if there is any serious problem
- B. Consult the project charter to understand the project goals and its business case
- C. Consult the project management plan to learn about the project baselines
- D. Consult the stakeholders register to start interacting with the different parties involved in the project

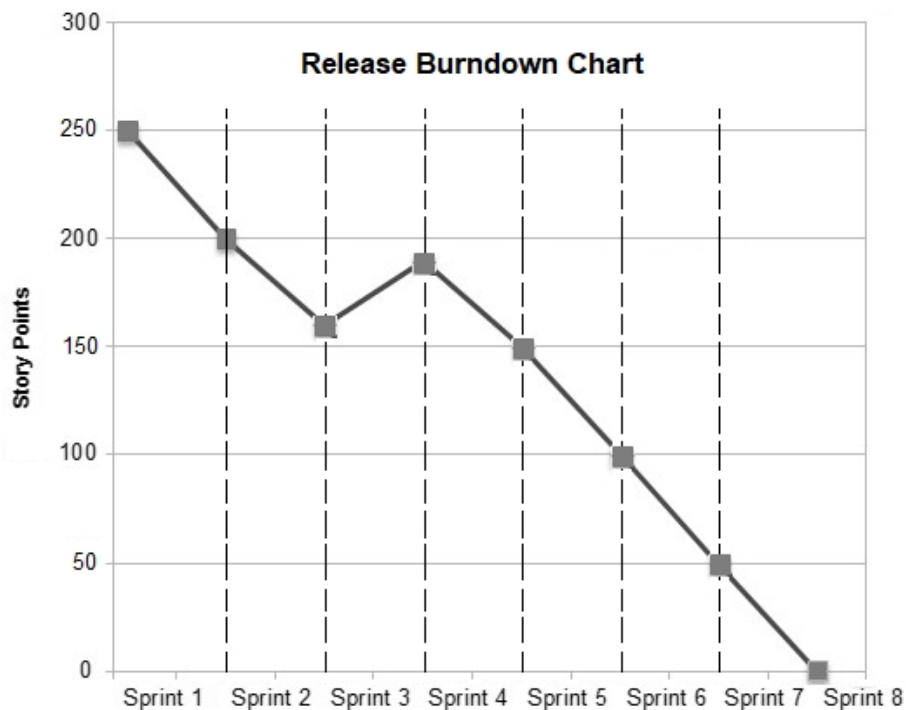
#### **Question 8**

A product owner creates a release plan based on an estimated team velocity of 50 story points. However, in the first two sprints, the team achieved 37 and then 35 story points. What can the agile project manager do in this case? (Select two)

- A. Inform the product owner that, based on available empirical data, the release plan could not be achieved
- B. Use their leadership skills to motivate their team to reach the estimated velocity
- C. Extend the duration of the sprint until completing 50 story points
- D. Study with the product owner the possibility of adding more resources to the team

### Question 9

After completing a release, the Scrum team is examining its burndown chart. Even though there were no changes in estimates, the chart shows an increase in story point value during the 3rd sprint. How can this be explained?



- A. The team's velocity decreased
- B. The team's velocity increased
- C. Work was added to the Product Backlog
- D. Work was removed from the Product Backlog

### Question 10

A project manager is carrying out a project using the agile approach with two-week sprints. One week into the current sprint, the team hasn't completed any of the sprint backlog items, making it impossible to achieve the sprint goal. What should the project manager do?

- A. Cancel the sprint, hold an early retrospective meeting, and start over with a new energy
- B. Discuss with the self-organizing team the root cause of their poor performance, during the standup meeting
- C. Discuss with the product owner the possibility of updating the sprint goal to make it more achievable
- D. Complete the sprint even though it will not achieve its goal, and help the team overcome the encountered problems

### Question 11

A project manager is leading a one-year Agile project. After a couple of months, the sponsor wanted to learn about the big picture of the project progress, more specifically the implemented vs. pending features. Which of the following tools will provide this information? (Select two)

- A. Cumulative flow diagram
- B. Iteration burn-down chart
- C. Feature chart
- D. Kanban board

### Question 12

Even though two user stories were estimated consecutively at 2 and 3 story points, their implementation took two days each. By how many story points do these two user stories contribute to the team velocity when calculated at the end of the iteration?

- A. 2 story points
- B. 3 story points
- C. 4 story points
- D. 5 story points

### Question 13

A project manager is managing a project that consists in implementing an accounting application for a pet store. During a project performance review meeting, they presented the following figures:

AC = \$4,000, PV = \$5,000, and EV = \$5,500. What does that indicate about the project?

- A. Since both the CV and SV are positive, the project is under budget and ahead of schedule
- B. These numbers are insufficient to calculate the project SPI and CPI

- C. Since the CV is negative, the project manager has probably spent more than they initially planned to
- D. Since the SV is negative, the project is behind schedule

**Question 14**

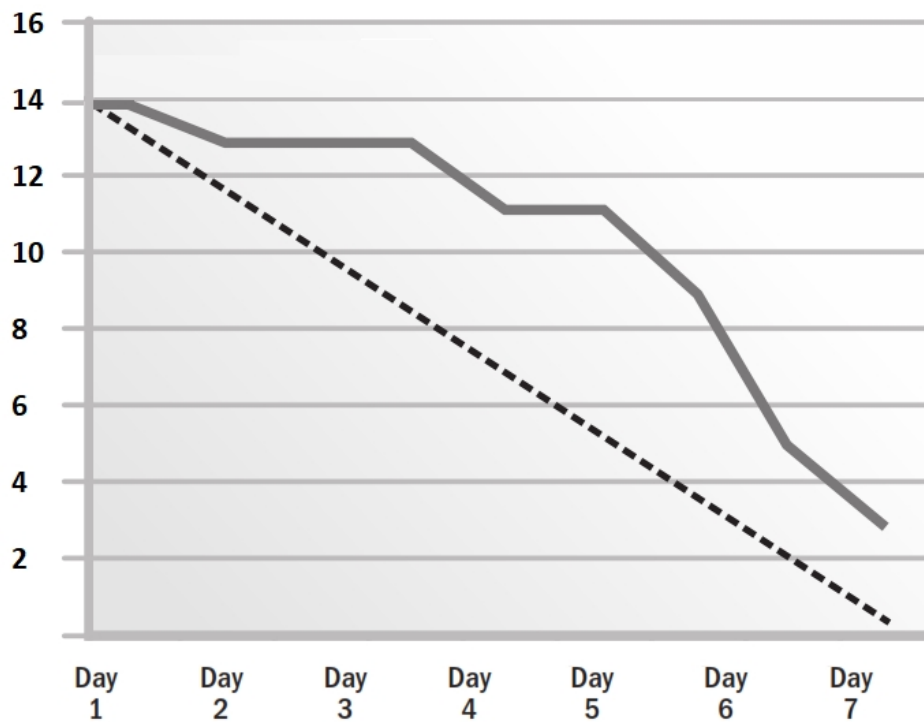
An organization is deliberating over two potential projects that have exactly the same payback period. After doing a benefit measurement analysis, the project manager finds out that project A has a lower Internal Rate of Return (IRR) than project B. What project should the organization choose?

- A. Project A
- B. Project B
- C. There is no difference
- D. The available information is not enough to make a decision

**Question 15**

Which statement is true about the following chart?

Story points



- A. The figure represents a burnup chart of the remaining story points
- B. Throughout the iteration, the completed story points are always more than projected
- C. The team planned 14 story points for the iteration which they completed
- D. 3 story points are unfinished at the end of the iteration

## Answers

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### Question 1 = A

**Explanation:** Calculating a project's Net Present Value (NPV) requires knowing its discount rate (i):

Net Present Value (NPV) = Future payment (F) / [ (1 + Discount rate (i) ) ^ number of periods in the future the cash flow is (n) ] . Since this is not an option in the described scenario, the project manager should rely on the Return On Investment (ROI) and pick the project with the highest value.

### Question 2 = D

**Explanation:** Cycle time is the total elapsed time it takes one unit to get through a process (PMBOK 7th edition, page 58). The cycle time of the standup event in the described scenario is 30 minutes (5 minutes delay + 5 minutes chatting + 15 minutes standup meeting + 5 minutes problem solving).

### Question 3 = B

**Explanation:** A Pareto diagram is a histogram that ranks issues from the ones with the highest frequency to the ones with the lowest frequency. The diagram is created according to Pareto's Law, which states that 80 percent of the problems come from 20 percent of the issues (also known as the 80/20 rule).

### Question 4 = B

**Explanation:** The project manager should notify the sponsor of any identified risks that may impact the business value of the project. Business value measurements are used to ensure that the project deliverables remain consistent with the business case and benefits realization plans. Business value can be financial or non-financial (PMBOK 7th edition, page 102). A make or buy analysis is considered a tool for measuring financial business value. The sponsor can determine whether to continue the investment or not if the payback period turns out to be more than 3 years after updating the make or buy analysis. The project manager should not update the make or buy analysis report without consulting or referring to the sponsor first. If the project is following a predictive approach, it can show assuring SPI and CPI, especially at the beginning of its execution. However, since the developer's rate was underestimated, the project will get off-track in terms of cost later on. If the sponsor agrees to carry on the project and increase its budget according to the new findings, then a change request should be issued. However, when following an adaptive approach, no change requests, SPI, or CPI are used. In

this case, the project manager should inform the sponsor or the product owner about their findings and discuss whether it's still possible to achieve the project goals or not.

**Question 5 = A**

**Explanation:** The team that has better performance is the team that fulfills its sprint engagement by completing all of its backlog items. This means that the performance of team A was better than the performance of team B. Velocity should not be used to compare teams' performance. Likewise, the number of completed user stories per sprint and team size can not indicate whether a team's performance is good or not.

**Question 6 = B**

**Explanation:** A Schedule Performance Index (SPI) less than 1 indicates that the project is behind schedule. A Cost Performance Index (CPI) greater than 1 means that the project is within the predetermined budget.

**Question 7 = B**

**Explanation:** First and foremost, the project manager has to understand why the project is being created in the first place; aka its business case. Moreover, the project manager should be aware of the project's predefined goals. These two elements along with the main deliverables are all defined in the project charter.

**Question 8 = A, D**

**Explanation:** Scrum uses empirical data to measure work progress, therefore the project manager should let the product owner know that, based on current performance, the release plan is not feasible. The product manager can update the release plan or study with the project manager the possibility of adding more resources to the team. The capacity of the team is around 36 story points, and it wouldn't be possible to motivate the team to consistently reach 50 points on each sprint. Besides, a sprint has a timeboxed duration which should not be extended for any reason.

**Question 9 = C**

**Explanation:** When work related to a release is added to the Product Backlog, the release story points naturally increase. If work was not added to the product backlog, the team should have expected the total of story points to decrease according to their velocity on sprint 3. This is independent of whether their velocity increased or decreased compared to the anterior sprints.

**Question 10 = D**



**Explanation:** Being unable to achieve the sprint goal is not a reason to cancel it and start it over. Stand-up meetings are not a suitable framework for addressing and identifying the root cause of any occurring problem. The sprint goal is a brief explanation of what the team plans to achieve during the sprint, therefore updating it has no impact on the sprint workload and on whether the team will be able to complete it or not.

**Question 11 = A, C**

**Explanation:** The cumulative flow diagram and the feature chart both provide a complete picture of the progress of a release or a project. The iteration burn-down chart, as the name suggests, only concerns a specific iteration, whereas a Kanban board exhibits the status of the undertaken features at a given point in time.

**Question 12 = D**

**Explanation:** Since velocity in the described scenario is calculated based on story points, then the two user stories should count for 5 story points. If the team velocity were based on actual days, the two user stories would represent 4 actual days in the team's total velocity.

**Question 13 = A**

**Explanation:** Since  $SV = EV - PV$  and  $CV = EV - AC$  then  $SV = \$5,500 - \$5,000 = \$500$  and  $CV = \$5,500 - \$4,000 = \$1,500$ .

The Cost Variance (CV) is positive, which means that the project is under budget, and since the Schedule Variance (SV) is positive too, that means the project is also ahead of schedule.

**Question 14 = B**

**Explanation:** The Internal Rate of Return is the annual rate of growth a project is expected to generate. The higher the IRR, the more desirable an investment is. Project B has a higher IRR, thus it will obviously be selected over Project A.

**Question 15 = D**

**Explanation:** At the end of the seven-day iteration, 3 story points are left undone. The team planned 14 story points, but they were only able to finish 11. The figure represents a burndown chart and not a burnup chart. When the actual progress line of the chart is above the projected progress, it indicates that the team is finishing fewer story points than what they initially committed to.

# **CHAPTER 9**

## Uncertainty and Risk

# 1. Types of Risks

In order to mitigate the impact of uncertainty in certain projects, project managers and organizations need to be aware of the different types and severity of the risks they can encounter in each unique project. While some projects are simple and straightforward, others can implicate high Volatility, Uncertainty, Complexity, and Ambiguity, which are typically referred to as **VUCA project environment**.

**Volatility** describes an unstable or unexpected challenge of unknown duration, which is not necessarily difficult to understand. Volatility occurs in environments that witness quick and unexpected changes. For example, projects involving cryptocurrency have a high level of volatility since the value of all cryptocurrencies often experiences major and unpredictable fluctuations.

**Uncertainty**, on the other hand, refers to a lack of definite knowledge and sureness. With uncertainty, the outcome of events, issues, paths to take, or solutions cannot be clearly or accurately guessed or measured. To put it more simply, uncertainty makes it hard to decide what you should do. In such cases, you can rely on more research in order to gather as much information as possible to minimize uncertainty. If that's not an option, you can act based on the probability of potential future outcomes.

Often, lack of knowledge is the result of the high interconnectedness of variables, which is referred to as **complexity**. The degree of complexity depends on the nature and amount of interaction between different elements; the bigger the number of elements and their interactions, the more the environment, project, or system is complex. However, projects' complexity is not only related to systems and the involved technologies, it can also be triggered by human behavior and ambiguity.

The complexity of human behavior can manifest in a sponsor's unrealistic expectations, poor executive sponsorship, hidden agendas, deliberately withholding critical information, stakeholders misunderstanding the project goals, team members disagreeing on the implementation approach, ethical dilemmas such as bribery, abuse of power, extortion, deception, fraud, collusion, embezzlement, cartels, and so on.

While uncertainty is a lack of comprehension, **ambiguity** is considered a lack of clarity; that's the state of not knowing what to expect or how to grasp a certain situation. Ambiguity can emerge when you move into a new or an

immature market, launch products outside of your field of expertise, or initiate a startup business.

In such cases, understanding the causes and effects of the ambiguous situation requires generating hypotheses and testing them, which is typically known as the **Design of Experiment**. In other terms, you design an experiment by adjusting the inputs or preconditions, so that you can identify which variables are influencing the product or system and how.

When it's possible to define a probability distribution of the possible outcomes, the uncertain event becomes a definite **risk**. For example, if you work in an industry where there is a high demand for qualified resources, resource turnover can be considered as a known risk or **known unknown**. It's known because it's identified, and unknown because you don't know if it will actually occur or not, and if it does, when it will occur, and at what rate.

However, when you can't analyze or predict the occurrence of certain risks, then you're dealing with **unknown unknowns**. These are the risks that are impossible to find or identify in advance since they're triggered by unexperienced situations, therefore are not part of the risk management plan.

Risks should not be confused with issues. The key distinction is that an **issue** is a problem that has already taken place while a risk is a potential issue that may or may not occur. Issues include delays, cost overruns, scope creep, technological failures, team conflict, stakeholders' dissatisfaction, etc.

When it happens, a risk can have either a positive or negative impact on the project. A **positive risk** is what is known as an opportunity, while a **negative risk** is a threat.

- 1) An **opportunity** can generate benefits including saved time and cost, better performance, higher productivity, and boosted reputation.
- 2) A **threat**, on the other hand, presents issues like missed deadlines, financial difficulties, performance shortfalls, and a bad reputation.

Realistically, any project is subject to risks. The existing level of risk in the absence of control or interventions is known as an **inherent risk**. In practice, and during the project planning, response plans for particular risks are developed to mitigate them in case they occur. Yet, minor risks, known as **residual risks**, could persist even after implementing the planned risk response.

Let's say that a particular industry has an average annual turnover rate of 30%. A project manager considers this as an inherent risk and sets rewards

and incentives to mitigate it. If after one year the project has a turnover rate of 10%, that's an example of residual risk.

When a risk response is implemented, i.e., a reward strategy, it can trigger the occurrence of other risks. This can include the risk of team members perceiving rewards as unfair or not understanding the reward performance requirements. This type of risk is called **secondary risk** since it arises as a direct outcome of implementing a risk response.

## 2. Analyzing Risks

After being identified, risks must be examined in order to decide whether they require taking proactive actions or not. This decision is mainly based on the sponsor or organization's risk tolerance, also known as **risk appetite**. Risk appetite represents an organization's internal tendency, tolerance, or willingness to deal with different levels of uncertainty in given situations. When an organization has a high risk appetite, it indicates that they are ready to incur risks in exchange for potential rewards or gains.

On the other hand, **risk-averse** organizations are neither supportive nor creative towards risk. Such organizations are very cautious as they try to avoid risks unless the reward is high enough to outweigh their aversion. Sovereign and financial institutions, for instance, are risk-averse as they have a low tolerance for risks.

Analyzing potential risks can be done using certain techniques such as the **What-If-Scenario Analysis**, which is mainly intended to assess different variables or scenarios in order to predict or forecast their outcomes and whether they have a positive and negative impact on the project. As the name implies, this speculation tool is carried out by asking a series of "What if...?" questions to figure out the potential effect of unexpected and adverse situations on project activities, processes, schedule, budget, and overall feasibility. This technique allows the project team to prepare contingency plans to overcome the impacts of certain risks.

In order to determine which risks are likely to have the greatest impact on your project, you can use **sensitivity analysis**. This technique ranks risks according to their importance from most to least impactful. Sensitivity analysis helps you understand the big picture and identify what, out of all threats, could potentially prevent you from achieving the project goals.

On a broader scale, you can study the impact of various risks on the project cost and schedule by performing a **Monte Carlo Analysis**. This technique is applied to predict and prepare for the impact of certain risks on the project timeline and cost through performing a simulation of the different probabilities of the project budget and schedule.

To try and find solutions for the detected potential risks, the **alternative analysis** can be used for studying and comparing the different possible options for responding to a particular risk. This type of analysis renders the decision-

making process easier as it allows you to identify the pros and cons of each alternative and compare them in an objective manner.

Similarly, with multiple alternatives to choose from, you can apply the **decision tree analysis** as a diagramming method that enables you to assess the implications of different choices and select the best course of action among the possible alternatives. By laying out each option's cost and probability, the decision tree assists in determining which decision has the least costs.

After listing all of your project's potential risks, you might need to perform a **qualitative risk analysis** to prioritize these risks based on their likelihood of occurrence and level of impact on the project cost and schedule. The most commonly used qualitative assessment method is the **Probability and Impact Matrix**, also called the risk assessment matrix. This visual tool maps and evaluates risks based on two main aspects: the probability and severity of each risk in case it happens. The Probability and Impact grid allows you to identify and prioritize risks of high probability and impact.

You can further analyze high-impact risks through **quantitative risk analysis** by assigning a numerical estimation of the risk's overall impact on the project. This type of analysis requires calculating the **Expected Monetary Value (EMV)** of the prioritized risks. EMV relies on two factors: the risk's probability of occurrence and the impact of the risk on the project if it does happen. A risk's EVM is calculated by multiplying these two factors:

(EMV= Probability x Impact).

The total EMV of all of the project's potential risks represents the overall **risk exposure**. Calculating a project's risk exposure can help you determine whether the estimated losses can be acceptable or not. Only focusing on individual risks means failing to address your project's overall risk exposure. One way for an organization to manage risks is by setting a **risk threshold** that presents the acceptable limits of its risk tolerance, guiding the organization through the decision-making process of whether to approve or decline potential projects.

### 3. Planning for Risks

When managing an agile project, risk identification and planning can take place in all sorts of planning meetings, including daily stand-ups, iteration planning, and release meetings, as well as iteration review meetings and retrospectives. The cross-functional team analyzes and addresses risks during these meetings since they own risk management, while the agile project manager is responsible for facilitating the process.

In a predictive environment, on the other hand, a thorough plan on how to deal with identified and non-identified risks must be developed in advance. An identified risk could be either a threat or an opportunity, which the project team can decide to actively or passively accept. **Active acceptance** entails creating a response plan that comprises the needed time, money, or resources to deal with the threat or the opportunity if it occurs eg. setting aside a contingency reserve. On the contrary, **passive acceptance**, as the name indicates, implies acknowledging the existence of the risk without planning or taking any action other than periodically examining the threat or the opportunity to make sure that it's not changing considerably.

Other strategies for managing risks include **escalating** the threat or the opportunity to the relevant party when the risk response is found to be out of the project manager's authority or when an opportunity is deemed to be outside the project scope. When escalating a negative or positive risk, the project manager determines who should be notified, meaning who should own the risk. However, risk ownership must be accepted by the relevant party in such a strategy.

Similarly, a threat's ownership can be **transferred** to a third party to deal with its negative impacts when it does occur including bearing any financial losses. A third party can be insurance companies, for instance, when approaching risks caused by theft, lawsuits, fire, floods, etc. However, some risks are uninsurable, therefore cannot be transferred to insurance companies.

A positive risk, on the other hand, can be **shared** when the project manager is unable to realize the opportunity on their own, therefore they either team up with another party to jointly profit from the opportunity, or allocate the opportunity's ownership to a third party that will be able to capture its benefit. This is the most suitable strategy when the project team lacks the needed technical capabilities for exploiting certain opportunities, for example.



Another way of handling risks is by **avoiding** a threat through its elimination in order to avert its potential impact on the project. This often requires making changes to the initial project plan to completely revoke the probability of the risk occurrence, hence its effect if it does arise. When a threat can't be fully avoided or eliminated, you can try to **mitigate** its impact or occurrence probability by taking early proactive measures. For that, you might need to change your project plans in an attempt to minimize the probability and impact of the threat in case it happens. Risk mitigation proves to be more effective than repairing the damage caused by the occurring threat.

For positive risks, an opportunity can be exploited or enhanced. When the project team wants to **exploit** an opportunity, they act to ensure its occurrence by all possible means. This strategy is often adopted when the opportunity is too important to miss. **Enhancing** an opportunity, on the other hand, implies trying to increase the probability of its occurrence. This is often the case when the positive risk isn't that important.

Let's say you're contracted to manage a project, and if you complete it before deadlines, you get a bonus. To exploit this opportunity, you assign extra resources to the project where it'll be operating 24/7. However, if you're only trying to enhance the opportunity's occurrence probability, you would just set a bonus to motivate your team, which may or may not lead to finishing the project earlier. The exploit risk response strategy can be considered as the opposite of avoiding risk, whereas the enhance risk response strategy is the opposite of the mitigation.

As I mentioned earlier in this section when we discussed the active acceptance of risks, planning for identified risks means allocating money in the form of a **contingency reserve**, which is dedicated to implementing a response and addressing risks if they arise. When setting aside a contingency reserve, you can consider creating a **fallback plan** too, as a backup in case the contingency plan fails to effectively fulfill its purpose due to certain factors. The fallback plan often includes alternative actions and measures to reduce the influence of a risk on the project if the main response, aka the contingency plan, fails to do so.

For unidentified risks, the performing organization defines a **management reserve** to use as a budget for unforeseen and unplanned work within the project scope. This type of reserve is not a calculated budget and does not take part in the cost baseline. Therefore, anytime an unknown risk occurs, the project manager needs permission to use this reserve. When an unidentified risk takes place, management reserve is used to implement a **workaround**, which represents an unplanned response to unidentified emerging threats.

Risks are commonly documented in the **risk register**, which acts as a repository that includes individuals responsible for managing the risks, the probability and impact of each risk, planned risk responses, and records of all information concerning the identified risks. An individual who is assigned to manage a certain risk is known as a **risk owner**. This person, who's determined and named in the risk register, is in charge of monitoring risk triggers, reporting changes in the risk status, and implementing the pre-defined measures, hence they're accountable for managing or mitigating the risk.

When dealing with big projects, a thorough and detailed **risk management plan** must be developed. This plan documents potential risks and covers how risk management activities will be structured and conducted. A risk management plan generally includes a Risk Breakdown Structure, Probability Impact Matrix, accuracy estimates, roles and responsibilities (RACI), budgeting and scheduling, and a Risk Register.

Probability and Impact matrix					
Prob. \ Impact	Trivial	Minor	Moderate	Major	Critical
<b>Rare:</b> This will probably never happen	Low	Low	Low	Medium	Medium
<b>Unlikely:</b> Do not expect it to happen	Low	Low	Medium	Medium	Medium
<b>Possible:</b> Might happen	Low	Medium	Medium	Medium	High
<b>Likely:</b> Will probably happen	Medium	Medium	Medium	High	High
<b>Very likely:</b> Will undoubtedly happen	Medium	Medium	High	High	High

Probability Impact Matrix

All of the details explained above concern risk planning, but what about when a risk actually takes place? As I mentioned, risks must be monitored for triggers. When there is a sign that the status of the risk is changing, **preventive actions** must be performed as a response to prevent the occurrence of potential identified risks. For instance, when the project shows signs of deviation from its planned scope, schedule, cost, or quality requirements, preventive measures are taken.

However, when risks arise, **corrective actions** must be implemented. While preventive actions are proactive, corrective actions are reactive, meaning they take place when a threat actually occurs in order to bring the project back on track. Corrective measures should follow the already established risk response plan in order to correct the issue and prevent it from recurring.

Whenever a risk happens, it should be immediately recorded in the **issue log**, Unlike the risk register, this log documents the threats that were not

accounted for during the planning phase. The issue log keeps track of arising problems and assigns accountability to team members responsible for resolving them in order to ensure that everything has been properly rectified. A project's issue logs should include the issue type, its technical description, the person responsible for solving the problem, the date or time of the issue occurrence, its priority and status, and any other information that can help you track these issues.

ID	Description	Reported by	Reported date	Assigned to	Priority	Status	Resolution/Comments
001	Scraping script is not working	Monica	13/07/2021	Sergio	High	Closed	The problem is caused by the last version update. Resolved on 14/07/2021.
002	Search functionality is taking too long	Markus	20/07/2021	Markus	Low	Open	
003	Search error when entering more than 100 characters	Markus	25/07/2021	Sergio	Medium	Open	

Issue Log Sample

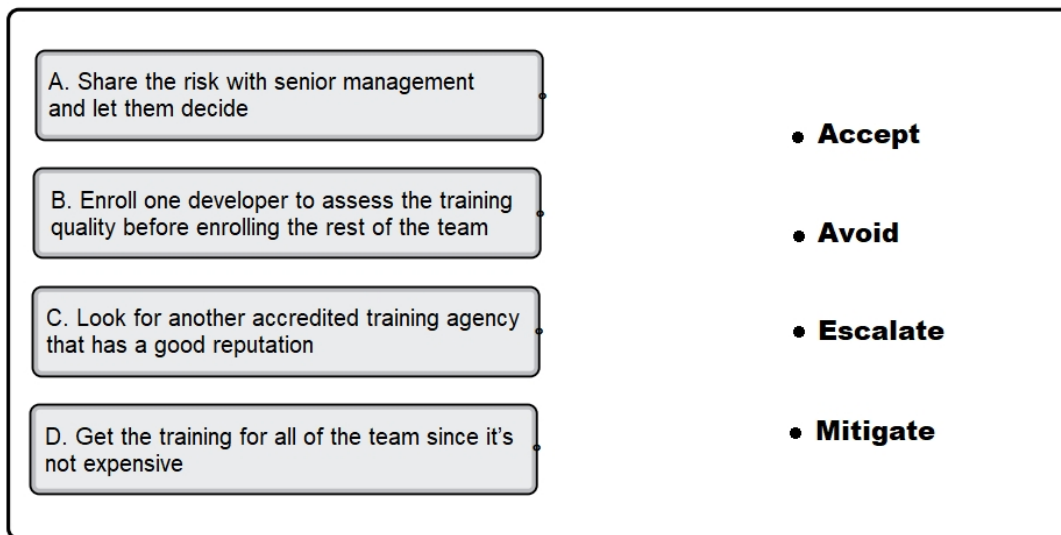
Sometimes, no matter how meticulously you plan for risks, certain issues end up disrupting your project when you think everything is going on perfectly. Here comes the role of risk audit and reviews. A **risk audit** examines the effectiveness of your risk management processes and whether the right procedures are being followed. Risk audits look at what has occurred when dealing with risks, whereas **risk reviews** look at what should happen in the future when dealing with risks. Risk reviews are considered a method for reexamining the effectiveness of risk management and response plans, aiming to improve these processes to ensure the success of the project's risk response strategies.

## Practice Test

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### Question 1

In a retrospective meeting, a development team expressed their desire to get training in Python programming. The project manager was checking some well-known training providers when they found a new provider that offers the same training for really interesting prices. The project manager was hesitant about getting the training from this new provider since they weren't sure about the quality. Link the risk response on the left to the correct strategy on the right:



### Question 2

While working on identifying risks, a project manager noticed that there is a disagreement among team members concerning the appropriate way to execute an important work item. What can the project manager do to mitigate this risk?

- A. Outsource the concerned work item
- B. Enroll the team in a training about the technologies related to executing that work item
- C. Let the team self-organize and figure out how to execute the work item
- D. Escalate the issue to the functional manager

### Question 3

A stakeholder added a user story to the product backlog. The user story seemed clear to the scrum team. However, during execution, the assigned member gets confused about one of its implementation scenarios. What should the development team member do in this case?

- A. Ask the stakeholder for clarification
- B. Ask the product owner for clarification
- C. Convey their confusion to the scrum master, who will help get a clarification from the product owner
- D. Wait for the next standup meeting to report the issue to the scrum master or product owner if they do attend the meeting

#### **Question 4**

During the planning phase, the project manager speculated that there will be no changes in the composition of the project steering committee. But, since any change could be very critical to the project, the project manager assigned a team member to monitor for triggers. Where should the name of the person responsible for monitoring the steering committee be recorded?

- A. Risk register
- B. Issue log
- C. Change log
- D. Stakeholder register

#### **Question 5**

Even though the project management plan was perfectly elaborated, the project manager thinks that unforeseen events could have a big impact on the whole project. What should the project manager do next?

- A. Identify these events and update the project management plan
- B. Ensure that a management reserve is allotted
- C. Discuss these events with the sponsor in order to develop a fallback plan
- D. Perform a qualitative risk assessment to define the priority of each of these events

#### **Question 6**

During a planning session, a project management team determined that they need to purchase new equipment in November. The project manager thought it would be a good idea to take advantage of Black Friday's discounts since it takes place in the last week of November. How should the project team deal with this opportunity?

- A. Exploit
- B. Share
- C. Enhance
- D. Accept

#### **Question 7**

An agile team is working on developing an innovative digital product. The product owner added a user story in the product backlog and noted that it

should be implemented in the next release. During a refinement session with the product owner, the development team stated that they are not sure about the user story implementation since it requires particular inputs from the current release. What should the development team do next?

- A. Further study the different implementation scenarios of the user story
- B. Prioritize the user story since it involves a high level of ambiguity and risk
- C. Stop spending more time trying to figure out how to implement the user story until they collect more information
- D. Give the user story a final estimation based on the current understanding and available information

### **Question 8**

A project manager is assigned to lead a megaproject that requires experts and resources from different countries. Unable to predict worldwide epidemics, the project team is worried about facing another event like CoronaVirus that might cause delays and cost overruns. What should the project manager do during the risk planning phase? (Select two)

- A. Add the risk to the risk register
- B. Perform a qualitative risk analysis
- C. Add the risk to the issue log
- D. Monitor the development of the risk

### **Question 9**

A project manager is leading a maintenance project for an energy supply company. During project execution, an engineer finds out that a spare part should be immediately changed to avoid an imminent power outage. However, it will take a lot of time to get a new spare part following the organization's procurement process. What should the project manager do in this case?

- A. Buy the spare part without following the procurement process
- B. Follow the procurement process, regardless of the risk results
- C. Update the organization procurement process in order to be able to get the spare part as soon as possible
- D. Escalate the problem to the project sponsor

### **Question 10**

Mid sprint, the development team's work was disrupted by a sudden issue concerning a dysfunctional software feature. During the following retrospective meeting, the project manager decides to use the Five Whys method in order to investigate the problem. Why did the project manager choose to use this specific technique?

- A. To identify the five main factors that caused the issue
- B. To identify the root cause of the issue

- C. To identify the five members responsible for the issue
- D. To identify the five steps to take to resolve the issue

### **Question 11**

During the planning of a call center project, a stakeholder mentions that since the used internet cable (DSL) can be slow, it should be considered a high risk to the project. However, based on their previous projects, the project manager thinks that the cable internet would work just fine for the project. Another stakeholder intervenes to explain that the internet cable speed and reliability vary depending on the geographical location. What should the project manager do next?

- A. Analyze and prioritize the risk by using a probability and impact matrix
- B. Set a contingency reserve to install fiber Internet cables if the threat occurs
- C. Perform a qualitative risk analysis by developing a risk mitigation plan
- D. Perform a quantitative risk analysis to determine the risk exposure

### **Question 12**

A project manager receives a document from the customer containing the new project's requirements. When going through the document, the project manager finds it difficult to understand certain requirements, outputs, and most importantly the project's ultimate goal. What should the project manager do next?

- A. Ask the customer for clarifications
- B. Reject the new project as it involves a lot of ambiguity
- C. Start planning the first iteration
- D. Acquire a team to help analyze the project requirements

### **Question 13**

During project execution, the project team had an issue with an unreliable vendor. Since the incident had a high impact on the project scope, the project manager decided to terminate the vendor's contract and never to deal with them again in the future. Where should the project manager record this issue?

- A. Lessons learned register
- B. Change log
- C. Risk register
- D. Issue log

### **Question 14**

As part of the project, an outdoor ceremony event is planned. However, one day prior to the event, forecasts showed that it would be raining all week. Knowing that it's not possible to change the event's date, what can the project manager do to turn around the situation? (Select two)

- A. Apply the risk response previously elaborated in the risk register
- B. Get waterproof tents
- C. Change the event location to an indoor space and inform all invitees of the new location
- D. Ask all invitees to take the needed precautions by bringing their raincoats, umbrellas, etc.

**Question 15**

During the risk identification process, attrition of resources was identified as a major risk. As a response, the project manager decided to opt for financial incentives to motivate their team members. What type of risk response are they following?

- A. Acceptance
- B. Mitigation
- C. Transference
- D. Avoidance



# Answers

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## Question 1

### Explanation:

A. Share the risk with senior management and let them decide → Escalation

B. Enroll one developer to assess the training quality before enrolling the rest of the team → Mitigation

C. Look for another accredited training agency that has a good reputation → Avoidance

D. Get the training for all of the team since it's not expensive → Acceptance

## Question 2 = B

**Explanation:** Providing training on technologies related to the work item will help the team fully understand how it should be executed. This strategy aims to mitigate the risk by reducing conflict between team members. The other options involve either avoiding the risk by outsourcing the work item, accepting it by letting the team figure out a solution on their own, or escalating the risk to the functional manager.

## Question 3 = B

**Explanation:** During sprint execution, the product owner should be available to respond to questions raised by the development team. The product owner represents the customer and stakeholders, which means that the development team should refer only to the product owner if they have any inquiries. Since the blocker concerns the clarification of a user story, the development team can reach out directly to the product owner without the intermediation of the scrum master. In agile, the development team is self-organizing, thus they're responsible for ensuring the achievement of the sprint work. Waiting till the next standup meeting to get clarifications is not proactive and can reflect a lack of ownership.

## Question 4 = A

**Explanation:** A risk register contains a list of all identified risks, their description, planned responses, probability, impact, risk owner, etc. (PMBOK 7th edition, page 185). In the described scenario, the change in the composition of the steering committee is considered a risk and the name of the person responsible for managing it should be noted in the risk register. Once the risk occurs, it becomes an issue. Since the described situation doesn't involve any issues yet, the issue log is not the correct answer. The situation

doesn't involve any change request either. Therefore, a change log is not the right option. The stakeholder register includes information about the project stakeholders and their classification. Unlike the stakeholder engagement plan, the stakeholder register doesn't contain action items for when, how, and who should monitor and engage stakeholders.

**Question 5 = B**

**Explanation:** Unforeseen events are "unknown unknowns", meaning that they cannot be previewed or identified beforehand. Therefore, it is not possible to discuss or prioritize these events. The only action to take against this type of risk is to set up a management reserve to respond to these events when they occur.

**Question 6 = A**

**Explanation:** The project team should exploit this opportunity by taking specific actions and preparing the required conditions to take advantage of the opportunity (PMBOK 7th edition, page 220). For example, before Black Friday, the project team can prepare a list of sellers, contact them to verify if they're planning to have any Black Friday discounts, subscribe to their newsletters to be notified of any opportunities, etc. The project team can exploit this opportunity without having to share it with a third party. Since the project team doesn't have any control over the opportunity, they cannot enhance it by increasing its occurrence probability or impact. Finally, accepting the opportunity without taking any action means that the team can end up buying the equipment at any time during November and they can miss the opportunity, i.e., the Black Friday discounts.

**Question 7 = C**

**Explanation:** The agile approach follows Lean principles. Among these principles is "deciding as late as possible"; when it's difficult to make a decision or plan an activity, you should delay it or postpone it until you have enough information or data for you to be able to make an educated decision. This practice is known as the last responsible moment concept. In this case, since determining how to implement the concerned user story requires inputs from the current release, the development team should wait until they're able to know more about these inputs. Final estimates are usually assigned during sprint planning, or whenever the user story implementation is clearly decided upon. On the other hand, the product owner is the one responsible for prioritizing work. Needless to say that prioritizing user stories should be based on values in addition to their ambiguity or risk.

**Question 8 = A, B**

**Explanation:** The project team should perform a qualitative risk analysis. If they find that the risk must be prioritized, a detailed risk response should be then developed. All identified risks should be added to the risk register. During the project execution, all occurring issues are noted in the issue log. Monitoring the risk development is undertaken during the execution phase too, not the planning phase.

**Question 9 = D**

**Explanation:** The appropriate strategy to deal with this threat is escalation since changing or exceptionally skipping the organization procurement process is outside the scope of the project or beyond the project manager's authority (PMBOK 7th edition, page 123). In the described scenario, avoiding one risk means accepting the other; buying the spare part without adhering to the procurement process might not be tolerated by the organization while following the procurement process can lead to high exposure to the critical risk of electricity outage.

**Question 10 = B**

**Explanation:** As a problem-solving technique, the Five whys is used to explore the underlying cause of a defect or an issue. By asking successive "Why?" questions, the team digs deep to figure out what went wrong and thus be able to determine how to properly address the problem and how to avoid similar issues in the future.

**Question 11 = A**

**Explanation:** The project manager should first perform a qualitative risk analysis to assess risks occurrence probability and impact. After that, they should further analyze the prioritized risks using quantitative risk analysis. With this type of risk analysis, the project manager will be able to determine the risk exposure level, develop a risk mitigation plan, or define a contingency reserve. Option C is incorrect because qualitative risk analysis is performed by using a probability and impact matrix, not by developing a risk mitigation plan.

**Question 12 = A**

**Explanation:** In case of ambiguity, the project manager should first ask for clarifications from the customer before making any further decisions. The project involves unclear requirements and objectives. Thus, it's not appropriate to start planning project work or acquire a team without first creating a clear vision of what the project consists of.

**Question 13 = D**

**Explanation:** The Issue Log is a project document where all information concerning faced issues is recorded and monitored (PMBOK 7th edition, page

336). Even though the described scenario involves lessons learned (never to deal with the unreliable vendor in the future), the question only inquires about where to record the issue.

**Question 14 = B, C**

**Explanation:** The project manager can get waterproof tents or relocate the event to an indoor location. Turnaround is a response to an unplanned event. Consequently, a risk response was not elaborated in the risk register. Asking invitees to bring their raincoats is not a practical solution for spending hours in an outdoor ceremony event on a rainy day.

**Question 15 = B**

**Explanation:** The project manager is mitigating the risk of resource attrition. This type of risk response aims to diminish the probability and/or impact of a threat (PMBOK 7th edition, page 123).

# **CHAPTER 10**

## Exam Tips & Tricks

# 1. Preparation Tips

You have made the commitment to prepare for your PMP exam. Here is how to set up a practical plan and schedule, and stay focused and disciplined throughout the whole process.

When creating a preparation plan and schedule, try to set **realistic goals**; your schedule should take into consideration how much time you can REALLY dedicate to preparation. It should be neither strict and exhausting nor imprecise and loose. Your schedule should allow you to comfortably juggle your PMP preparation journey with your other professional and personal responsibilities and obligations.

Setting a **specific date** as your goal for passing the exam will motivate you to stick to your schedule with no postponing or slacking. When creating your plan and schedule, try to set a number of **milestones**. Reaching each milestone will be a small victory and a huge step towards reaching your ultimate goal.

As a general rule, you should take into consideration any **unforeseen events** that might impact your plans. Life happens, so you should keep in mind that you might have to alter your study schedule or even reschedule your exam for any reason. However, keep in mind that planning for the unexpected is better than rushing your preparation and even showing up to the exam unprepared.

PMP preparation is known to be an exhausting crucial process, and sometimes, no matter how easy and relaxed your studying pace might be, you can get overwhelmed and risk getting burned out. Thus, you should plan for some **time off** where you take a daily walk or enjoy doing some activities with family and friends to maintain your mental well-being.

After setting up the full picture of how you're going to tackle the materials you chose and how much time you're going to dedicate daily for your PMP certification pursuit, all you have to do is stick to your plans and daily schedule. **Commitment** is key here! You did all the needed planning by now, so it should be easy to implement the determined steps. Failing to commit to your schedule will only frustrate you, so you should avoid that by being determined to achieve each milestone you set up on time.

No matter how much you limit your preparation material, you'll end up with a lot of information to retain. Thus, don't attempt to start memorizing everything

you put your hands on. Instead, start with **familiarizing** yourself with your books and courses content by going through everything and trying to understand how you can implement this knowledge in a real-life project. For instance, you can break down the PMBOK into chapters and sections you can go through over a period of time. You can also choose to skim certain resources instead of reading them word by word if you find their content to be repetitive.

Now that you have got familiar with the material in hand, you should move on to better grasp and master all fundamental approaches, concepts, tools, and techniques of risks, quality, procurements, resources, stakeholder, scope, budget and schedule management, leadership styles, problem-solving, communication, etc. Don't leave anything to chance! Make sure you have a full understanding of anything your PMP exam can address.

By now, you must have digested a huge amount of new information. To make sure you properly **understand** what you came through, you should put your knowledge to the test. For now, you can use quizzes and mini-tests to identify your knowledge gaps and weak points and determine whether your study efforts were efficient before moving on to full-length mocks and exam simulators.

At this phase, you should start preparing yourself for the exam experience. You should **practice** at least 2 full-length mock exams until you eventually score 70% or higher. After finishing each practice exam, check your wrong answers and go through their explanations to find out what went wrong and to understand the logic behind every question. Try to practice your mocks while mimicking the real exam conditions; this will help build endurance and better manage stress and time.

While preparing for your PMP exam, try to identify which **study techniques** work for you: do you find reading more efficient, do flashcards make retaining information easier, are you more of a visual learner who grasps information better through watching videos or using mind maps? you can use a mix of all of these techniques as long as you find them helpful.

Writing down key information is proven to be a great way to **remember and retain** details while studying. Plus, by taking your own notes you won't have to refer to multiple resources whenever you want to check something up. Your personal notes can help you create a brain dump or a personal mini reference table that includes definitions, abbreviations, concepts, formulas, etc.

The PMP exam initially tests your ability to think and respond as a project manager in certain situations and under particular conditions. It is more crucial to understand the how's, why's, and logical relationships than it is to attempt to memorize everything.

With the huge emphasis that the PMP exam puts on Agile, some PMP aspirants think that traditional and predictive approaches won't take part in the exam questions anymore, which is totally wrong. You should cover all **adaptive and predictive methods** as well as hybrid ones and make sure you understand the difference between each one of them. A lack of understanding of the PMP vocabulary leads to missing out on what certain questions mean. Therefore, you should thoroughly study and understand all new vocabulary.

Surrounding yourself with people who support your goal will give you a big push towards reaching it. Getting the **support** of friends and family during your preparation phase can truly make a difference motivation-wise. Reaching out to fellow PMP aspirants in study groups and discussion forums can also help you get your concerns addressed and queries answered, thus getting the support you need from people who are going through the same experience as you.

Whether you're deadline-driven, or you're doing it to get a promotion, to change your career, or just to develop your potential as a project manager, whatever your **motivation** is for going through the PMP exam, just remember it whenever you feel down and visualize reaching your ultimate goal and you'll be back on track with your preparation in a second. You can also motivate yourself by setting a reward once you get certified such as buying yourself the laptop you always wanted or taking your family to their favorite vacation destination.

To reinforce your commitment, you can tell people about what you are up to. Talk to your friends and family about your pursuit and you'll feel more committed to reaching your goal. Preparing for the PMP exam can be both stressful, draining, and exhausting. So, make sure you're going easy on yourself. Don't put too much pressure on yourself. Instead, try to keep a steady pace with short **breaks** to disengage.



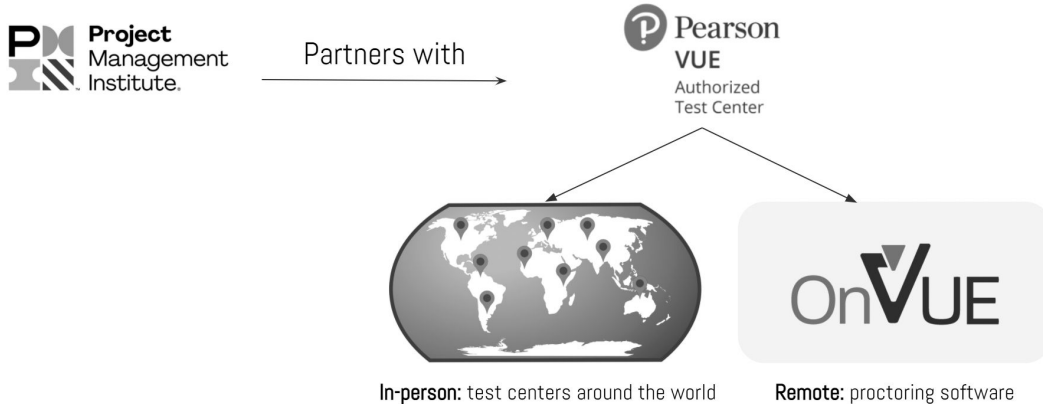
## 2. Prior to the Exam Day

When the day approaches, some PMP aspirants intensify their preparation under the impact of pressure and in order to be better prepared, which is not preferable. Instead, you should keep the **same relaxed pace**, rely on your personal notes and any memory sheets, focus on practicing more mock tests, and just take it easy. Most importantly, make sure you're having enough sleep and you're following a balanced diet to get the needed energy for the rest of your PMP journey.

Before making a decision on whether to take the exam in a testing center or at home, you should consider the following Pros and Cons of each choice.

- Taking the PMP exam online: It is a convenient option as it allows you to take your test from the comfort of your home, you don't have to travel or drive to get to your testing center. You will also have the flexibility to schedule the exam date any time of any day of the week, i.e., 24/7, which means you're less likely to experience any date or location changes. However, online testing has its cons too, you might not be able to avoid noise and interruptions during the exam, which can put you at risk of not being compliant. Your internet connection can be bad that day too which can cause technical issues. Some people even reported delays in proctor response when contacted online.
- Taking the PMP exam In Person: This is the traditional way of taking the exam. Among its Pros is that testing centers are available all around the world, the rules are well-known, the testing environment and protocols are clearly laid out, accommodations can be provided upon request as well as writing materials. However, in-person testing has its Cons too. For instance, it may take you some time to find an available convenient date and/or location. Due to COVID-19, you will have to wear a mask for the entire test duration when taking the exam in person.

**PS:** You can change your exam option from online to in-person and vice versa; all you have to do is cancel your appointment, and schedule a new exam option and date. You can reschedule your exam up to 48 hours before your exam date. However, rescheduling within 30 days of your initial exam date will result in extra fees.



## 1) Online

The PMP online proctor testing requires certain conditions such as a reliable internet connection and a computer that has a webcam and a microphone. Your computer should also be able to run the Pearson OnVue PMP exam application. **Pearson VUE** is a third-party Online and test centers provider that is contracted and operates with professional certifications organizations such as PMI.

To make sure everything complies with Pearson VUE online exam requirements, you should perform a **system test** with OnVue. It's recommended that you run the test at the same exam scheduled time, from the same computer, testing space, and internet connection you intend to use on the exam day. The system test will allow you to verify your computer connectivity to OnVUE and Pearson VUE servers, your microphone and webcam functionality, the download, unzipping, and launching of the secure browser. Do not use your work computer, as they generally have more restrictions that may prevent a successful test, nor a tablet or a touch screen, as these devices are not supported.

Since you're not allowed to have anything on your desk on the day of the exam, you will be provided access to some online tools. You can use OnVue's built-in whiteboard for taking notes along with an on-screen calculator. You can practice using both tools on Pearson VUE's website before your exam.

For you to have a **quiet place** on the day of the exam, you have to plan beforehand on how to avoid having any interruptions from your family members, friends, or even pets. You should inform everyone that you need that certain space to yourself on the particular day and time so no one is allowed in your room or house. To make sure they don't forget, you can schedule sending reminders to everyone that can potentially interrupt you that day. If you have babies, you can make arrangements for babysitting for instance. Keep in mind

that the proctor can invalidate your exam if there is a lot of noise or movement during the exam.

Additionally, you should prepare your space by removing any items on the wall that have writings such as posters, whiteboards, and art pieces, and remove any clutter on your desk so you create a test-ready space that will easily pass the workspace scan on the exam day.

You should keep in mind that, even with preparing for all scenarios, some issues can occur during the exam such as a bad internet connection, some loud noises from the street or neighbors, an unexpected interruption by delivery services, mailman, etc. Keeping this in mind can help you better manage the situation and the stress when it does happen.

## 2) In-person

Once you schedule your exam in one of Pearson VUE testing centers, check the **location** and visit the test center in advance so you know precisely how to get there on your exam day. This way, you'll avoid the unnecessary anxiety of getting lost and arriving late.

Pearson VUE testing centers exist all around the world, so sometimes instructions and rules at each site vary. Thus, you should check all **instructions** on the website of the specific Pearson VUE center you're taking your exam in to make sure you comply with the guidelines.

On the day of the exam, you'll be requested to show a copy of your exam registration email as well as your ID. So, make sure to print out a copy of your registration email and that your ID meets the requirements. Examination centers require an ID that includes your photo and signature, and since some countries do not include these two elements in their national IDs, consider bringing a second identification document such as your passport, just in case.

### 3. The Day of the Exam

This might sound impossible, but think of it this way: you're well prepared, you're going to do your best, and you're going to be tested on things you either professionally practiced or you thoroughly learned about, so try to be confident and tell yourself you got this! Try to **sleep** well, have a balanced breakfast, stay hydrated, and avoid **last-minute studying** as it will only trigger more anxiety. When stress hits you during the exam, take a deep breath, remember how many simulations you did and how great your scores were, clear your head, and only recall positive thinking such as visualizing the "congratulations" screen appearing at the end of the exam.

Whether you're taking the exam online or in a testing center, try to dress **comfortably** and most importantly according to the rules. Dress in layers so if it gets hot during the exam you can remove your vest or jacket. Avoid too many pockets as it will slow down your check-in process.

Make sure you don't forget your registration proof just in case you need to show it, your primary ID which should be government-issued with your photo and signature, and a secondary ID such as your driver's license, passport, military ID, etc. in case your primary ID was refused for any reason.

Throughout the entire exam, you will be monitored by the proctor, so avoid moving from your seat, talking to yourself, or looking in other directions.

#### 1) Online

Get your computer ready by closing other applications such as virus scanning software and disabling notifications. Remove everything on your desk except your computer, keyboard, and mouse. Don't leave anything within arms reach either to ensure a smooth **check-in** process, except your phone as you'll need it to take photos for the check-in process, then you can leave it in the room in silent or vibrate mode in case the proctor needs to contact you. You can have a beverage on your desk but it should be in a clear container. If there is someone in the house/office with you, inform them that you're starting your exam in an hour so no one interrupts you; your proctor can terminate your exam session if someone enters your room or walks behind you while you're taking the exam.

You will be provided with your exam link 30 minutes prior to your scheduled time, write down your **access code**, and put it away as you might need it to restore your session. Before you start your exam, you should first go through

your check-in process in which photos of you, your ID card, and your testing space will be taken to verify your identity and to make sure you don't have any prohibited items in reach and that your space is in compliance. The proctor may also ask you to roll up your sleeves or empty your pockets.

The overall process should take about 15 minutes, so make sure you follow instructions to move on to your exam as quickly and easily as possible. Once the check-in is complete, put away your phone and still put and wait for the next available proctor; this won't take long. The proctor will either contact you via the chat option or through the computer to give you some final instructions before ending the discussion and starting the exam.

When the exam starts, you need to pay attention to two things: don't read questions **out loud** and don't move out of the camera and proctor view range. Reading the exam questions out loud will result in a warning that implies that in case you continue doing that your exam will be ended. Similarly, if the proctor can't see you through the camera, they will send a warning informing you that you're out of the camera's **view range**.

In case of a technical or connection issue, **don't panic!** You will be contacted by your proctor through the phone or your computer speakers to guide you on how to fix the issue. You can also contact them through the chat feature in case you need help. If the issue persists and you can't get to your proctor, you are permitted to use your phone to contact support. The proctor will try to help you resolve the technical issues. Unfortunately, you may lose some time, and any loss of time cannot be restored due to technical problems.

In case of a system crash or an internet connectivity problem, you can probably restore your session back to where you stopped; Try relaunching the OnVUE application, use the access code that you wrote down earlier, and redo the check-in process as requested. This might cost you some of your exam time but it's better than redoing the whole thing and having to reschedule. Some PMP holders reported that they did not finish the whole exam but they did pass anyway. Therefore, whatever happens, stay calm and follow the above steps and everything should be alright.

## 2) In-person

On the day of the exam, you should arrive **30 minutes** early at your testing center, or you might risk getting turned away. Take into consideration any potential traffic delays or other unexpected issues with your car for instance. Showing up early will make you avoid any unnecessary stress.

Once you arrive at your testing center, you will have to go through the **verification process** which involves showing your ID and Pearson VUE confirmation receipt, taking your picture, and verifying your signature. After the verification process, you will be guided to the locker area where you must put away any personal items such as your phone, keys, outwear, wallet, etc.

Since you're not allowed to take practically anything with you into the testing room, the proctors will provide you with pencils, scratch paper, a whiteboard, a calculator, and even earplugs or a headset to cancel noise since people will be going in and out of the exam room and center, taking their exams at different times with different durations.

Once you complete and submit your exam, your **result** will show up on your score noting whether you passed or failed, along with your performance in each domain. Don't expect to get a specific score as this is not how it works. Now that your hard work has paid off and you got the long-awaited "Congratulations!" at the end of the exam, you should be able to receive a copy of your exam results report at the testing center and your digital certificate will be available in your PMI account.

## 4. Question Answering Tips

Almost all of the PMP exam questions are **situational**, and since the exam aims to test your potential as a project manager, it would be best to rely on your practical experience to answer these questions. Questions such as "what should the Project Manager do first?" "What's the best course of action in this situation?" etc. requires applying the situation to a real work context in order to figure out the right answer.

Certain types of questions such as drag and drop, click on the chart and fill in the blank questions rely on your understanding rather than memorization. In Particular, you don't need to memorize any ITTOs (Input, Tools & Techniques, and Output). Questions about inputs or techniques used in particular processes or about the processes' logical sequencing are no longer part of the PMP exam.

A lot of questions inquire about the project manager's first action in certain scenarios and situations. The different suggested options may include many options that seem like the right answer. Therefore, try to chronologically prioritize the proposed actions and select the one that involves investigating or discussing the issue with the concerned party.

Many candidates reported that they didn't come across any math questions. Thus, you may not need to memorize the formulas, but you should know what each metric means and how to use it. For example, you should know that a positive Schedule Variance (SV) indicates that the project is ahead of schedule.

Try using common sense and adopting a **servant leader** or a mentor mindset when going through situational questions. The presented situations usually require the project manager to act in a decent, helpful way. These situations also focus on collaboration, so if the situation requires making decisions, look for the option that highlights collaborating and consulting with your team instead of making decisions on your own.

If the question illustrates a situation where an issue occurs, such as problems with resources allocation, procurement, schedule, budget, etc, this means that the project manager should first review their documents to figure out a solution for this type of issue. As a rule of thumb, the project manager should analyze the situation from different perspectives and understand people's concerns before taking any action.

When problems arise in a project, the project manager should act proactively. The issue should not be handled passively until it gets way out of proportion. This means that question options that imply ignoring the situation are in most cases incorrect. Always opt for the answer that describes how the project manager removes team impediments proactively.

When a question addresses the different types of communication, always opt for face-to-face meetings when possible, over emails and other indirect ways of communication. There is always a good chance that the right answer involves positive keywords, such as “collaborate”, “help”, “discuss”, etc. On the other hand, you should disregard options with negative terms, such as “direct”, “reproach”, “express dissatisfaction”, etc.

When a scenario involves an issue with the performance of a certain team member, never opt for the firing option. A project manager should always find a way to help team members develop their skills and mentor them into becoming more competent.

In most cases, when a question suggests escalation, it’s a trap. A project manager should avoid escalation unless the threat is out of the project scope or the required response exceeds the project manager’s authority.

Read the questions thoroughly, every single word can change the whole meaning of the question and the way the project manager should act. For example, try to identify whether the situation involves a risk or an issue, the sprint backlog or the product backlog, the Communication Management Plan or the Stakeholders Engagement Plan, etc.

Lastly, if you’re still unsure how to answer a certain question, follow the **elimination principle**; you should eliminate two choices and choose the correct answer from the remaining two options.



## 5. Exam Time Management

When facing a complicated question, you might get carried away while trying to figure out the right answer and forget about the time. Thus, make sure you're not spending a lot of time on particular questions as you might end up with no time left to complete your exam.

Think of it this way; your PMP exam includes 180 questions that must be tackled in 230 minutes, meaning for every 60 questions you'll have to spend an average of 76 minutes, i.e., 25 minutes per 20 questions, etc. So, you can for instance check the time after answering each set of 20 questions to make sure you're not falling behind. Plus, make sure you're not spending more than **3 minutes** on a single question as the average required time for answering a question is 1min:17sec.

Sitting for 4 hours won't be easy; with time passing by, you'll start to feel tired, stressed, and drained. Thus, we strongly recommend using your **allotted breaks** to freshen up, restore your energy, have a snack and a drink if allowed, go to the bathroom, and just take a breath. If you're taking the online exam, you can check your phone even though we do not recommend it; you can get distracted by work or personal matters so just wait for the exam to end, and then you will be able to check your emails, calls, and messages.

However, when taking both breaks, make sure to return **before the 10 minutes** are over; if you're taking the exam in a testing center, and you do not return at the end of your break, your exam session will be terminated. If you're taking the exam online, the clock will continue counting down, costing you your exam time. You do not have to take the full 10-minutes, you can resume your test earlier if you want to, this does not give you extra exam time. Keep in mind that once you click "Submit" to take your break, you will not be able to go back to the previous section.

If you still have a lot of questions to answer without enough remaining time, just read the **last sentence** of the question as it'll indicate what's required and then you can immediately take your chance and pick an option.

During the exam, you will have the option to **mark** certain questions for later review. However, a lot of people make the mistake of marking a lot of questions that they won't have enough time to review later on. Use this feature to only flag certain questions that you're not sure about their answer to further review later.

**\*\*\* You can do it! \*\*\***

*This is neither a trick nor a piece of advice, it's a fact! I know for sure that if you follow a well-planned schedule, cover key topics, adopt the right mindset to handle the questions, and most importantly have the required will and commitment, you'll definitely ace your PMP exam.*

## Full-length Exam

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### Question 1

A project manager is leading a software development project using a hybrid approach. During project execution, the sponsor left the project and a new sponsor was assigned. When the project manager informed the new sponsor that the deliverables were produced using a hybrid project management approach, they asked for proof. How should the project manager address the new sponsor's request?

- A. Explain the hybrid approach to the new sponsor
- B. Inform the new sponsor that they should reach out to the project team in order to get a clear explanation of how the product is being developed
- C. Demonstrate the project charter to the new sponsor
- D. Present the project management plan containing the product development approach to the new sponsor

### Question 2

A project manager is leading a one-year project. Five months into the execution phase, 50% of the project work is completed. What is the project's SPI and status?

- A. The SPI is 0.83 and the project is behind schedule
- B. The SPI is 0.83 and the project is ahead of schedule
- C. The SPI is 1.2 and the project is behind schedule
- D. The SPI is 1.2 and the project is ahead of schedule

### Question 3

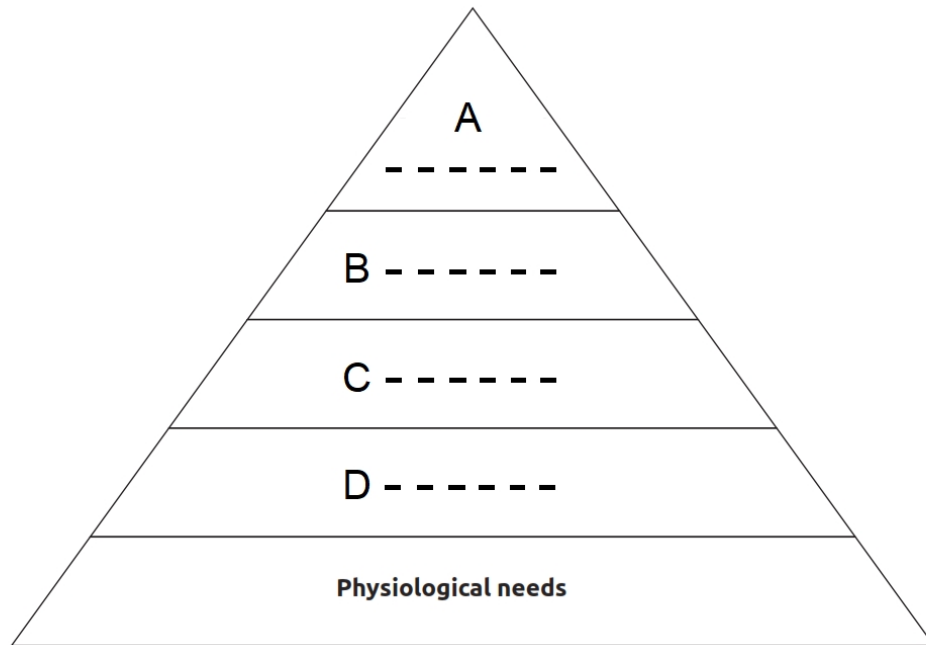
A project manager is leading a project using the predictive approach within a functional organization. During the project execution, the project manager encountered an issue that was not identified in the planning phase. To resolve this issue, additional work should be added to the project scope, which will result in an increase in the project cost. To whom should the project manager escalate the need for additional funds to complete this work?

- A. Program manager
- B. Product owner
- C. Project sponsor
- D. Functional manager

### Question 4

Maslow's hierarchy of needs is a theory created by Abraham Maslow that breaks down human needs dictating their behavioral motivation. At the bottom, it identifies physiological needs such as food, water, warmth, and rest. Place the rest of the other needs in their right position on the graph below:

self-actualization, belongingness and love needs, safety needs, esteem needs



### Question 5

A project manager is assigned to a project that follows an adaptive approach. After gathering all requirements, the project manager previewed 3 to 5 releases to achieve the project goal. They intend to define the details of each release progressively when they get more insight and feedback from key stakeholders. What should the project manager do, taking into consideration that the project has a fixed budget that cannot be exceeded?

- A. Since the budget is fixed, the project manager should adopt a predictive approach for the project instead of an adaptive approach
- B. Since chances of scope creep are high, the project manager should ensure that a Change Control Board (CCB) is established before the start of project
- C. Before the start of the project, the project manager should set a fixed number of releases and develop a detailed budget for each of them
- D. The project manager should work with stakeholders to prioritize work for each release until running out of budget

### Question 6

A project manager works for an NGO, leading a campaign to collect medical supplies for refugees. While contacting pharmaceutical companies to convince them to take part in this campaign, they enumerate the many benefits this partnership can bring them. Which of the following are considered tangible benefits of participating in this campaign? (Select two)

- A. Generating more revenue
- B. Building a stronger brand since more people will know about them after the campaign
- C. Building a good reputation
- D. Benefiting from taxes reduction for supporting an NGO

### **Question 7**

One month after joining their new company, a project manager gets assigned to lead a new project. The project manager is a bit nervous since it's their first time managing a hybrid project. Plus, they do not get along with the product manager. The project manager has been informed that an external auditor is going to conduct a quality audit on their project next week. What should the project manager expect from this audit?

- A. It will identify whether the project is under budget and ahead of schedule or not
- B. It will detect any nonconformance compared to scope baseline
- C. It will examine whether the project follows the company procedures
- D. It will detect any product defects and errors

### **Question 8**

A project manager works in a financial institution where data security is accorded the greatest importance. They have recently been assigned to a project for investigating all of the organization's workstations in order to remove any illegally installed software. To successfully implement this project, the project manager needs to collaborate with all departments. During the project execution, they got support from all departments' heads, except for the head of investments and the head of customer relations. The head of investments always claims that they didn't receive the project manager's emails and thus cannot help them with their requests. The head of customer relations, on the other hand, seems to be constantly busy and never replies to the project manager's emails. But, they do respond directly whenever the project manager runs across them in the hallway. How should the project manager classify the head of the investments department and the head of the customer relations department in the stakeholder engagement assessment matrix?

- A. They are both resistant
- B. The head of investments is unaware, while the head of customer relations is resistant

- C. The head of investments is unaware, while the head of customer relations is neutral
- D. The head of investments is resistant, while the head of customer relations is neutral

### Question 9

A data science project manager is used to implement projects with the hybrid approach. Their organization owns two servers for manipulating big data, with one server being more performant than the other. After a meeting with a potential client, the project manager informed their superior that if this project is approved, they would like to use the organization's performant server and have the senior developer, Adam, as part of their team. Does the project manager have the right to make such a request?

- A. Yes, project managers can pre-assign resources if they need to
- B. Yes, competition over resources is common so project managers should be proactive in reserving them
- C. No, project managers cannot pre-assign resources before conducting the resource planning
- D. No, in hybrid projects it's the product owner's responsibility to acquire and develop resources

### Question 10

A project manager is leading a project using an adaptive approach. Halfway through the iteration, they realize that some user stories are unexpectedly delayed. Along with identifying any potential impediments, the project manager works on helping their team \_\_\_\_\_ Work In Progress (WIP).

- A. Increase
- B. Limit
- C. Compress
- D. Skip

### Question 11

A project manager was asked to manage an ongoing project that operates using a predictive approach. While reviewing the project status, the project manager discovered that some of the deliverables that were noted as finished are actually still in progress. Moreover, and contrary to what the sponsor thinks, the project is in fact over budget and behind schedule. What should the project manager do next?

- A. Politely decline managing such a messy project
- B. Notify the sponsor of their findings
- C. Submit a change request to fix the identified issues
- D. Study the option of crashing the schedule in order to bring the project back on track

### **Question 12**

A project manager is assigned to a predictive marketing project. The client claims that the project manager should take charge of the billboards' rent cost since billboard advertising is included in the scope section of the contract. However, the project manager argues that it's out of scope because the renting costs were not mentioned in the pricing section of the contract. After a long discussion without coming to an agreement, what should be the project manager's next step?

- A.** Try direct negotiation
- B.** Attempt Alternative Dispute Resolution (ADR)
- C.** Set a claims resolution guideline
- D.** Resort to litigation

### **Question 13**

To build a web application, a project manager referred to a freelancing platform to hire a remote team composed of a designer, a front-end developer, and a back-end developer. One week after becoming acquainted with each other, the conflicts dramatically intensified between the two developers to the point that the project manager decided to terminate their contracts, and they have been both replaced. What is the current development stage of the team?

- A.** Adjourning
- B.** Norming
- C.** Storming
- D.** Forming

### **Question 14**

A project manager is leading a project using a hybrid approach. Shortly after acquiring the resources, they discover that their team members are politically very engaged; almost all of their meetings end with a political dispute between team members. The project manager has decided to put an end to this before it deteriorates team members' relationships, by prohibiting any political discussions. Where should the project manager note this rule?

- A.** Team charter
- B.** Project charter
- C.** Resource charter
- D.** Resource management plan

### **Question 15**

An agile coach has been hired by an organization to help them implement the Scrum framework. One of the team members asked them who should prioritize items in the sprint backlog. What was the agile coach's response?

- A.** The Scrum Master
- B.** The Product Owner

- C. The cross-functional team members
- D. All of the above

### Question 16

A project manager is assigned to lead a large project with a cost variance of -\$40,000, an actual cost of \$200,000, and a planned value of \$140,000. Based on these numbers, how much is the project's Earned Value (EV)?

- A. \$100,000
- B. \$160,000
- C. \$180,000
- D. \$240,000

### Question 17

A Scrum Master working in a web agency is managing a co-located team of seven members. The Scrum Master has recently noticed that a senior web developer in their team is not as motivated at work as before. After being asked about what's been going on with them lately, the team member told the Scrum Master that their partner moved to another city for a 6-month work contract and that they want to join them but they are not willing to lose their job. What should the Scrum Master do in this case?

- A. Give the senior web developer a 6-month unpaid leave
- B. Use their emotional intelligence skills to keep the senior web developer motivated at work
- C. Hire another developer to respond to the risk of this senior web developer leaving the company
- D. Allow the senior web developer to work remotely so they can join their partner

### Question 18

During the retrospective session, the cross-functional team asked for specific training to keep up with the latest technological trends and resolve problems more effectively. How will such training impact the team's velocity?

- A. Positively affects velocity with no short-term productivity decline
- B. Positively affects velocity with a short-term dip due to time dedicated to training
- C. Positively affects velocity with a long-term dip due to the ongoing training
- D. Negatively affects velocity with a short-term increase because of training

### Question 19

Match the following terms with the corresponding options below: approach, artifact, technique, framework



- A. Agile is a(n) \_\_\_\_\_
- B. Scrum is a(n) \_\_\_\_\_
- C. Refactoring is a(n) \_\_\_\_\_
- D. Product backlog is a scrum \_\_\_\_\_

### Question 20

A project manager started working for a new organization when they were informed that all of the projects' expected incremental revenue must exceed their costs by at least 30%. Their current project is anticipated to have a 0.7 BCR (Benefit-Cost Ratio). Taking this into consideration, which of the following statements is true about this project?

- A. The project is not profitable and the BCR does not meet the minimum threshold established by the organization
- B. The project is not profitable and the BCR meets the minimum threshold established by the organization
- C. The project is profitable and the BCR does not meet the minimum threshold established by the organization
- D. The project is profitable and the BCR meets the minimum threshold established by the organization

### Question 21

A scrum master works in a web agency. Their client, who is unfamiliar with the Scrum framework, asked them who should attend the Sprint Retrospective. What should the scrum master's answer be?

- A. Development Team, Scrum Master, Product Owner, and Sponsor
- B. Development Team, Scrum Master, and Product Owner
- C. Development Team and Scrum Master
- D. Development Team

### Question 22

Which is the most important characteristic of an Agile team?

- A. Their ability to create and manage their own work schedule
- B. Their ability to be flexible and adaptable
- C. Their ability to accurately plan the project
- D. Their ability to simultaneously work on their tasks

### Question 23

While a project manager was meeting with the organization's CEO, they got a call from one of their project team members, asking for a four-day leave to attend a religious celebration. The project manager immediately refused the team member's request since the project is already behind schedule and it was approaching its deadline. The CEO, who was listening to the conversation, intervened to discuss the matter with the team member. After a long call, the

CEO decided to allow the team member to only get a two-day leave. What type of conflict management technique did the project manager use in this situation?

- A. Smoothing
- B. Compromising
- C. Forcing
- D. Collaborating

**Question 24**

At the beginning of the first sprint of their new project, the scrum master had an important business meeting at the same time as the daily standup meeting. What should the scrum master do in this situation?

- A. Skip the standup meeting and attend their business meeting instead
- B. Ask the cross-functional team to postpone the standup meeting
- C. Cancel the standup meeting
- D. Ask the cross-functional team to record the standup meeting, so they can watch it later

**Question 25**

Before a demonstration meeting with the client, a team member discovered a defective component that could be either repaired or replaced. The cost of both options is negligible, they're both risk-free, and the whole operation will require less than 1 hour. However, the team spent 15 minutes discussing the two options without reaching an agreement. What should the project manager do in this case?

- A. Allow the discussion to continue until the team agrees on a solution
- B. Set up and facilitate a formal meeting with their team members
- C. Escalate the issue to the project sponsor
- D. Call for a vote in order to reach a decision

**Question 26**

After a discussion with the development team, the scrum master decided to label backlog items as short term, mid-term, and long term. Soon after, the scrum master got an email from the product owner asking them to remove those labels, without giving any clear explanation. What should the scrum master do next?

- A. Ask for an explanation
- B. Call for a meeting to address this issue
- C. Wait until the next sprint planning meeting to update the labels as per the product owner's request
- D. Remove the labels

**Question 27**

The critical path method is a schedule network analysis technique. Which of the following statements is true regarding the critical path?

- A. All of the tasks on the critical path should be critical themselves
- B. If a task in the critical path is delayed, it will result in delaying the whole project completion date
- C. A change request does not have any impact on the critical path
- D. The critical path can be used in both predictive and adaptive life cycles

### Question 28

During the sprint planning, the development team estimated a task to be worth “8” story points, while the product owner’s estimation for the same task was “3” story points. Therefore, the scrum master decided to assign this task “5” story points to bridge the gap between the two estimations. What did the scrum master do wrong in this scenario?

- A. They should provide their estimate before making a final decision since estimates should be assigned by the entire Scrum team
- B. They should assign “5.5” story points to the task as an average of both estimates
- C. They should assign “3” story points to the task since the product owner is the one responsible for assigning estimates
- D. They should assign “8” story points to the task since the development team is responsible for assigning estimates

### Question 29

A project manager is leading a 3D modeling project of a castle that will be built near a river. Halfway through execution, the sponsor requests the termination of the project since a dam will be built nearby, making the castle’s location not appealing anymore. What should the project manager do?

- A. Terminate the project as per the sponsor’s request
- B. Proceed with claims administration
- C. Try to directly negotiate the matter with the sponsor in order to convince them to allow the project continuation
- D. Insist on delivering the project since the dam has no association or impact on it

### Question 30

A project manager attended a leadership training workshop. The trainer listed the characteristics of servant leaders, then mentioned some examples of a servant leader’s behavioral traits, such as: (Select two)

- A. Helping a team member write a professional email to a stakeholder in order to get key information
- B. Rewarding high-performing employees in order to motivate them

- C. Checking up on a team member to find out why they've suddenly become an introvert
- D. Inspiring their team with success stories

### **Question 31**

A project manager is managing an agile project in which the product owner has a relatively low involvement. The project manager continuously reminds the product owner of their responsibilities and that they should, for instance, take care of sorting the product backlog items by placing:

- A. The easiest items at the top
- B. The less valuable items at the bottom
- C. The most recent items at the top
- D. The less clear items at the top

### **Question 32**

A project manager is leading a software project using a predictive approach. During execution, a team member developed a new feature that caused regressions on the other features already used by the client. What should the project manager do? (Select three)

- A. Submit a change request to fix the resulted regressions
- B. Inform the concerned stakeholders about the regressions, their impact, and the proposed solutions
- C. Set up lessons learned meeting to avoid similar issues in the future
- D. Since it's an internal problem, try to fix it without the customer's notice

### **Question 33**

A project manager is responsible for leading a hybrid project with remote team members dispersed across four continents. As a result, the team has experienced communication issues. What can the project manager do to alleviate the team's communication challenges? (Select two)

- A. Set up remote pairing
- B. Use an agile approach for the project
- C. Colocate the team
- D. Create fishbowl windows

### **Question 34**

A project manager developed the Work Breakdown Structure (WBS) by decomposing the work into three levels. The supportive PMO points out that three levels are not enough and recommends breaking down project work into five levels instead. What should the project manager do?

- A. Take into consideration the PMO's recommendation and decompose work as needed

- B. Establish common ground by decomposing the WBS into four levels instead
- C. Since the PMO has a high level of control, the project manager should decompose the WBS into five levels as recommended
- D. Since the PMO has a low level of control, the project manager should ignore their request and keep the WBS decomposition levels at three

**Question 35**

A project manager is leading a project using a predictive approach with a contingency reserve of \$6,000. During the execution phase, the project manager updated the risk occurrence in the risk register as follows:

	Value	Probability of occurrence
<b>Risk 1</b>	\$3,000	0%
<b>Risk 2</b>	\$2,000	50%
<b>Risk 3</b>	\$1,000	100%

According to the project manager's updates, how much is left in the contingency reserve?

- A. \$6,000
- B. \$5,000
- C. \$3,000
- D. \$2,000

**Question 36**

A project manager is in charge of a two-hour concert where a playlist of 20 songs will be performed. One hour into the concert, they find out that the band has only played 8 songs. What should they do next?

- A. Ask the band to hurry up so that they can finish performing all 20 songs before the concert ends
- B. Ask the band to only play 8 more songs
- C. Perform all 20 songs even if it takes longer than expected
- D. Gather more data before making any decision

**Question 37**

A project manager is managing a project that consists in manufacturing a Wi-Fi-enabled device that alerts house owners when packages are delivered in their absence. The project manager figured out that they need a visual representation of the manufacturing process flow, which can also be used to

determine when quality checks should be conducted. Which diagramming technique would be most useful for the project manager's needs?

- A. Flowchart
- B. Pareto chart
- C. Context diagram
- D. Scatter diagram

### **Question 38**

During work execution, a project manager faced an issue that requires a deviation from the scope. The project manager discussed the matter with the rest of the team and provided the Change Control Board (CCB) with a plan on how to approach the alteration. The CCB recognized the need for the change, but they approved a different implementation method. Knowing that the project manager doesn't agree with the approved method, what should they do?

- A. Resign from their position and quit the project
- B. Refrain from implementing the change
- C. Implement the change using the approved method
- D. Create a prototype using the rejected method to convince the CCB of its efficiency

### **Question 39**

During a daily stand-up meeting, the scrum master of an eCommerce website project overheard one of their team members saying that they worked on additional functionality that was not described in the user story. The team member went on about how the client will appreciate the extra feature. What should the scrum master do?

- A. Thank the team member for their initiative and inform the client of the newly added functionality
- B. Ask the team member to add the extra feature to the sprint backlog as a separate item and mark it as done
- C. Ask the team member to remove the functionality and recommend the project team to stick to requirements
- D. Nothing, since their role as a scrum master is to remove impediments rather than direct the team

### **Question 40**

A project manager is facilitating a sprint review meeting. At the end of the meeting, the product owner approved the release of the working increments. However, a key stakeholder attending the meeting expressed their dissatisfaction with the deliverables and disapproval of their release. What should the project manager do first?

- A. Consult the cross-functional team and consider their decision

- B. Ask meeting attendees to vote on either option and adopt the decision of the majority
- C. Align the product owner and the key stakeholder on a common decision
- D. Support the product owner's decision

#### **Question 41**

When they facilitate the sprint planning, the scrum master ensures that every story has a checklist that includes the testing activities. However, after a few iterations, the scrum master notices that most of the time, the development team does not conduct any testing, causing stories to remain open for a long time. What should the scrum master do?

- A. Separate the testing activities from the user stories
- B. Have a separate QA team to perform the testing at the end of each iteration
- C. Discuss the issue with the team during the sprint retrospective meeting
- D. Schedule training for the team on how to perform testing activities

#### **Question 42**

A project manager is assigned to lead a marketing project for a political party. During a phone call with the party representative, the latter requested adding social media advertisements to the project. The project manager informed the representative that they were willing to include the service for an additional \$8,000, to which the representative agreed. However, when the project manager sent the invoice including the requested service fees, the representative refused to pay the additional cost. What could have been done differently to avoid this situation?

- A. The project manager should have chosen a more appropriate communication channel
- B. The scope could have been cut to balance the cost of the additional service
- C. The project manager should have requested a lower price for the additional service
- D. Nothing could have been done differently

#### **Question 43**

A project manager is leading a project using an agile approach. Their main focus is to respond to their team members' needs, remove any progress impediments they might face, and promote support tasks to maximize the team's productivity. This project manager is a(n) \_\_\_\_\_ leader.

- A. Adaptive
- B. Servant
- C. Supportive

**D. Collaborative**

**Question 44**

Due to a lack of knowledge of the involved technology, an agile team was unable to estimate the number of user stories needed in the subsequent iteration. What tool or technique can the project manager recommend to overcome such a problem?

- A. Value stream
- B. Progressive elaboration
- C. Spike
- D. Refactoring

**Question 45**

Senior management is inspecting two potential projects to pick the one that best meets the organization's strategic objectives. Taking into consideration time constraints and limited resources, they ended up choosing Project X, which was estimated to generate \$100,000 in profit over Project Y, which was expected to generate \$150,000 in profit. What is the opportunity cost of the choice made by the senior management?

- A. \$100,000
- B. \$150,000
- C. \$50,000
- D. -\$150,000

**Question 46**

During the sprint planning meeting, the product owner discovered that only a few user stories were ready for the upcoming sprint, while the rest still needed refinement. The product owner got nervous because the meeting will not be long enough to finish planning the new sprint, which starts the following day. How could the product owner have avoided such a situation?

- A. Through setting up backlog refinement meetings with the development team throughout the sprint
- B. By requesting the development team to take responsibility for refining user stories before the planning session
- C. By requesting the scrum master to take responsibility for refining user stories before the planning session
- D. The product owner did nothing wrong in this situation. They should just include user stories that are ready, and complete refining the remaining stories during sprint

**Question 47**

A project manager is leading a four-year project using a predictive approach. The initial budget of the project is \$1,000,000. At the end of the first



year, the steering committee asked the project manager to share a diagram showing how much funding was spent each month. Which data representation technique should the project manager use?

- A. Burndown chart
- B. Burnup chart
- C. Histogram
- D. Gantt chart

#### **Question 48**

An agile project manager is leading a cultural project. After reviewing and tracking the team's velocity, the agile project manager decides:

- A. To set a goal for the team to reach a higher velocity than the industry's average
- B. That the team's velocity should increase by 10% each iteration
- C. That tracking the team's velocity is unnecessary since they are self-managed
- D. That the team's velocity should be more consistent

#### **Question 49**

A kill board composed of 9 members is discussing a project that has just concluded its first phase. Three focal opinions emerged during the meeting: 4 members suggested carrying on with the project while keeping the same scope, 3 other members suggested continuing the project while reducing the scope, and the 2 remaining members suggested discontinuing the project. Knowing that the kill board follows a "majority" decision-making technique, what will be the final output of this meeting?

- A. Continuing the project and keeping the same scope
- B. Continuing the project and reducing the scope
- C. Discontinuing the project
- D. None of the above

#### **Question 50**

A project manager is managing an industrial project using a hybrid approach. The project team has estimated that a work package will most likely require 5 days to complete. But, if everything goes well, it could take only 3 days. However, in the worst-case scenario, it might take up to 13 days to complete. So, the team has decided to opt for the PERT method to set a final estimation. What is the expected duration of the work package?

- A. 5 days
- B. 6 days
- C. 7 days
- D. 8 days

### **Question 51**

An organization is used to following the scrum framework where sprints are 4-week long. One day, the organization's Chief Technology Officer (CTO) approached the scrum master and argued that a 4-week sprint is too long and should be reduced to 2 weeks. Convinced by the CTO's suggestion, how could the Scrum Master make this change?

- A.** Announce to the team that the CTO, who has formal power, has decided that the sprint should only last 2 weeks
- B.** Let team members know about their intention to reduce the sprint length and involve them in the decision
- C.** Inform the team of the sprint length change during sprint retrospective and provide them with arguments
- D.** Engage an agile coach to assist in this transition since having someone external to the team will most likely reduce any resistance

### **Question 52**

After taking over a project, the project manager noticed that team members are not interacting and collaborating with each other as they are supposed to. What team-building activities could the project manager opt for? (Select two)

- A.** Purchase gym memberships for all team members and let them choose the gym and training hours that work best for them
- B.** Buy a ping pong table and allow the team to use it during breaks
- C.** Go hiking with the project team
- D.** Offer them tickets to watch new movies

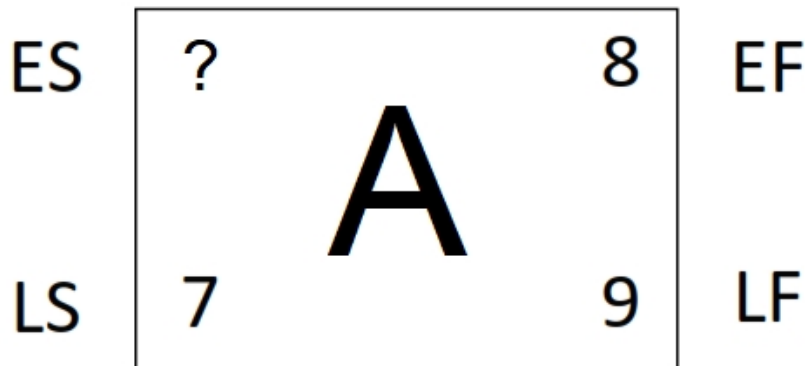
### **Question 53**

During a retrospective meeting, two team members disagree about their involvement in a recent work incident, accusing each other of dodging responsibility. To avoid such an issue in the future, the project manager decides to create a RACI matrix. RACI is an acronym for:

- A.** Responsible, Accountable, Confirm, Inform
- B.** Recommended, Accountable, Consulted, Inform
- C.** Responsible, Accountant, Consulted, Inform
- D.** Responsible, Accountable, Consulted, Inform

### **Question 54**

The following illustration involves a project network activity node. Based on the provided data, if work starts on day 1, what is the duration and the Early Start (ES) of activity A?



- A. Duration = 2 and ES = 5
- B. Duration = 2 and ES = 6
- C. Duration = 3 and ES = 5
- D. Duration = 3 and ES = 6

**Question 55**

During project execution, a team member who was assigned to handle a critical task, informed the project manager that they won't be able to meet the deadline and that they will need two more days. Knowing that the new estimation will have no impact on the critical path or the project duration, what should the project manager do?

- A. Transfer the task to another team member who can complete it within the allocated time
- B. Inform the team member that since the project schedule has already been approved, it won't be possible to change it
- C. Ask the team member to take care of updating the project schedule whenever any inaccuracy in activities' estimates is identified
- D. Approve the team member's new estimate of the activity and update the project schedule and any other relevant plans accordingly

**Question 56**

A servant leader has recently been assigned to a new project. After checking the requirements, they decide that Kanban is the ideal Agile framework to use. However, their team is unfamiliar with kanban. What should the servant leader do?

- A. Refrain from using Kanban since their team is not familiar with it
- B. Explain Kanban during the first iteration planning meeting
- C. Assign training sessions for the team to learn about Kanban in practice
- D. Ask team members to learn Kanban practices using their own means

**Question 57**

Upon reviewing user stories, the agile coach finds out that a few ones are not following the common template format. Which of the following formats should the agile coach instruct the development team to follow for user stories?

- A. As a <developer role>, I want to develop <feature>
- B. As a <user role>, I want to <goal>, so that <benefit>
- C. As a <stakeholder role>, I want to achieve <goal>
- D. As a <user role>, I want to <feature>

### Question 58

During the project charter development phase, the project manager discovers a gap in the business case; some key regulatory requirements were missing. The non-compliance with these regulations could result in legal issues. Complying with these regulations, on the other hand, could result in drastic scope changes and budget overruns. What should the project manager do?

- A. Issue a change request to implement the needed changes for meeting regulations
- B. Consider these findings a risk and plan a response
- C. Start implementing the project and decide later on how to address these requirements when a better solution can be established
- D. Inform the project sponsor of their findings

### Question 59

A project manager is leading a project that involves installing 120 air conditioners in a corporate building. The project includes too many stakeholders because every office has at least one air conditioner. What is the best course of action for the project manager to deal with the situation?

- A. Ask the project sponsor to represent all of the stakeholders
- B. Set up an effective way to define the needs of each stakeholder
- C. Classify stakeholders and only work with those who have high power and interest
- D. Inform their senior management that the project should be divided into sub-projects so that it will be managed as a program instead

### Question 60

Since its foundation, an organization has always used the predictive life cycle to implement its projects. However, executives have recently decided to experiment with adaptive approaches. The project manager suggested using the Kanban method since it respects the company's current work enrollment state, processes, roles, and titles. What other principles and characteristics of the Kanban method could the project manager communicate to their executives? (Select three)

- A. Osmotic communication
- B. Visualize the workflow

- C. Limit work in progress
- D. Implement feedback loops

**In the real exam, a 1st pop-up suggesting a 10-minute break will appear at this point, which we recommend you take.**

### **Question 61**

A project manager is leading a team of 6 members in an open space work environment. While working on an offer, the potential client called the project manager to ask for the cost estimate. The project manager informed them that it is around \$600,000. A team member immediately corrected the project manager by saying “it’s actually around \$700,000”. The project manager didn’t even notice that the team member was overhearing the discussion. What kind of communication is being used here?

- A.** Open space communication
- B.** Distracting communication
- C.** Indirect communication
- D.** Osmotic communication

### **Question 62**

An organization decided to conduct an MBTI (Myers–Briggs Type Indicator) Personality Test. The project manager is confident that the quiz results will reveal their pragmatic personality as they only believe in facts and never rely on intuition. Among the following options, what should the project manager’s personality type be?

- A.** ISTJ
- B.** INTP
- C.** ENTJ
- D.** ENTP

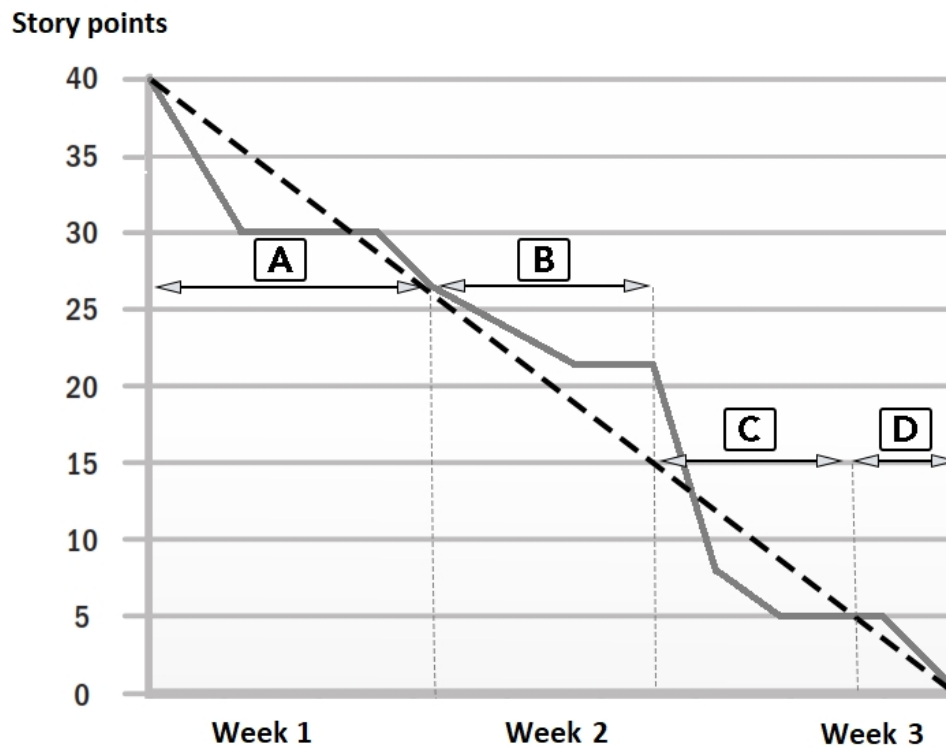
### **Question 63**

A project manager works for an organization that is used to the predictive approach. The organization’s decision-makers attended a conference about Agile and decided to adopt this approach in their upcoming projects. The project manager got worried about losing their job because as far as they know, an Agile team is composed of team members, a scrum master, and a product owner. Thus, the organization will not need a project manager anymore. Is the project manager’s concern justified?

- A.** Yes, the agile team doesn’t include a project manager
- B.** Yes, the project manager should either convert to a scrum master role or look for a new opportunity in an organization following the predictive approach
- C.** No, the project manager can work as a product owner since both roles are similar
- D.** No, they can continue working as a project manager but they will be more of a facilitator

### **Question 64**

After running a three-week sprint, an agile team examines their burndown chart. In which area did the team progress suffer the most: A, B, C, or D?



### Question 65

To keep up with everything going on with their project, a project manager relies on emails as a medium to communicate with the project team and stakeholders. To write efficient emails, the project manager uses all of the following techniques, except:

- A. Brief, right-to-the-point expressions
- B. Consideration of the reader needs
- C. Words and ideas fluency
- D. Tone variation

### Question 66

A project manager is managing a project using the predictive approach. A Change Control Board (CCB) is formed, in which the project sponsor is a member, to review all change requests. One month after the project launch, the CCB received three change requests; the first was by the sponsor, the second was by a low-power stakeholder, and the third one was issued by a senior team member. Which of these individuals is not allowed to submit a change request?

- A. The sponsor since they are a member of the CCB

- B. The stakeholder since they have low power
- C. The senior team member since they are part of the project execution team
- D. All of the above are allowed to submit a change request

**Question 67**

Working in a risk-averse organization, the project manager suggested using the agile approach for a new project that has a high level of uncertainty. How should risk management be conducted in this case? (Select two)

- A. The project manager will own the risk management
- B. Both the project manager and the project team conduct risk analysis, determine risk responses, and update the Risk Register
- C. The project team analyzes and addresses risks in all planning meetings, with a focus on qualitative rather than quantitative analysis
- D. Risks are monitored through the use of information radiators, stand-up meetings, iteration reviews, and retrospectives

**Question 68**

A sales representative of a luxurious hotel chain asked a local carpenter, who owns a small workshop specialized in designing and manufacturing outdoor furniture, to produce a single unit of a new concept of egg chairs as quickly and inexpensively as possible. What is this product called?

- A. Pre-production version
- B. Product increment
- C. Minimum viable product
- D. Sample

**Question 69**

A project manager is facilitating a planning session to define and estimate the duration of a number of activities. 7 members attended the meeting and Katherine was the most experienced one among them. Upon a disagreement about the duration of one of the activities, the project manager decided to hold a vote and adopt the decision of the majority. The voting results were as follows:

Member	Ali	John	Kathrine	Sam	Diana	Kim	Hana
Estimation (days)	5	2	3	5	4	5	4

What should the project manager do next?

- A. Assign the activity a “5 days” estimation since it was the decision of the majority
- B. Assign the activity a “4 days” estimation as an average of all estimates



- C. Assign the activity a “3 days” estimation as suggested by Kathrine
- D. Discuss the different estimations and do another round of voting

**Question 70**

A project is 50% complete. During its planning phase, the project manager divided the project into 4 consecutive phases. Now that phase 2 is completed, they're moving on to phase 3. Based on the following table, how much is this project's Earned Value (EV)?

Phases	Planned Value (PV)	Actual Cost (AC)
Phase 1	\$2,000	\$3,000
Phase 2	\$2,000	\$3,000
Phase 3	\$3,000	
Phase 4	\$3,000	

- A. \$4,000
- B. \$5,000
- C. \$6,000
- D. \$10,000

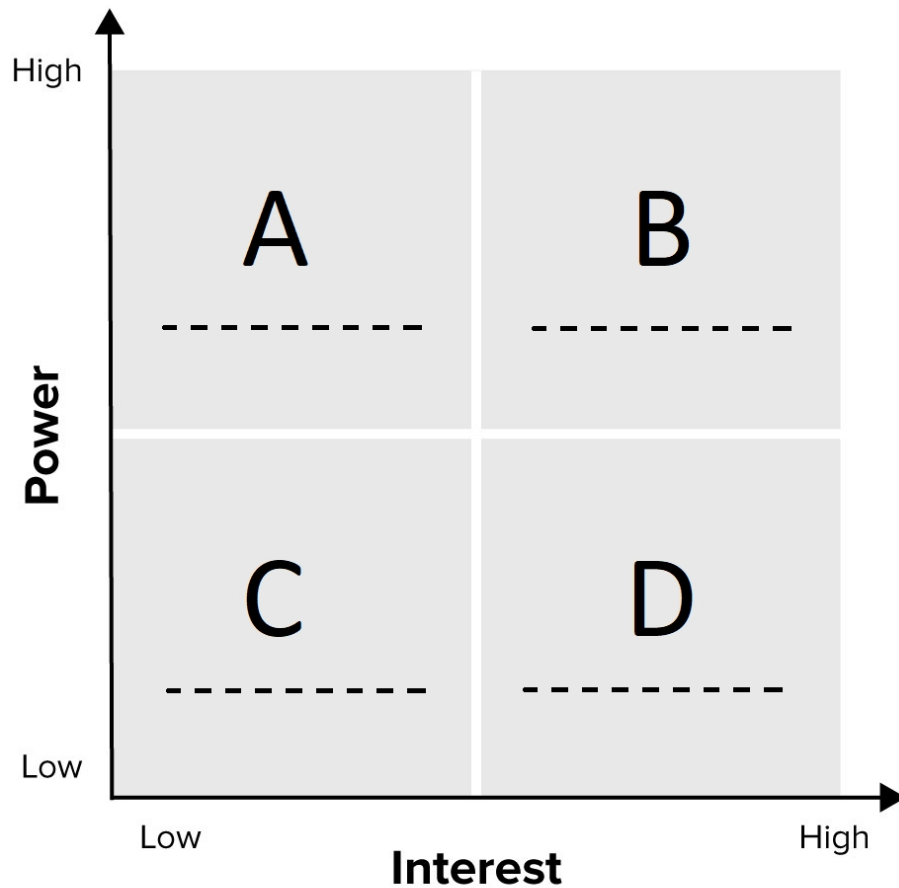
**Question 71**

During the sprint retrospective meeting, team members complained that they're always wasting time going back and forth with the product owner to schedule the backlog refinement meeting. The project manager suggested creating a recurring event to fix the issue. When should this event take place?

- A. Right after the sprint retrospective
- B. Right before the sprint planning
- C. Right after the sprint planning
- D. At any time during the sprint

**Question 72**

A project manager is conducting a stakeholder analysis using the power/interest grid. Place the following actions in the corresponding spaces on the matrix: Monitor, Keep Satisfied, Manage Closely, Keep Informed.



**Question 73**

During the sprint planning session, a scrum team came across a disputable user story for which everyone had a different story point estimation. The product owner, being the most acquainted with the business case, weighed in with a “2” story point estimation. However, the scrum master thinks it should be “3”, comparing it to similar previously completed stories. The cross-functional team thinks it should be assigned “5” story points. Which estimate should be applied?

- A. 2, because the product owner is the most aware of the business
- B. 3, because the project manager has past experience that allows them to use the analogous estimation technique
- C. 5, because the team members are the ones who will be working on the story
- D. 3, as an average of all estimates

**Question 74**

A project manager is leading a project using an iteration-based Agile approach. During the retrospective meeting, one of their team members stated that the sprint planning meeting always takes too long because tasks were not detailed enough in the first place. What should the project manager do to fix this issue?

- A. Establish a rule that prohibits the creation of non-detailed tasks
- B. Encourage the team to hold one or more backlog refinement sessions with the product owner during iterations
- C. Ignore the team member's feedback unless other members agree with them
- D. Split the planning meeting into two or three sessions so attendees don't feel bored

### **Question 75**

A project manager asked a team member to prepare a presentation for an important prospect. After checking it, the project manager found the presentation comprehensive and engaging, but the outline was missing. The outline of the presentation is a list of:

- A. Major headings or topics to be covered in the presentation
- B. References and bibliography at the end of the presentation
- C. The presentation requirements and purpose
- D. External sources used in the presentation

### **Question 76**

A project manager is planning for a project consisting of manufacturing a drone for wildlife protection purposes. The project is challenging because the drone is supposed to be able to identify and keep count of a wide range of wild animals. Since they have previously dealt with drones in the military field, the project manager thinks that using analogous estimating will be of great help for their current project. This estimation technique is best known as:

- A. Three-point estimating
- B. Expert judgment estimating
- C. Bottom-up estimating
- D. Parametric estimating

### **Question 77**

Wanting to have their own home, a couple decided to avoid getting a mortgage and build a tiny house instead. After watching some videos and reading many tutorials, they started planning for the project. However, when it came to interior design, they seemed to disagree on many details. Since they wanted to get their house ready by the end of the year, they decided to launch the construction work first and decide about the interior design details later on. What technique are they using?

- A. Rolling wave
- B. Fast-tracking
- C. Crashing
- D. Decomposition

### Question 78

A project manager is approached by an organization to develop the resource planning for their new innovative project. Even though the project manager has worked with many similar organizations in the past, this time, they are skeptical about the project's business model. Should the project manager use historical information in this case?

- A. No, since every project is unique, there is rarely any correlation between different projects' resource expectations
- B. No, since historical information is usually not applicable for innovative and rapidly changing projects
- C. Yes, since historical information can provide insight when making comparisons to resources used on previous similar projects
- D. Yes, since an accurate estimation of resources cannot be performed without referring to historical information

### Question 79

A project manager has joined a new organization that adopts the Agile approach. Their team is using "ideal hours" to size tasks during sprint planning. However, the project manager gets a bit confused when team members use other terms to refer to "ideal hours". Which of the following terms are used to refer to "ideal hours"? (Select three)

- A. Effort hours
- B. Business hours
- C. Man hours
- D. Person hours

### Question 80

During a sprint review meeting, a team member demonstrated a new feature and pointed out that it took longer than expected due to missing technical documentation. Then, they asked a senior team member how they could avoid this in the future. What should the meeting facilitator do?

- A. Let the discussion flow naturally since it's important and only intervene if the side discussion continues for too long
- B. Ask the team member to reflect on how to make such improvements at another meeting
- C. Interrupt the team member because the product owner is not supposed to know that documentation is missing

- D. Let the discussion continue and then ask the product owner to give feedback on potential improvements

### **Question 81**

A project manager is assigned to lead their first project. When discussing how they plan to develop their team, the project manager shares with their superiors that they intend to focus on developing team members' loyalty to the organization by promoting their well-being both at work and outside of work. Which of the following motivational theories is the project manager planning to adopt?

- A. Expectancy theory
- B. Theory X
- C. Theory Y
- D. Theory Z

### **Question 82**

An organization puts too much emphasis on continuous improvement. They even have a policy that entails holding a meeting after each checkpoint in order to capture patterns of success or failure. In which of the following meetings can they discuss why things went wrong and what could be improved? (Select three)

- A. Retrospective meeting
- B. Lessons learned meeting
- C. Status meeting
- D. Post-mortem meeting

### **Question 83**

After checking the burndown chart in their Agile project management tool, a project manager finds out that there is a lot of work left to be done that will be difficult to complete by the end of the sprint. What should the project manager do next?

- A. Request an urgent meeting with the team and inform them that they will need to work overtime to meet the sprint deadline and keep the client satisfied
- B. Send an email to the team informing them of the situation and encouraging them to do more effort
- C. Wait for the next standup meeting to find out the reason behind the team's slow pace
- D. Wait until the next retrospective meeting to reflect on what is happening

### **Question 84**

A project manager sits with a key team member to understand why they've been frustrated lately. The team member explains that mistakes made by a

certain coworker impacted their work, making them unprecedentedly fall behind schedule. The project manager explains to the team member that they're aware of the situation and that all of their hard work is noticed and appreciated. What conflict resolution technique did the project manager use?

- A. Smoothing
- B. Compromising
- C. Collaborating
- D. Forcing

**Question 85**

A sponsor submitted a change request to the Change Control Board (CCB) in which the project manager is a member. The Board counts five members, and their opinions were diverged concerning whether to accept or reject the change request. What is the best course of action in order to make a decision?

- A. Try to reach a consensus
- B. Call for voting and let the majority decide
- C. Let the most experienced member of the board decide
- D. Let the board director decide

**Question 86**

A Scrum team is using the Fibonacci sequence to estimate user stories. The scrum master assigned one of the stories an estimation of "5", while the team thinks that a "3" estimation is more accurate. What should the final estimate of this user story be?

- A. 3
- B. 4
- C. 5
- D. They should discuss it further in order to reach a consensus

**Question 87**

A project manager has experience managing projects in different fields. However, this is their first time managing an IT project. The project manager often hears the product owner mentioning that technical debt should be avoided at all costs. What is technical debt?

- A. Bugs caused by omission or mistakes
- B. Code Refactoring
- C. The cost of rework due to missed features
- D. The cost of rework due to degraded code quality

**Question 88**

A project manager is managing a national book fair. Early in the planning phase, they have identified some low priority risks. What should the project manager do next?

- A. Ignore the risks since their occurrence is fairly low
- B. Add the risks to the risk register and keep monitoring them
- C. Develop a detailed risk response
- D. Report the risks to the fair sponsor(s)

**Question 89**

One month into execution, a project's cost variance reached \$0.90. What is the project's status?

- A. The project is under budget
- B. The project is over budget
- C. The project will end up costing more than initially forecasted
- D. The project will end up costing less than initially forecasted

**Question 90**

A project manager is managing a project using an iterative approach. During the iteration planning, one of the team members insists that a user story should not be brought into the upcoming sprint since many use cases are still missing. What is the most likely reason for the team member to push out this user story?

- A. The user story doesn't meet the Definition of Done
- B. The user story doesn't meet the Definition of Ready
- C. The user story involves an impossible stakeholder demand
- D. The user story might result in wasted time and effort

**Question 91**

A project manager was recently hired by an organization. In their previous position, the project manager used to have wide-ranging authority. Wondering if things will be different for them in the new organization, the project manager asked their mentor what type of organization it is. Which of the following options is not an organizational structure type?

- A. Projectized
- B. Matrix
- C. Functional
- D. Technical

**Question 92**

During a prospect meeting, the client insisted that the new website they want to develop must meet some crucial conditions: it must be SEO (Search Engine Optimization) friendly, with a score of 80% or above, and all of its pages must be responsive on all devices and screen sizes. The client is setting the website's \_\_\_\_\_.

- A. Definition of Done
- B. Quality Assurance

- C. Functional Requirements
- D. Fit for Use

**Question 93**

While inspecting the construction work progress, a project manager discovered that their team had forgotten to install the solar panel on the roof, which had already been completed. The house was expected to be delivered by the end of the month, but this error will result in a delay of one to two days. What should the project manager do first?

- A. Notify the house owner of the omission and the expected delay
- B. Find out how the omission occurred in the first place to avoid having similar issues in the future
- C. Submit a change request to the house owner
- D. Study alternatives with the project team to deliver the house on time

**Question 94**

A senior manager has informed the project manager that they will be in charge of leading a Fintech (Financial Technology) project. The project manager is excited about this project since it's big and innovative, and it will present a great accomplishment in their career. However, after a few weeks, the project manager starts to feel worried because every time they inquire about the project's start date, the senior manager says that they are waiting for an official document to be issued in order to start working on the project. Which document is the senior manager referring to?

- A. Project charter
- B. Project management plan
- C. Scope statement
- D. Enterprise resource planning

**Question 95**

Which of the following estimation techniques is not usually used in Agile?

- A. Planning poker
- B. Affinity estimating
- C. Bottom-up estimating
- D. Expert judgment

**Question 96**

After completing all requirements, the project manager sits with the product manager to go over each item of the deliverable acceptance criteria. The product manager found that among thirty deliverables, two did not meet requirements, so they asked the project manager to make the necessary changes before signing off the final delivery document. Which process are they both currently performing?



- A. Control quality
- B. Control scope
- C. Validate scope
- D. Close project

**Question 97**

A project manager has just started a two-year project with team members from different locations and cultures. After attending a webinar about the power of motivation, the project manager decided to set a reward strategy for their project team. Which of the following reward strategies would be the most convenient for their project? (Select two)

- A. Set a reward for the project team every 6 months
- B. Set a reward for the project team at the end of the project
- C. Consider cultural differences when determining rewards
- D. Cultural differences should not be considered when setting up a reward strategy as they have no substantial impact

**Question 98**

Which factor should be considered during Sprint Planning?

- A. Number of stories in the product backlog
- B. Number of stories completed in the last sprint
- C. Team velocity
- D. Team size

**Question 99**

A project manager is assigned to an amusement park project. The project comprises two phases: the first phase involves importing attractions like games and rides, and the second entails setting up and installing everything. What should the project manager do after completing the first phase?

- A. Validate scope
- B. Identify risks
- C. Identify stakeholders
- D. Define activities

**Question 100**

Two sales representatives of a wholesale business refuse to share with the business owner the contact information of some of the company's retailers. Possessing this sensitive data, they use it to blackmail the business owner on multiple occasions. For this reason, the business owner wants to set up a CRM (Customer Relationship Management) to ensure that all explicit information concerning retailers will be recorded. Knowing that this project might face resistance from these two sales representatives, what should the project manager's first step be?

- A. Use the why-why method to understand the root of the sales representatives' behavior
- B. Use the what-if scenario analysis to evaluate the sales representatives' attitude and its potential impact on the project
- C. Meet with the two sales representatives and try to win their support
- D. Hire another trusted sales representative to secretly get the retailers' contact info

### **Question 101**

A company has been awarded a contract in one of the Scandinavian countries. Before moving along with the team to the project site, which proactive measure should the project manager take?

- A. Educate the project team about the country's laws
- B. Teach the project team the country's common slang terms
- C. Raise the project team's awareness of the cultural differences
- D. Develop a communication management plan

### **Question 102**

A company provides an open workspace as a way of fostering team collaboration. However, while managing an agile software project, the senior developer approached the project manager to request a separate office where they can better focus on their work since they were unable to carry out some critical tasks in the common team area. What should the project manager do in such a situation?

- A. Convince the senior developer of the advantages of working in the same space as their colleagues
- B. Move the senior developer to a separate cubicle
- C. Allow the senior developer to work in a separate area until their complex tasks are solved
- D. Ask the whole team not to make noise as it might disturb others

### **Question 103**

A project manager is leading a business transformation project. As part of the project scope, a survey with 10 experts has to be conducted. During project execution, the project sponsor asked to raise the number of experts to 20, explaining that 10 experts might not provide enough input and insight. The sponsor also requested making this adjustment without issuing a change request. What should the project manager do?

- A. Accommodate the change
- B. Refuse to make the change
- C. Negotiate the number to reach a consensus
- D. Inform the sponsor that they need to follow the change management process

**Question 104**

A project manager of a distressed project had been replaced by a new one. While the new project manager was examining the network diagram, they found five critical paths and two near-critical paths. What does this indicate about the project?

- A. The project is at high-risk
- B. The project requires more financial or human resources
- C. The project will be completed on time and within budget
- D. The project should be terminated

**Question 105**

An organization has recently converted to Agile for its projects' execution. After a few months, the project manager's superiors approached them to complain that Team A was performing poorly in comparison to Team B, which always had a higher velocity than Team A. What should the project manager do?

- A. Move some of Team B's best performers to Team A
- B. Set up a reward program to motivate Team A
- C. Encourage Team A to increase their velocity in the upcoming sprints
- D. Inform their superiors that they can't compare the performance of different teams based on their velocity

**Question 106**

A remote-first company is holding an annual one-week retreat in an exotic country. For this year's retreat, the project manager has been asked to take charge of the program planning. In order to quickly generate ideas, the project manager sends a form to all attendees asking for suggestions before holding a group creativity session to further discuss ideas. What technique is the project manager using?

- A. Brainwriting
- B. Brainstorming
- C. Survey
- D. Mind mapping

**Question 107**

During a standup meeting, a team member raises an impediment they're facing. In order to address the impediment, the project manager invites the project team to collaborate with the team member using the following techniques:

- A. Pairing, swarming, and mobbing
- B. Pairing, swarming, and brainstorming
- C. Pairing, mobbing, and refactoring
- D. Pairing, brainstorming, and refactoring

**Question 108**

A project manager is mentoring a team member to become a project manager themselves in the future. Before having a meeting with a prospective seller, the project manager asked the team member to facilitate the meeting. What should the team member do to appropriately play the facilitator role?

- A. Take the project manager's side in whatever decisions they make
- B. Ensure the proper running of the meeting while remaining neutral
- C. Get involved in the negotiations with the seller to help the project manager get a good deal
- D. Ignore team members who are texting during the meeting

**Question 109**

A project manager is leading a dispersed team using the Scrum framework. During the sprint retrospective, their team suggested improving communication and collaboration by using fishbowl windows and remote pairing. Despite their concerns that this might negatively impact the team's productivity, the project manager agrees to implement both tools in order to promote self-organization within the team. What should the project manager's next step be?

- A. At the end of the upcoming sprint, the project manager and the cross-functional team should evaluate the impact of the new practices
- B. The project manager should frequently join the remote conferencing rooms to ensure that the project team is actually working and not wasting time chit-chatting
- C. The project manager should measure their team's velocity during the following sprint, and if they notice any decrease, they should discontinue the use of the new practices
- D. The project manager should ask for the product owner's approval to deploy the use of these two practices

**Question 110**

A project manager is in charge of holding a conference about entrepreneurship. In order to be up-to-date with the current trends and understand what participants and potential attendees might look for, the project manager asked their team to perform benchmarking, brainstorming sessions, focus groups, interviews, and questionnaires. What are these tools and techniques used for?

- A. Data analysis
- B. Data gathering
- C. Data representation
- D. Decision making

**Question 111**

During a meeting with the sponsor of a new project, the project manager suggested opting for an incremental delivery to benefit from the following advantages: (Select two)

- A. Reduce customer uncertainty
- B. Allow early feedback
- C. Eliminate change requests
- D. Simplify work for the team

#### **Question 112**

A project manager is leading an Agile project through two-week sprints. One week into the first sprint, they got a request from the product owner to immediately cancel the sprint. What should the project manager do?

- A. Inform the product owner that the sprint is time-boxed and should continue till its predefined end date
- B. Ask their team to just finish the work in progress and then terminate the sprint
- C. Immediately cancel the sprint
- D. Ask the product owner to provide a clear explanation of their decision in order to cancel the sprint

#### **Question 113**

A project manager is developing a software project using an iterative and incremental approach. During a retrospective meeting, and while the cross-functional team was discussing several potential improvements, the scrum master was taking note of the associated action items. What should the cross-functional team do next?

- A. Ask the product owner to approve the action items
- B. Ask the scrum master to prioritize the action items
- C. Prioritize the previous iteration's unfinished user stories
- D. Decide which action items should be prioritized for the next iteration

#### **Question 114**

A project manager had a major dispute with one of the project suppliers. The project manager claims that the vendor has failed to provide raw materials that conform to the agreed-upon quality requirements, while the vendor complains that payments were late, failing to meet contractual obligations. What should the project manager do?

- A. Not waste more time and simply replace the vendor
- B. Involve a third party for arbitration or mediation
- C. Collaborate directly with the vendor to resolve the issue
- D. Conduct a procurement audit

#### **Question 115**

Match the statements concerning the tasks of a hybrid project with their right classification:

A. Task A is not yet complete	• <b>Report</b>
B. Task B is not accepted because of a security issue	• <b>Data</b>
C. Task C had a huge impact on the burndown chart	• <b>Practice</b>
D. Task D is added to the product backlog based on customer feedback	• <b>Information</b>

**Question 116**

During the project's planning, the project manager noticed that a number of stakeholders are unsupportive because they think that they will lose their jobs due to the project. What should the project manager do to overcome this problem?

- A. Disregard the project's unsupportive stakeholders
- B. Use the autocratic leadership style to be able to lead the project
- C. Create an effective communication management plan and stakeholder engagement plan
- D. Refuse to work on a project that might lead to job losses

**Question 117**

When a dispute arose between two important stakeholders, the project manager intervened and successfully handled it, preventing further escalation. Where should the project manager take note of the arising issue?

- A. Risk register
- B. Issue log
- C. Change log
- D. Stakeholder register

**Question 118**

In which activity do the product owner and the cross-functional team discuss possible approaches to implement user stories as well as provide some initial size estimations?

- A. Brainstorming
- B. Story mapping
- C. Backlog refinement
- D. Iteration planning

**Question 119**

A project manager has been invited to a monthly executive meeting within their manufacturing organization. After reviewing monthly KPIs, the CEO encouraged all attending managers to foster a more lean way of thinking. Which of the following is not among the principles of lean practices?

- A. Eliminating waste
- B. Seeing the whole
- C. Deciding promptly
- D. Delivering fastly

**Question 120**

A project manager is leading a manufacturing project to create a new gaming console. While testing the product, the project team discovers that one of the controller buttons is not functioning properly. To replace the button, a change request was submitted and approved. This change request represents:

- A. Corrective action
- B. Preventive action
- C. Defect repair
- D. Gold plating

**In the real exam, a 2nd pop-up suggesting a 10-minute break will appear at this point, which we recommend you take.**



**Question 121**

Since the project stakeholders' needs were quite vague and imprecise, the project manager was worried about the occurrence of multiple change requests as well as excessive rework during the execution phase. What can the project manager do in this case?

- A.** Create the project scope and break it down into work packages during the project planning phase
- B.** Opt for an iterative and incremental approach for the project execution
- C.** Set up a firm change control system that will only approve critical changes to be implemented
- D.** Create an activity list using the currently known information and opt for a Kanban board to convert those activities into tasks

**Question 122**

A project manager decided to issue a Request For Proposal (RFP) to acquire new equipment and assigned the associated tasks to their team as shown in the following RACI chart:

<b>RACI Chart</b>	<b>Person</b>			
<b>Activity</b>	Stefania	Michelle	Tushar	Samarth
Writing the RFP	A	R	I	C
Conducting the selection	I	A	R	C
Creating the contract	A	C	I	I

When the RFP was released, the project manager received a lot of complaints from different suppliers claiming that the procurement document is not clear as it includes some contradictory requirements. Who should the project manager refer to in order to address this issue?

- A. Stefania
- B. Michelle
- C. Tushar
- D. Samarth

**Question 123**

A project manager is leading a project using the Scrum framework. During sprint planning, the cross-functional team realized that they had selected more items than they could realistically complete during a sprint. What should they do?

- A. Ask the scrum master to allocate more resources to the team
- B. Discuss the issue in the next sprint retrospective
- C. Make more effort and even consider working overtime to finish the selected tasks
- D. Inform the product owner that some items should be removed from the sprint

**Question 124**

A project manager is leading the construction of a data center. The project management plan states that the air conditioning system should be set up according to a thorough study carried out by a specialized company. However, after getting their quote, the sponsor refused to spend such a high price even though it is within the project budget. What should the project manager do first to resolve this issue?

- A. Ask the sponsor to issue a change request involving their decision of not hiring the company
- B. Hire the company anyway in order to achieve the project goal

- C. Evaluate the consequences of the sponsor's decision and discuss with them the other possible solutions
- D. Train the project team to internally perform the air conditioning study

**Question 125**

After defining the project's high-level requirements, the agile team along with the product owner began writing down a list of the product features, including short descriptions of all the functionalities they're going to deliver. Next, they're going to prioritize the product backlog based on:

- A. The value of the items
- B. The complexity of the items
- C. The size of the items
- D. The risk associated with the items

**Question 126**

Throughout their entire career, a project manager has always followed a servant leadership style, particularly with agile teams. All of the following imply servant leadership characteristics, except:

- A. Promoting team members' professional growth
- B. Prioritizing the team needs ahead of everything else
- C. Succession planning by developing future servant leaders
- D. Taking instructions from the team concerning project work

**Question 127**

A project manager was brought on board to take charge of an agile project that was already mid-execution. To learn about the high-level description of the project scope, what should the project manager refer to?

- A. Project charter
- B. Work Breakdown Structure (WBS)
- C. User stories
- D. Epics

**Question 128**

Maria is supervising three projects within her organization: two are of a similar type, while the third is entirely different. What is Maria's role in the organization?

- A. Project coordinator
- B. Project manager
- C. Program manager
- D. Portfolio manager

**Question 129**

A project manager is working for a large accounting firm and has been asked to perform a study on the launch of a new offshore site for one of the firm's clients. They have met with all stakeholders, noted down their requirements, and are now deciding what their study should cover. The process the project manager is currently undertaking depicts:

- A. Plan scope management
- B. Collect requirements
- C. Define scope
- D. Define requirements

### **Question 130**

In order to effectively manage their stakeholders, a project manager decides to conduct an engagement assessment matrix. What engagement levels does this technique use for classification?

- A. Power and interest
- B. Power, urgency, and legitimacy
- C. Unaware, resistant, neutral, supportive, leading
- D. Upward, downward, outward, and sideward

### **Question 131**

A project manager is conducting a risk analysis on an olive oil extraction project. They identified several risks with varying degrees of probability and impact. One of the risks concerns the high customs fees of importing press machines, which can reach \$10,000. If this particular risk event has a 70% chance of occurring, what does \$7,000 represent?

- A. Risk impact
- B. Present value
- C. Expected monetary value
- D. Contingency reserve

### **Question 132**

A project manager is in charge of conducting an efficiency study concerning the development of a recruitment application. They find out that the project will require an initial investment of \$50,000 and can generate \$15,000 in revenue during its first year. The project manager expects that the operational cost and tax liability will amount to \$5,000 each. How much is this project's return on the invested capital?

- A. 10%
- B. 20%
- C. 25%
- D. 30%

### **Question 133**

To avoid the frustration of wasted time and resources, a project manager relies on the project management plan before the project gets off the ground. Which of the following statements is true regarding the project management plan?

- A. It identifies and authorizes the Project Manager to launch the project
- B. It is a detailed project schedule defining the tasks and their dependencies, as well as key milestones
- C. It is a formal document that defines how the project will be managed
- D. It is part of the “Executing” process group

#### **Question 134**

The agile team along with the product owner decided to create a big user story depicting a new requirement. The team needed some time to dissect this user story in order to be able to implement it over multiple upcoming iterations. This big user story is commonly known as:

- A. Feature
- B. Epic
- C. Release
- D. Milestone

#### **Question 135**

During a bidder conference, a supplier brought to the project manager’s attention a missing requirement in the request for quotation (RFQ). When checking the RFQ, the project manager realized that the supplier was right. Therefore, they made sure to talk about this particular requirement and its acceptance criteria for 15 minutes to ensure that all attending suppliers were fully aware of it. When sellers’ responses were received, only one prospective supplier addressed the missing requirement. What should the project manager do next?

- A. Retain the supplier who noticed the missing requirement
- B. Retain the supplier who addressed the missing requirement in their response
- C. Extend the deadline to receive more proposals and have more choices
- D. Send an adjusted RFQ comprising the missing requirement to all suppliers and give them the opportunity to resubmit their proposals

#### **Question 136**

A project manager is managing a hostel redevelopment project. During a status meeting, one stakeholder asked the project manager why wallpaper was chosen over paint. Since the project manager had only joined the project during the execution phase, they were unable to answer the question. What should the project manager do? (Select two)

- A. Inquire whether any other meeting attendees could answer the stakeholder's question
- B. Change the subject to avoid responding
- C. Confess that they don't know the answer, claiming that the question was irrelevant to the meeting's topic
- D. Admit that they don't know the answer and promise to get back to the stakeholder after checking with the project team

**Question 137**

Match the following Scrum events with the corresponding activities in the table below:

Sprint planning - Sprint execution - Sprint retrospective - Sprint review

Activities	Scrum Event
A. Inspects progress towards the sprint goal	----- -----
B. Presents the project's performance to the stakeholders	----- -----
C. Discusses the improvements that can be applied in the upcoming sprints	----- -----
D. Provides estimates of the required effort to complete user stories	----- -----

**Question 138**

During a training session, and in order to clearly explain what a project can be, a project management coach gave their trainees the following example:

- A. Saving an endangered species of rhinos from extinction
- B. A weekly clean-up of the local park
- C. A shoe factory that produces 1000 pairs monthly
- D. Preparing pasta for your family every Monday

**Question 139**

A project manager is pitching an innovative project idea in an entrepreneurial event to get the needed investment. To ensure that they engage both the audience and the jury during the pitch, the project manager should:

- A. Point her finger
- B. Make eye contact
- C. Wave her hands
- D. Stand up straight

### Question 140

A scrum master suggested facilitating the first backlog refinement session since the product owner and some of the development team are new to the agile method. After a quick intro, what should the scrum master ask the participants to do?

- A. Only add more details to the product backlog items
- B. Only add initial estimates and more details to the product backlog items
- C. Only add more details to the product backlog items and define their priorities
- D. Add initial estimates and more details to the product backlog items and define their priorities

### Question 141

An agile team finished 5 sprints. Their velocity was as follows: 30, 34, 30, 26, 30. Why should a velocity of 30 points be assigned when planning for the next sprint?

- A. It's the first value
- B. It's the last value
- C. It's the most repetitive value
- D. It's the average value

### Question 142

What is the Scrum Master's role during the daily stand-up?

- A. Congratulate the team when they do a good job
- B. Listen to the team for any faced impediments
- C. Ask each team member what they accomplished since the last daily standup
- D. This meeting is for team members only, the Scrum Master should not attend

### Question 143

A project manager is working in an organization that provides products on the cloud. After a 6-month study, the organization's R&D department approved a project which will permit internet navigators to create cartoon videos using stock images, gifs, and short video clips. There will be only a \$20/Month pricing plan. What type of project does this describe?

- A. Large project
- B. Internal project
- C. Agile project
- D. Traditional project

### Question 144

During a planning meeting of an agile project, a stakeholder asked the team members why there is no formal documentation involved in this project, to which they replied that:

- A. The documentation is kept to a bare minimum to only respond to regulatory requirements
- B. Agile projects do not require any documentation as they only focus on delivering added value
- C. Documentation in agile projects is only carried out for completed functionalities
- D. Agile requires sophisticated documentation that they are lagging behind to produce

#### **Question 145**

In a predictive work environment, project managers are primarily responsible for Integration Management by controlling the project's detailed planning and delivery. In an Agile setting, who is responsible for managing integration?

- A. Scrum master
- B. Team members
- C. Product owner
- D. Project sponsor

#### **Question 146**

A project is behind schedule since the functional manager reassigned three team members to other projects. After negotiating with the functional manager, the project manager agreed to a temporary solution that would enable them to get one team member back for the time being, with a follow-up discussion after two weeks to re-address the issue. What conflict resolution technique did the project manager employ in this situation?

- A. Compromise
- B. Force
- C. Collaborate
- D. Smooth

#### **Question 147**

The project sponsor attended the sprint review meeting and appreciated the demonstration. Then, they requested a new feature to improve the product competitiveness. How should the project manager respond to this request?

- A. Welcome the change by creating a user story and adding it to the ongoing sprint
- B. Create the user story, but add it to the next sprint to protect the team from disruptions
- C. Create the user story and let the product owner decide its priority



- D. Not create the user story since the request should come from the product owner, not the sponsor

### **Question 148**

During the sprint retrospective, the development team discussed how they want to improve testing delays in the next sprint. After examining different ideas, they decided to install and configure a built-in application that sends a notification as soon as a new feature is ready for testing. Where should this task be placed?

- A. In the next sprint backlog
- B. In the Product Backlog
- C. In the Retrospective Improvement Backlog
- D. None of the above. The team should just carry on this work in the next sprint

### **Question 149**

A project manager is leading an iteration-based project that uses story points for effort estimation. While checking the burndown chart of the current iteration, the project manager found that the trend line is above the projected line. What does that mean?

- A. The iteration is behind schedule
- B. The iteration is on schedule
- C. The iteration is ahead of schedule
- D. None of the above. The schedule should not be controlled in Agile

### **Question 150**

After acquiring resources for a new hybrid project, the project manager decided to develop a training plan to improve their competencies. Which of the following tools can the project manager use to assess the team members' skills? (Select two)

- A. Brainstorming
- B. Ability tests
- C. Focus groups
- D. Team-building

### **Question 151**

To collect more funding, a project manager sends their project's business case to an investor who happens to be quite demanding, as they might reject a project because its goal is not SMART. What does "S" stand for?

- A. Specific
- B. Simple
- C. Smart
- D. Safe

### **Question 152**

The cross-functional team is complaining that their work is moving slowly because the project sponsor is constantly inquiring about the implementation details and technical choices. What should the scrum master do?

- A.** Assign one team member to answer all of the sponsor's questions
- B.** Inform the sponsor that any future questions should be brought to them being the scrum master
- C.** Ask the product owner to help the team deal with the sponsor's questions
- D.** Inform the team that they should ask for permission before discussing any details with the sponsor

### **Question 153**

To obtain the human resource requirements of their new project, the project manager published a job offer on a well-known recruitment platform. Days later, over 300 applications were submitted. Going through all of them will take a lot of time and effort, so what's the best next course of action?

- A.** Using a weighting system to select the best applicants
- B.** Adding a section for minimum qualifications in the job description
- C.** Creating a screening system to reduce the number of applications to treat
- D.** Randomly selecting a few candidates and picking the best of them

### **Question 154**

A scrum master noticed that team members are dedicating too much time to refine the product backlog, which is impacting their commitment to the sprint work. How should the scrum master approach this problem?

- A.** Ask the product owner to assume the responsibility of refining the product backlog so that the development team can concentrate on their sprint work
- B.** Do nothing since refining the product backlog is quite important
- C.** Constrain the team to their sprint work by canceling product backlog refinement meetings
- D.** Coach the team to better manage their time through refining the product backlog for the next sprint while remaining committed to their current sprint

### **Question 155**

A project manager sets up a demonstration meeting with a group of end-users. Despite the fact that this is the fifth demonstration meeting, users still asked for other changes. Thus, the project team will be now implementing the requested alterations and another demonstration session will be scheduled. Which of the following statements best describes this situation?

- A. Better change control and requirements management practices should be implemented
- B. The project team is not well acquainted with the project requirements
- C. The project team is delivering value in a timely consistent manner
- D. The end users are indecisive about what they want

**Question 156**

A project manager is managing two agile teams. The organization set a \$5,000 bonus for the best-performing team and asked the project manager to determine the reward criteria. The project manager decided to use velocity as a performance metric and announced that the team with the highest velocity will get the bonus. Is velocity a suitable criterion in this case?

- A. No, velocity should not be used as a performance metric for rewards and recognitions
- B. No, velocity is only used for planning purposes
- C. No, velocity is only used as a team diagnostic metric
- D. Yes, velocity indicates which team gets more work done on each sprint

**Question 157**

A project manager is assigned to lead an external software development project under a T&M contract. After coming up with a way to automate the testing activities, the project manager finds out that this will lead to finishing the project ahead of schedule and under budget. What should they do next?

- A. Inform the customer of the potential cost and time changes
- B. Hold this information since all cost savings are considered as an additional profit
- C. Do nothing since the customer will have access to all of these details at the end of the project and savings will be split according to the contract terms
- D. Use the saved time and money to add more features

**Question 158**

An organization assigned an agile coach to assist a project manager and their team with the transition to Scrum project management. During a training session, the agile coach explained the nature of the relationship between the development team and the customer along with both parties' responsibilities in a Scrum project, stating that:

- A. The development team is responsible for determining which features should be addressed first
- B. The customer is responsible for determining how to carry on the project work
- C. The customer is responsible for defining value and assessing the user experience

D. The development team is responsible for prioritizing features

**Question 159**

A team member was assigned to add an “upload” button to a website’s support page so that users can attach files when reporting any issues. During the iteration review, the team member proudly demonstrated that they did not only add the button, but they also included the possibility of uploading files through “drag and drop”. How do you describe the team member’s behavior?

- A. This is “delivering value”, which should be encouraged
- B. This is “customer obsession”, which should be encouraged
- C. This is “scope creep”, which should be avoided
- D. This is “gold plating”, which should be avoided

**Question 160**

One of the cross-functional team members took an urgent unplanned leave, putting the rest of the team under a lot of pressure in order to meet the sprint goal. How should the agile project manager address this issue?

- A. Ask team members to take their time finishing tasks with no need to rush
- B. Ask the functional manager to assign a replacement for the leaving team member
- C. Ask team members to work extra hours
- D. Ask the product owner to extend the sprint duration in order to give the team more time to finish the sprint backlog

**Question 161**

In predictive projects, the scope baseline, which is usually used as a basis for future comparisons, can only be modified through formal change control procedures. What are the components of the scope baseline?

- A. Scope statement, WBS, and WBS dictionary
- B. Scope management plan and WBS
- C. WBS and WBS dictionary
- D. Project charter and Scope management plan

**Question 162**

When working on the WBS, a project manager disagrees with the project team about whether to use numbers or letters when indicating the highest level of the Work Breakdown Structure. The project manager believes that with a lot of levels in the WBS, A.1.2.2 will be more clear and easier to read than 1.1.2.2. What is this disagreement mainly about?

- A. Code of accounts
- B. Control accounts
- C. Work packages

**D. Scheduling software**

**Question 163**

A project manager had already assembled a team for a new project when they got promoted to a portfolio manager position. The project manager informed their successor that the majority of the team needs training. In order to be able to provide the team members with the suitable type of training, the succeeding project manager should refer to:

- A. Resource Management Plan**
- B. Responsibility Assignment Matrix**
- C. Work performance reports**
- D. Work Breakdown Structure**

**Question 164**

A team has 100 story points in the product backlog and a velocity of 30 points per iteration. Taking into consideration that the iteration is two weeks long, how many weeks does the team need to complete the backlog?

- A. 4 weeks**
- B. 6 weeks**
- C. 8 weeks**
- D. 10 weeks**

**Question 165**

A project manager is leading a Hybrid project using a Kanban board for executing activities. During a regular monthly retrospective meeting, a new team member stated that the cycle time is high compared to the last project they worked on. What does the team member mean by “cycle time”?

- A. The duration of the project iterations**
- B. The time required to review a task**
- C. The time from the moment the team starts working on a task to the moment they complete it**
- D. The time from the moment a task is added to the kanban board to the moment it's completed**

**Question 166**

A project manager is trying to control the costs of the project they are working on. Thus, the project manager decides to calculate the \_\_\_\_\_ in order to define the value of the completed work, based on its pre-approved assigned budget.

- A. Planned Value**
- B. Earned Value**
- C. Schedule Variance**
- D. Cost Variance**

**Question 167**

An organization intends to form a change control board for assessing and managing change requests. What is the most appropriate selection of members to form the change control board?

- A. Project sponsor and product owner
- B. Project manager and project team members
- C. Project sponsor, project manager, and project team members
- D. Product owner and scrum master

**Question 168**

A project manager is leading a construction project that consists in adding a number of bungalows to a seaside hotel. Since they need to procure the required construction materials, the project manager is responsible for issuing all of the following documents, except:

- A. Proposals
- B. Source selection criteria
- C. Request for quotes
- D. Purchase order

**Question 169**

A project manager works in an IT company that strictly complies with the Agile Software Development Manifesto. All of the following are values of the Agile Manifesto, with the exception of:

- A. Individuals and interactions over processes and tools
- B. Working software over comprehensive documentation
- C. Customer collaboration over contract negotiation
- D. Following an iteration over following a plan

**Question 170**

After shortlisting vendors, a project manager is in the process of preparing the contract. What type of contract should the project manager opt for if they want to terminate the project in case they're not satisfied with the delivered incremental shippable product?

- A. Fixed Price
- B. Cost Reimbursable
- C. Fixed Price with Incentive
- D. Time & Materials (T&M)

**Question 171**

A project manager is leading a project with some remote team members. The project manager recently received a complaint from these members, claiming that they are being treated as second-class employees. What should the project manager do next?

- A. Review team charter
- B. Conduct a performance survey to evaluate the efficiency of remote work
- C. Invest more in collaboration tools
- D. Perform a root cause analysis

**Question 172**

Which of the following is an example of an information radiator?

- A. Prototype
- B. Milestone
- C. Kanban board
- D. Brainstorming

**Question 173**

During the sprint, the scrum master asked two senior members whether the remaining work in the sprint backlog could be completed to achieve the sprint goal. The team members replied by saying that they were not supposed to track such data. What should the scrum master do next?

- A. Take disciplinary action against them
- B. Take charge of tracking the sprint backlog progress
- C. Inform team members that tracking sprint backlog is the responsibility of the agile team and guide them through the process
- D. Ask them about the sprint backlog progress during the next standup instead

**Question 174**

A new project manager was excited to lead a project for the first time. However, their enthusiasm faded away as soon as they realized that, despite their position, they had limited control over the project. In which type of organization would the project manager have the most control as a project manager?

- A. Projectized organization
- B. Weak matrix organization
- C. Balanced matrix organization
- D. Strong matrix organization

**Question 175**

A project manager is working on a project for creating and testing a new piece of software. The project is following a predictive approach and is currently behind schedule and under budget. The project manager estimated that it will take another 2 weeks to complete the testing activity. The program manager asked the project manager to only dedicate one week to the testing activity. What should the project manager do in this situation?

- A. Crash the project to complete the testing activity in one week
- B. Fast track the project to complete testing in one week
- C. Submit a change request to complete testing in one week
- D. Complete the testing activity in two weeks as planned and inform the program manager that they cannot compromise the testing phase

**Question 176**

A Change Control Board (CCB) is composed of 4 members: two members representing the performing organization: the project manager and the functional manager, and two members representing the client: the product manager and the sponsor. During the last week of the project, the product manager and the sponsor requested a change. What should the project manager do next?

- A. Refuse to implement the change since it was requested late in the project's life span
- B. Evaluate the change with the project team, then decide whether to proceed with it or not
- C. Evaluate and discuss the change internally, then call for a CCB meeting
- D. Discuss the change with the functional manager, then decide whether to proceed with it or not

**Question 177**

A project sponsor assigned a product owner to an agile project. After a few iterations, the sponsor announced that since the product owner seemed to be oblivious of their role and responsibilities, they will be replaced by someone else. What did the first product owner probably do wrong?

- A. Tell the agile team what work they should do
- B. Tell the agile team how they should do their work
- C. Tell the agile team when the work needs to be done
- D. Tell the agile team why the work is needed

**Question 178**

An organization decides to develop an innovative system to control the quality of its products. The project manager assigned to the project opted for an Agile approach. Why did the project manager make this choice?

- A. To avoid change requests as much as possible
- B. To avoid scope creep as much as possible
- C. To get feedback as early as possible
- D. To complete the project as early as possible

**Question 179**



Agile team members are estimating a complex user story. Which of the following items the agile team should not include in their estimations?

- A. Research time
- B. Troubleshooting time
- C. Testing time
- D. Waste time

**Question 180**

A scrum master is leading a project with two-week sprints. The cross-functional team, which is composed of five members, had a disagreement about the maximum duration of a standup meeting. While some believe it should be 15 minutes, others think that 10 minutes are sufficient. The scrum master interfered to inform them that the maximum duration of the daily standup is:

- A. 10 minutes, since each team member needs 2 minutes for their status update
- B. 10 minutes, since it's a 2-week sprint and they should dedicate 5 minutes for each week
- C. 15 minutes, since 3 minutes should be allocated for each team member
- D. 15 minutes, regardless of the team size and iteration length

## Answers

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### Question 1 = D

**Explanation:** Since the project follows a hybrid approach, it should be pointed out in the development approach. The project management plan includes the product development approach as one of its elements. The other options are incorrect because the sponsor asked for formal proof, not an explanation of the hybrid approach.

### Question 2 = D

**Explanation:**  $EV = \% \text{ of completed work} \times BAC$  (Budget at Completion) =  $(6/12) \times BAC$ .

Since the project manager is 5 months into the project, then the  $PV = (5/12) \times BAC$ . Doing the math,  $SPI = EV / PV = 6 / 5 = 1.2$ .

You can also conclude that the project is ahead of schedule without doing any math since half of the work is done before reaching half of the project duration. Since the project is ahead of schedule, you should just select the answer where the SPI is greater than 1.

### Question 3 = D

**Explanation:** In a functional organization, the project manager doesn't manage the budget. Thus, they should escalate the need for additional funds to the functional manager. If the functional manager validates their assessment, they will need to escalate their request to the project sponsor to approve allocating additional financial resources. If the project manager was working in a projectized or strong matrix organization, they wouldn't need to raise their request for more funds to the functional manager. The product owner's role is limited to the scrum framework, which is an adaptive approach. If that was the case, the project manager would need to report similar issues to the product owner, who will escalate the matter to the project sponsor. A program manager, as the name suggests, only handles programs, which is not the case in this scenario.

### Question 4

#### Explanation:

A = Self-actualization: achieving one's potential, including creative activities.

B = Esteem needs: prestige and feeling of accomplishment.

C = Belongingness and love needs: intimate relationships and friends.

D = Safety needs: security and safety.

Please note that in the real exam such a question usually comes in the form of “drag & drop”.

**Question 5 = D**

**Explanation:** With an adaptive approach, the project’s cost and schedule are fixed, while the scope can be adjusted to stay within the cost constraint. Consequently, the project manager needs to prioritize the most important features when planning each release until they exhaust the whole budget. All other options imply using the predictive approach, which won’t work for this project since its scope is unpredictable.

**Question 6 = A, D**

**Explanation:** This project’s concrete benefits for pharmaceutical companies involve increasing revenue and reducing charges, by getting tax deductions for instance, which are considered tangible benefits. Reputation and brand recognition, on the other hand, are intangible benefits.

**Question 7 = C**

**Explanation:** Quality audits are conducted to ensure that the project activities comply with the organizational and project processes, policies, and procedures. Quality control, on the other hand, focuses on assessing the project performance and ensuring that the project outputs are complete, accurate, and meet customer expectations.

**Question 8 = D**

**Explanation:** The head of investments is clearly unwilling to help, which means that they are a resistant stakeholder. They can’t be considered unaware because they are just pretending to be unaware in order to avoid collaborating or supporting the project manager. The head of customer relations, on the other hand, is responsive whenever the project manager meets them in the hallway, so they can’t be considered resistant. However, this does not mean they are supportive since they never reply to the project manager’s emails. Hence, the head of customer relations is showing neutral behavior; they are too busy to collaborate and don’t seem to care a lot about helping the project manager. In addition to being unaware, resistant, and neutral, the stakeholder engagement assessment matrix also includes supportive and leading classifications.

**Question 9 = A**

**Explanation:** Pre-assignment is one of the techniques that project managers can use to ensure project success when certain resources are considered important or essential for the project. Consequently, resource pre-assignment should be employed for a good reason, not just because there is

competition over these resources. Pre-assignment can take place before the initial resource management planning is complete. It's the project manager's responsibility to acquire resources in a predictive and hybrid work environment.

**Question 10 = B**

**Explanation:** To improve productivity and efficiency, an agile team needs to limit Work In Progress (WIP). Limiting work in progress is a technique to troubleshoot unexpected or unforeseen delays (Agile Practice Guide, page 59).

**Question 11 = B**

**Explanation:** In such a situation, the project manager should first report back to the sponsor about their findings and the project's actual status. According to the PMI's Code of Ethics and Professional Conduct, when the project manager discovers errors or omissions caused by others, they should communicate them to the appropriate body as soon as they are discovered. Project managers should provide accurate information in a timely manner (pages 3, 6). After notifying the sponsor, the project manager should study with the project team the different solutions to bring the project back on track. A process improvement and waste removal might sometimes end up being sufficient to reduce cost and deliver results as quickly as possible, without resorting to a change request. If this is not possible, then they can consider fast-tracking or crashing the project schedule. On the other hand, they cannot simply refuse to manage the project due to its current status and the fact that it is behind schedule and over budget.

**Question 12 = B**

**Explanation:** Since the project manager had already tried direct negotiations and failed to reach an agreement, Alternative Dispute Resolution (ADR) such as arbitration and mediation, is the best next step. Setting a claims resolution guideline should be done beforehand during the elaboration of the contract. Litigation should be their last resort.

**Question 13 = D**

**Explanation:** When the team was in the storming stage, there were conflicts between the two developers. However, since they have been both replaced, the team is now back to the forming stage. Tuckman ladder's team development identifies five stages: forming, storming, norming, performing, and adjourning (PMBOK 7th edition, page 166).

**Question 14 = A**

**Explanation:** The team charter is the right document to include rules and guidelines on how the team members should interact with each other (Agile Practice Guide, page 20 & PMBOK 7th edition, page 192). By adding the rule

to the team charter, team members will have to adhere to it and refrain from discussing politics at work. The Resource management plan, on the other hand, covers staffing acquisition, timetable, training needs, recognition and rewards, release criteria, compliance, and safety. The project charter includes a brief description of the project and its requirements. The resource charter is a made-up term.

**Question 15 = C**

**Explanation:** Apart from the development team, nobody should decide the stories' order in the sprint backlog. Instead, team members should define their own task-level work and then self-organize in any manner they feel best to achieve the sprint goal (Essential Scrum by Rubin, Kenneth S, page 23). The agile coach should keep in mind that the "sprint backlog" is different from the "product backlog". A sprint backlog is the set of items that the cross-functional team selects from the product backlog to work on during the upcoming sprint. The sprint backlog represents the primary output of sprint planning.

**Question 16 = B**

**Explanation:** Cost Variance (CV) = -\$40,000, Actual Cost (AC) = \$200,000, and Planned Value (PV) = \$140,000. The Earned Value (EV) is calculated using the following cost variance formula:  $CV = EV - AC$ , meaning that the project's  $EV = CV + AC = -\$40,000 + \$200,000 = \$160,000$ .

**Question 17 = D**

**Explanation:** The best option is to allow the senior web developer to work remotely. Since they are a senior member, they are considered an asset to the team. Besides, they work as a web developer, which makes their tasks feasible remotely. The best thing to do as a servant leader is to keep the developer motivated by allowing them to move to another city to join their partner. The senior web developer showed their desire to keep their job, so hiring someone else won't resolve the initial problem. Instead, this will be a sign to the team member that their job is at risk. The project manager already used Emotional Intelligence (EI) to detect that their team member is not OK. According to the PMBOK 7th edition (pages 26-27), EI covers four areas: 1) Self-awareness 2) Self-management 3) Social awareness 4) Social skills. Other models of emotional intelligence include a fifth area for motivation. Motivation in this context is about understanding what drives and inspires people. Consequently, EI could also help the project manager make the right decision in order to keep the senior web developer motivated. Even though option B is not totally wrong, it's too generic as it can apply to all of the employees, not just the team member in question. The project manager can offer the web developer a 6-month unpaid leave, but this decision must be approved by the company first, in accordance with the Family and Medical Leave Act (FMLA) policy.

Furthermore, such leaves should be preferably planned beforehand to study their impact on ongoing and upcoming projects. Additionally, the team member might not find this option suitable because they might be unable to support themselves if they lose their income for several months. For all of these reasons, the project manager should opt for the remote work option.

**Question 18 = B**

**Explanation:** Actions such as implementing new work tools, providing training, or adding more resources have a positive effect on velocity. However, these actions can also lead to a dip in the team's velocity due to dedicated time for processing and adapting to any new changes. This decline is usually followed by an increase in velocity until the team establishes a new plateau (Essential Scrum by Rubin, Kenneth S, page 136).

**Question 19**

**Explanation:**

Agile is an approach

Scrum is a framework

Refactoring is a technique

The product backlog is a scrum artifact

Agile is an iterative project management approach that promotes an easy and fast value delivery to customers throughout the project life cycle rather than only at the end of the project. Scrum is an agile framework where roles, artifacts, events, and rules are defined and an iterative approach is used to deliver working products. Refactoring is a technique that consists in improving the internal structure of an existing program's source code while preserving its external behavior. The product backlog is a scrum artifact that is maintained and curated by the product owner as it reflects the project's requirements and priorities.

**Question 20 = A**

**Explanation:** A benefit-cost ratio (BCR) is a monetary or qualitative metric that represents the relationship between a potential project's costs and benefits. If the BCR is greater than 1.0, its revenue will potentially outweigh its costs, and if it's less than 1.0, the costs will outweigh the gains. In this situation, a 0.7 BCR means that revenue is 0.7 times the cost. So, this project will not be profitable. The minimum BCR threshold established by the organization is 1.3, and this project does not meet it.

**Question 21 = B**

**Explanation:** Because the sprint retrospective is used to reflect on the process, the full Scrum team should attend this meeting. This includes all members of the development team, the Scrum Master, and the Product Owner.

Having the product owner attend the retrospective should not prevent the team from being honest about any encountered difficulties. In such a situation, the Scrum Master can play an important role in fostering a more trusting environment (Essential Scrum by Rubin, Kenneth S, page 377).

**Question 22 = B**

**Explanation:** Flexibility and adaptability are the core principles of Agile. All other skills can be developed over time when the Agile team gets to learn from its own experiences.

**Question 23 = C**

**Explanation:** The project manager used the forcing resolution technique since they firmly refused the project member's request. This is a win-lose situation. On the other hand, the CEO used the compromising technique since they tried to partially satisfy the two parties which usually results in a lose-lose situation (PMBOK 7th edition, pages 168-169).

**Question 24 = A**

**Explanation:** The Scrum Master should ensure that the cross-functional team holds the standup meeting every day as planned, but they are not required to attend it. The development team is responsible for conducting the standup meeting. Recording implies that the Scrum Master can't miss any standup meeting which suggests controlling the team rather than empowering them to take responsibility and ownership.

**Question 25 = D**

**Explanation:** Voting is used to reach a consensus decision by selecting the option which gets more votes from the team members. This technique is simple, intuitive, and both time and cost-efficient. Since both options have a negligible cost, no risk, and a short implementation period, it wouldn't be adequate to allow the discussion to take more time, nor to set up a formal meeting or escalate the matter to the project sponsor.

**Question 26 = D**

**Explanation:** The product owner is responsible for the product backlog. Consequently, the scrum master should remove the labels as per the product owner's request, even if they didn't get any clear explanation for this decision.

**Question 27 = B**

**Explanation:** The critical path comprises tasks that must be completed as scheduled in order for the project to be finished on time. If a task is delayed, it may cause a delay in the project's completion date. Some tasks on the critical path may not be critical themselves, but they need to be accomplished on time

in order for the critical task(s) to be completed (Fundamentals of Technology Project Management by Colleen Garton, Erika McCulloch, pages 238-239). The critical path method is used in projects following a predictive life cycle where change requests could have a direct impact on the project.

**Question 28 = D**

**Explanation:** Assigning estimates is the responsibility of the development team who is going to execute the task. Since the team's estimation was "8", then the task should be assigned "8" story points.

**Question 29 = A**

**Explanation:** When the project sponsor decides to terminate the project for any reason, the project manager should follow their instructions and terminate the project. In this case, they should immediately start the "close project" process. This scenario doesn't describe any disputes between the project manager and the sponsor concerning contracts' terms, consequently claims administration is not the right answer.

**Question 30 = A, C**

**Explanation:** Helping someone do a task properly and focusing on people's well-being are the main behavioral aspects and characteristics of servant leaders. However, rewarding high-performing employees is considered as transactional leadership, whereas inspiring people fall under the charismatic leadership style.

**Question 31 = B**

**Explanation:** The product owner is responsible for placing the clearest and most valuable items at the top of the product backlog. Consequently, less valuable items will be dragged to the bottom. Product backlog items should not be organized chronologically or according to their difficulty level.

**Question 32 = A, B, C**

**Explanation:** When issues occur, the right course of action implies informing the client of what happened, suggesting potential solutions for the issue, and then submitting a change request. This is aligned with the philosophy stating "don't bring me problems, bring me solutions" (PMBOK 7th edition, page 28). Later on, when the issue is fixed, a lessons-learned meeting should be conducted to avoid similar problems in the future. Holding the information and not updating the customer on what's going on with the project can have a bad impact, both on the project and its manager's transparency.

**Question 33 = A, D**



**Explanation:** Fishbowl windows and remote pairing are two techniques used to manage communication in remote teams. The project manager can create fishbowl windows by initiating long-lived video conferences, where team members join in at the beginning of the workday and leave at the end. Remote pairing, on the other hand, is when two or more people join an online event at a specific time to discuss and share screens when needed (Agile Practice Guide, page 46). Colocating the team is not always feasible due to many considerations such as cost, talent availability, regulations, etc. However, when possible, getting the team together in person on a regular basis is a good practice. Changing the project life cycle from hybrid to agile won't have any significant impact on communication if team members don't take any specific measures or techniques to improve the way they interact with each other.

**Question 34 = A**

**Explanation:** The details and level of decomposition of the Work Breakdown Structure (WBS) depend on the project size, complexity, and level of control needed to effectively manage the project. There's no standard or a predefined number of decomposition levels. A supportive PMO has low control over the project. Therefore, even though the project manager should listen to their advice and consider their recommendations, they are not obliged to follow them.

**Question 35 = D**

**Explanation:** Only \$2,000 is left in the contingency reserve, which is reserved for Risk 2. Risk 1 has a 0% probability of occurrence, which means that the risk will not happen and thus the project manager should release its associated contingency reserve. Risk 3 has already taken place, so \$1,000 has been already spent.

**Question 36 = D**

**Explanation:** The project manager needs to gather more data before making any decisions. The fact that only 8 songs were performed doesn't mean that they are behind schedule since song durations may differ. The project manager is in the process of monitoring and controlling the project work, so they need to deploy the data analysis technique to the gathered data. In this scenario, they should first check the list of remaining songs and their durations in order to verify whether or not the project is on schedule.

**Question 37 = A**

**Explanation:** A flowchart (also referred to as process maps, progress flows, and progress flow diagrams) graphically displays the logical order of the project's progress flow. Flowcharts can be used for process improvement as well as identifying where quality defects can occur or where to incorporate

quality checks. A Pareto chart is displayed as a histogram, illustrating the most serious causes of an error, while a scatter diagram is used to determine the correlation between two variables. Both diagrams don't show the manufacturing process flow. Context diagrams, on the other hand, are used to visually demonstrate how a business process, other systems, and people, all interact. So, context diagrams can include a business process as one of its components, but they can't give you an inside look at how the process flows.

**Question 38 = C**

**Explanation:** The CCB's decision should be respected and the project manager has to comply with it by implementing the change using the approved method. Since the project manager wasn't able to convince the CCB through the elaborated and submitted plan, they can't refrain from implementing the change. The project manager has to follow the integrated change control processes and should not take the matter personally. Therefore, resigning or quitting the project would be unprofessional. Creating a prototype using the rejected implementation method is considered scope creep since this work was neither requested by the client nor included in the scope statement.

**Question 39 = C**

**Explanation:** Regardless of the team member's intentions, adding a functionality that was not included in the initial website design requirements is considered scope creep. Consequently, the scrum master should ask him to remove the added functionality and make sure that their team is creating the website as per the requirements described in the user stories. Scope creep is not always caused by the client, it can also originate from the team itself, similarly to this case, where a task beyond what is required is added because the developer believes it would bring value. In addition to removing impediments, the scrum master has to coach their team and guide them through the right processes and practices. In this case, the team member can create a new item in the product backlog (not sprint backlog) and the product owner can prioritize it in the upcoming sprints if they approve that it has indeed an added value.

**Question 40 = C**

**Explanation:** As a facilitator, the project manager should first align the product owner and the key stakeholder on a common decision. If this doesn't work, the project manager should support the product owner's decision as they are the one responsible for approving deliverables and deciding whether they meet the acceptance criteria. It's not up to the cross-functional team members to decide whether a product increment should be released or not. Therefore, voting is not the right course of action in this case.

**Question 41 = C**

**Explanation:** During the sprint retrospective, the project manager goes over what went well during the sprint and what should be improved. It's best to address any problems during this meeting to identify the root causes and come up with the right action plan. Separating testing activities from user stories is not correct because the "definition of done" could include testing. Having a separate QA team contradicts the fact that the Agile team should be cross-functional. Finally, scheduling training could be an option if the team lacks testing knowledge; however, this should be confirmed after discussing the issue with the team during the retrospective since the problem could have other reasons, such as inaccurate estimations.

**Question 42 = A**

**Explanation:** This situation could have been avoided if the project manager had used formal communication when discussing and approving changes to the contract terms. A phone call is considered informal communication, which means that any decisions made over the phone mainly rely on mutual trust since there is no written record of the discussion or any ensuing decisions. Formal communication, on the other hand, provides a record of any terms, conditions, dates, etc. that have been discussed and approved, binding both parties to comply with any decisions made. In this scenario, the project manager should have used a formal communication channel, such as emails, to keep a formal record of the contract changes requested and approved by the client.

**Question 43 = B**

**Explanation:** Servant leadership is an actively used leadership model in Agile projects. A servant leader's primary focus is to serve their teams by enabling and encouraging them to continuously improve their performance. Servant leaders provide what their team members need, work on removing any progress impediments they might face, and establish supporting tasks to maximize productivity. Adaptive leadership exists in complex networks (Desai, 2010) and complex dynamics of interdependency relationships, which leads to emergent creativity and adaptability (Uhl-Bien et al, 2007). Supportive is a PMO type. Collaborative leadership is a made-up term.

**Question 44 = C**

**Explanation:** The project manager should recommend using Spike. As a research story, a spike represents a timeboxed effort that is dedicated to learning, architecture & design, prototypes, etc. to better understand critical technical or functional details and thus make accurate estimations. Progressive elaboration can be a solution if the used technology could be understood over time. But, since the user stories are going to be implemented during the

subsequent iteration, then progressive elaboration is not feasible in this scenario. Refactoring is a technique for enhancing product quality. A value stream is used to determine which actions bring more value to customers.

**Question 45 = B**

**Explanation:** The opportunity cost is the value of the non-selected or missed out projects or opportunities. Therefore, the opportunity cost of selecting Project X over Project Y is \$150,000.

**Question 46 = A**

**Explanation:** It's the responsibility of the product owner to lead backlog refinement meetings. During one or more mid-sprint sessions, the product owner should collaborate with the team in order to prepare the user stories for the upcoming sprints (Agile Practice Guide, page 52).

**Question 47 = C**

**Explanation:** The project manager can use a histogram as a graphical representation of numerical data. The steering committee asked for the amounts spent each month rather than the total spending or the monthly remaining funds. Thus, neither burnup nor burndown charts can be used. Gantt charts, on the other hand, are used to illustrate the project schedule and not the budget.

**Question 48 = D**

**Explanation:** Team velocity is a key metric since it represents the average rate at which the team accomplishes work. However, the project manager should not compare their team's velocity to that of other teams because each has its own work specifications and requirements. Besides, it is unreasonable to expect their team's velocity to continuously increase. It's more practical and realistic to seek consistency when it comes to the team's delivery potential.

**Question 49 = D**

**Explanation:** No majority was reached in any of the three opinions since only 4 out of the 9 members were proponents of continuing the project with the same scope. If the kill board had followed "plurality" as a decision-making technique instead, the four members' suggestion would have been endorsed. Now, the kill board should continue discussing the matter and maybe use other decision-making techniques to reach a consensus.

**Question 50 = B**

**Explanation:** The PERT estimation formula is: (Optimistic + Pessimistic + (4 × Most likely)) ÷ 6. Applying the given numbers, you will get the following result:  $13 + 3 + (4 \times 5) \div 6 = 36 \div 6 = 6$  days.

**Question 51 = B**

**Explanation:** The scrum master needs to make sure to involve the entire team or whoever the change is likely to impact when tailoring a process (Agile Practice Guide, page 120). The buy-in from the team will suffer significantly if one person defines the process especially if they are from outside the team such as an agile coach. The organization's CTO gave a personal suggestion and not a formal order.

**Question 52 = B, C**

**Explanation:** Buying a ping pong table or going on a hike are both considered team-building activities. Team building enhances the team's social relations and builds a collaborative and cooperative working environment. If team members go separately to the gym or to the movies, there will be no interaction between them, thus interpersonal relationships will not be improved. These activities are just considered motivational factors, not team-building activities.

**Question 53 = D**

**Explanation:** RACI stands for Responsible, Accountable, Consulted, Inform. The RACI chart or matrix is an example of the Responsibility Assignment Matrix (RAM), which shows the relationship between activities and team members as it defines team members' roles and responsibilities. It's an efficient tool to make sure everyone is on the same page and understands what they are supposed to do.

**Question 54 = D**

**Explanation:** Duration = 3 and ES = 6.

The activity duration is calculated by using the following formula:  $LF - LS + 1 = 9 - 7 + 1 = 3$ .

Early Start can be calculated in two ways:

1) Using this formula:  $EF - ES + 1 = \text{Duration}$ , which gives

$ES = EF - \text{Duration} + 1 = 8 - 3 + 1 = 6$ .

2) Calculating the total float (slack);  $LF - EF = \text{Slack} = 1$ , then applying this formula:

$LS - ES = \text{Slack}$ , which gives:  $ES = LS - \text{Slack} = 7 - 1 = 6$ .

**Question 55 = D**

**Explanation:** Since the new activity's activity estimate has no significant impact on the project, the best course of action in this situation is to approve it and update the project schedule and all relevant plans accordingly. The project manager won't have to transfer the task to another team member due to missing the activity's deadline. During the planning phase, estimations might be sometimes inaccurate for a variety of reasons. Thus, updates and adjustments

are necessary during execution. If the new estimations have a significant impact on the project, a change request should be issued. Under a predictive approach, the project manager is responsible for managing and controlling the schedule. So, the project manager should not ask the team member to update the schedule without referring back to them, since they should be aware of all schedule updates.

**Question 56 = C**

**Explanation:** This situation implies that the servant leader has chosen the Kanban framework for their project, which happens to be unfamiliar to their team. If they believe that this particular approach is the best fit for the project, they must ensure that the development team receives the necessary training to properly execute the project. Of the suggested scenarios, setting up training sessions would be the most consistent with servant leadership as well as agile best practices, as it will provide team members with the needed knowledge and mastery to carry out the project.

**Question 57 = B**

**Explanation:** A predefined template format is usually followed when developing user stories in order to indicate the user's class (their role), what this class wants to realize (their goal), and why they want to achieve this goal (the benefit) (Cohn 2004). Using the term "so that" in a user story is not mandatory if the purpose is clear enough to everyone; otherwise, "so that" should definitely be used when writing each user story (Essential Scrum by Rubin, Kenneth S, page 83).

**Question 58 = D**

**Explanation:** The project manager should immediately inform the project sponsor of their findings. The PMI's Code of Ethics requires project managers to comply with all laws and regulations. Concealing such information can lead the organization to face legal issues. In the case of a predictive project, change requests can be only issued after setting the project baseline. In the described scenario, the project is neither authorized nor baselined since it's still in the project charter development phase.

**Question 59 = B**

**Explanation:** The project manager needs to implement an efficient approach to identify the needs of all project stakeholders in order to minimize any disturbing changes later during the project execution. No matter how many stakeholders a project has, they should all be identified and analyzed, along with their needs, as early as possible. This might be a complicated process due to the large number of stakeholders involved in this project. However, this does

not mean that the project manager should request breaking down the project into sub-projects or assigning a representative for all stakeholders.

**Question 60 = B, C, D**

**Explanation:** The main aspects of the Kanban method are: visualizing the workflow, limiting work in progress, managing flow, making process policies explicit, implementing feedback loops, and improving collaboratively. Close or osmotic communication is one of the crystal methodology's characteristics (Agile Practice guide, pages 104, 107).

**Question 61 = D**

**Explanation:** Osmotic communication is when team members are in the same room and one person asks a question, others in the room can either contribute to the discussion or continue working (PMBOK 7th edition, page 243).

**Question 62 = A**

**Explanation:** Since the project manager never relies on Intuition (N), their style should be Sensing (S). The only option that involves sensing is ISTJ. Sensing is when you pay close attention to reality, concentrate on facts and details, and take advantage of practical experience.

**Question 63 = D**

**Explanation:** In Agile, there are three common roles: cross-functional team members, product owner, and team facilitator. The team facilitator can also be called project manager, scrum master, project team lead, or team coach. A team facilitator's role is to remove impediments, facilitate, and coach the team. In other terms, the team facilitator should have strong servant leadership skills (Agile Practice Guide, pages 40-41).

**Question 64 = B**

**Explanation:** In phase B, the team started with 27 story points as planned and finished with only 22 story points. They are behind by 7 story points since the forecasted progress at the end of phase B is 15 story points. Throughout this phase, the team is behind schedule and progress is trending out. In all of the other phases, the team's progress is either ahead of the forecasted progress or very close to the trending line.

Please note that in the real exam, such a question usually comes in the form of "click the area where...".

**Question 65 = D**

**Explanation:** In order to reduce misunderstandings when using written communication mediums, the project manager can rely on the 5 techniques or

the 5Cs of written communication, which represent: Correct grammar and spelling, Concise expression and elimination of excess words, Clear purpose and expression directed to the needs of the reader, Coherent, logical flow of ideas, and Controlled flow of words and ideas. Tone variation is a verbal communication technique.

**Question 66 = D**

**Explanation:** Change requests may be submitted by any stakeholder involved with the project. The project sponsor(s), stakeholders, and the project team are all considered project stakeholders, therefore, they can all make change requests. CCB membership, power level, or involvement in project execution should not be restrictions for someone to request changes.

**Question 67 = C, D**

**Explanation:** When managing an Agile project, risk identification occurs in all types of planning meetings, such as daily stand-ups, release meetings, iteration reviews, and retrospectives. The project team analyzes and addresses risks during planning meetings through qualitative analysis rather than quantitative analysis. In Agile projects, the project team owns Risk management, while the project manager is only responsible for facilitating the process.

**Question 68 = C**

**Explanation:** A Minimum Viable Product (MVP) is a prototype with just enough features to be presented to early users, who can then provide feedback for future product development (PMBOK 7th edition, page 243). An MVP could be subject to many changes and subsequent prototypes, thus it can't be considered a pre-production version. A sample is a small part of a product intended to demonstrate the characteristics of the whole product. Product increment involves a workable increment delivered at the end of each iteration.

**Question 69 = D**

**Explanation:** Since only three out of seven members voted for the "5 days" estimation, the majority was not reached. Therefore, the facilitator should discuss the estimations and do another round of voting if they want to stick with the majority as a decision-making method. If plurality was adopted instead, the "5 days" estimation would have been selected as a final decision. If the average was adopted, "4 days" would have been selected as the activity's estimated duration. If it was an autocratic decision, the estimation of Katherine, for instance, would have been endorsed.

**Question 70 = B**



**Explanation:** The project is 50% complete, so in order to calculate its EV, the following formula must be applied:

$$EV = (BAC \times \% \text{ complete}).$$

The project's BAC is calculated by adding up all of the PVs of the project phases:

$$BAC = \$2,000 + \$2,000 + \$3,000 + \$3,000 = \$10,000.$$

$$\text{Therefore, the project's EV} = (\$10,000 \times \%50) = \$5,000.$$

### **Question 71 = D**

**Explanation:** In an iteration-based agile project, the product owner works with the team to refine the backlog and prepare user stories for the next iterations along one or multiple sessions, in the middle of the iteration (Agile Practice Guide, page 67).

### **Question 72**

#### **Explanation:**

A = Keep Satisfied. Due to their influence, stakeholders with high power and low interest should be kept satisfied. But, because they don't have a high interest in your project, they can get bored if you over-communicate with them.

B = Manage Closely. Stakeholders with high power and high interest are the most important to your project, and you should make sure to keep them happy by managing them closely.

C = Monitor. Stakeholders with low power and low interest should be kept informed periodically without overdoing it.

D = Keep Informed. You'll want to keep stakeholders with low power and high interest informed by checking in with them regularly to make sure they are not experiencing any issues or problems.

Please note that in the real exam such a question usually comes in the form of "drag & drop".

### **Question 73 = C**

**Explanation:** Estimates should be provided by individuals who are assigned to do the work, such as the development team, and not by the product owner or the Scrum Master. (Essential Scrum by Rubin, Kenneth S, page 123).

### **Question 74 = B**

**Explanation:** Backlog refinement is used to prepare tasks and user stories for the upcoming iteration (Agile Practice Guide, page 52). The team member's declaration indicates that the team either is not holding backlog refinement sessions at all, or they need to have more sessions. Hence, such feedback shouldn't be ignored. Dividing the planning meeting into shorter sessions is not going to solve the root cause of this issue. Similarly, setting a restrictive rule for

creating tasks will only prevent team members from adding tasks to the backlog.

**Question 75 = A**

**Explanation:** The presentation outline represents a guide of the key elements covered in the presentation. It includes a comprehensive list that sums up what will be demonstrated to the prospective customers, clients, or investors. It allows the pitcher to organize their thoughts, highlight fundamental points, and logically elucidate their ideas.

**Question 76 = B**

**Explanation:** Expert judgment is the use of specialized knowledge of an industry or previous similar experience in estimations. Likewise, analogous estimating uses parameters from similar previous projects. Since the project manager worked with drones before, they have gained enough experience to make them an expert and enable them to use analogous estimation.

**Question 77 = A**

**Explanation:** The Rolling wave method is used to address uncertainty by planning near-term work in detail while planning future tasks in a more broad manner (PMBOK Guide 7th edition, page 249). It's a form of progressive elaboration that sets up near-term plans and "rolls" into the longer term as more details become available. In this way, rolling wave planning allows work to progress in current and near-term deliverables while planning for potential work packages continues.

**Question 78 = C**

**Explanation:** Historical information can be helpful when developing analogous estimates or parametric estimates. Analogous estimating is usually less time-consuming and less costly than other techniques, such as bottom-up estimating, but it also tends to be less accurate.

**Question 79 = A, C, D**

**Explanation:** Ideal hours are also referred to as effort-hours, man-hours, or person-hours (Essential Scrum by Rubin, Kenneth S, page 122). Business hours are daily hours in which business is commonly carried out. When estimating tasks, we don't use business hours, because interruptions are common in an eight-hour workday. As a result, you may spend only 6 hours working on your tasks while dispersing the other 2 hours on meetings, phone calls, emails, client support, etc.

**Question 80 = B**

**Explanation:** The retrospective meeting is the right meeting to reflect on what happened during the sprint and how to improve the implemented processes. Therefore, rather than discussing how to improve future work efficiency, the meeting facilitator should steer back the discussion to only focus on the demonstrated feature and get the product owner's feedback on what has been produced. This being said, if the documentation needs improvement, team members should create a technical task for it and demonstrate its importance to the product owner during Sprint Planning.

**Question 81 = D**

**Explanation:** The motivational theory the project manager describes is William Ouchi's version of Theory Z. This theory mainly focuses on increasing employee loyalty to the organization by emphasizing their well-being both at work and outside of work. Opting for this motivational theory often leads to high employee satisfaction and morale, resulting in increased productivity (PMBOK 7th edition, page 160). Theory X, on the other hand, implies that employees are generally incompetent, have limited ambitions, avoid any kind of responsibility, and dislike work. Hence, authoritarian managers motivate their employees either by rewarding or punishing them. Contrarily, Theory Y managers have a positive, optimistic view of their employees, considering them creative and committed to the organization's objectives and vision. The Expectancy theory implies that employees' performance depends on their expectations that a definite outcome will follow their performance. This outcome will be a reward for their accomplishments, thus they remain productive as long as the rewards meet their expectations.

**Question 82 = A, B, D**

**Explanation:** Lessons learned are sometimes morbidly referred to as "postmortems" (Fundamentals of Technology Project Management by Colleen Garton, Erika McCulloch, page 47). They are also known as retrospectives (PMBOK 7th edition, page 71). A status meeting is held to review the actual status as well as risks. Status meetings could be eventually followed by preventive or corrective actions, change requests, or lessons learned meetings.

**Question 83 = C**

**Explanation:** As a servant leader, the project manager should remove any impediments facing their team. Listening to their updates and trying to detect if there are any blockers causing their slow work pace is the best course of action amidst an ongoing sprint. As a second step, the project manager can raise the issue during the retrospective meeting in order to improve processes; this could involve improving estimations, performance, documentation, etc. The project manager shouldn't ask the team to work overtime or send them an email as a formal way of putting them under pressure (Agile Practice Guide, page 35).

**Question 84 = A**

**Explanation:** The project manager used the smoothing technique. This method is characterized by giving more consideration to one side of the conflict over the other in an attempt to smooth out the situation and avoid making the conflict more intense. The project manager is downplaying the seriousness of the issue by reassuring the key team member. This technique often leads to establishing harmony and prevents any amplification of non-critical issues. This does not imply any compromise since the other side of the conflict was not involved nor partially satisfied. It is not a collaboration either since the project manager didn't incorporate different views nor did they reach a consensus. This can't be considered forcing since no decisions or solutions were enforced.

**Question 85 = A**

**Explanation:** Collaboration is the best approach to resolve a conflict between members. This would involve an open dialogue where differing viewpoints and insights are exhibited and discussed to eventually reach consensus and commitment to the final decision (PMBOK 7th edition, page 168).

**Question 86 = A**

**Explanation:** In Scrum, the scrum master (aka team lead or project manager) should not estimate user stories. Hence, the cross-functional team's estimation of "3" should be the one considered.

**Question 87 = D**

**Explanation:** Technical debt (aka design debt or code debt) implies the cost of rework incurred as a result of choosing a quick solution over a more time-consuming solution that would, however, ensure better quality. This behavior makes the product less stable over time and the involved maintenance cost ends up being very high. Code refactoring is one of the solutions for technical debt.

**Question 88 = B**

**Explanation:** Passive risk acceptance is an appropriate approach for low priority risks. No proactive action is needed for passive acceptance other than periodically reviewing the threat to ensure that it is not significantly changing. On the other hand, active risk acceptance entails developing a detailed risk response or a contingency plan that would be implemented if the event occurred (PMBOK 7th edition, page 123).

**Question 89 = A**

**Explanation:** The cost variance is the difference between the earned value (EV), i.e., the budgeted cost of work performed, and actual costs (AC).  $CV =$

EV – AC.

If the variance is negative, the project is over budget and if the variance is positive, it is under budget. In the question, the cost variance is barely above 0, so the project is under budget. Since the variance is very close to 0 (90 cents), we can also consider the project to be on budget, but this was not included as an option. Cost variance helps to determine the project's current status, but it cannot determine or predict if the project will end up costing less or more than anticipated. For instance, when the CV is negative, the project manager could take preventive or corrective actions in order to steer the project back on track within the defined budget.

**Question 90 = B**

**Explanation:** The team member tried to push out the user story because it wasn't ready yet as it doesn't involve a comprehensive description of its different use cases. Definition of Ready (DoR) is a checklist of all the criteria that must be met before a user story can be considered ready for the team to include in the sprint and start working on it (Agile Practice Guide, page 151).

**Question 91 = D**

**Explanation:** Technical is not an organizational structure. There are multiple types of organizational structures including functional or centralized, matrix, and projectized or project-oriented.

**Question 92 = A**

**Explanation:** A Definition of Done is a checklist of required criteria in order to consider a product ready for delivery (Agile Practice Guide, page 151). Functional requirements describe the product requirements, e.g., website menus, functionalities, services, etc. Fit for Use is when a product serves its purpose as it is usable in its current state.

**Question 93 = D**

**Explanation:** The project manager should confront the issue and try to resolve it with their team in order to deliver the project on time. This should not involve a change request since it includes an omission caused by the project team and not an omission of requirements. Next, and after things settle down, the project manager should capture lessons learned in order to avoid such problems in the future.

**Question 94 = A**

**Explanation:** The project charter is the document that authorizes the project manager to launch the project execution (PMBOK 7th edition, page 184). It also includes a brief description of the project and its requirements.

Both the scope statement and the project management plan contain a detailed version of these requirements.

**Question 95 = C**

**Explanation:** Bottom-up is used in predictive life cycles to estimate a project cost or duration by aggregating the estimates of the lower-level components of the WBS. All of the other estimation techniques could be used in Agile.

**Question 96 = C**

**Explanation:** During the “Validate scope” process, deliverables are compared against the acceptance criteria and requirements in order to formally sign off the completed deliverables. “Control quality” and “Control scope” should be carried out before the “Validate scope” process. “Validate Scope” consists in formalizing the approval and acceptance of the completed project deliverables. The verified deliverables obtained upon conducting the “Control Quality” process are the input of the “Validate Scope” process. One of the outputs of the “Validate Scope” process is the accepted deliverables that were formally signed off and approved by the authorized stakeholder.

**Question 97 = A, C**

**Explanation:** Project managers should demonstrate their acknowledgment and recognition to their team members throughout the project life cycle rather than waiting till its end to do so. Moreover, cultural differences should be taken into consideration when determining rewards since recognition and rewards can be perceived differently based on various cultural factors.

**Question 98 = C**

**Explanation:** Team velocity, i.e., the sum of story points’ sizes of the completed features in the current iteration, allows the team to plan its next iteration more accurately by taking into consideration their historical performance (Agile Practice Guide, page 64).

**Question 99 = C**

**Explanation:** The “Identify stakeholders” process should take place either before or concurrently while creating and approving the project charter. Stakeholders’ identification should be carried out as many times as needed. However, it should always be executed at the beginning of each project phase and whenever a significant change occurs on both the project and the organization level. Since the first phase was complete, this means the scope has already been validated. Risks, on the other hand, are identified early on in the project. Nonetheless, you should keep monitoring and identifying new risks throughout the project execution. Likewise, activities are determined during the

planning stage of each project phase, unless you're employing the rolling wave technique or adopting other life cycles rather than the traditional approach, which is not the case in this situation.

**Question 100 = C**

**Explanation:** The project manager's first step should be to include the two sales representatives in question as project stakeholders. Meeting them and trying to win their support should be a key priority. A logical next step could be to use the why-why method or the what-if scenario analysis. If the project manager fails to win their support, they should consider other alternatives for obtaining the retailers' contact info.

**Question 101 = C**

**Explanation:** Understanding cultural differences is the first step toward effective communication, which entails reducing misunderstandings and enhancing communication skills. A communication management plan could be developed later on when you're more acquainted with the aspects and characteristics of this culture.

**Question 102 = C**

**Explanation:** Companies that go for a "Caves and Common" office design ("Caves" refers to private spaces such as separate offices or cubicles and "Common" refers to common work areas) allow its agile team members to temporarily work in quiet separate areas if they are unable to concentrate in the common open area. However, once they have finished the work at hand, they should return to the common team space (Agile Practice Guide, page 46).

**Question 103 = D**

**Explanation:** Any change to the project management plan should go through the organization's change control process by issuing a change request.

**Question 104 = A**

**Explanation:** According to the network diagram, the project is at high risk. With five critical paths and two near-critical paths, any delay of any activity belonging to these paths will result in the whole project's delay. Having more than one critical and near-critical path does not mean that the project requires more resources and an increase in the allocated budget. On the other hand, just because the project is at high risk of schedule delay does not mean it should be terminated.

**Question 105 = D**

**Explanation:** An agile team decides how many story points to tackle based on their own estimations, which can be different across teams. Thus, velocity

can't be used to compare the performance of different teams.

**Question 106 = A**

**Explanation:** Brainwriting (aka individual brainstorming) is a refinement of the brainstorming technique that grants participants time to reflect on the questions individually, either on paper or online, before the whole group participates in a creativity session. This technique allows the participants to be better prepared, making the meeting or the creativity session more effective than a traditional brainstorming session would be.

**Question 107 = A**

**Explanation:** Pairing, swarming and mobbing are collaboration techniques used by the Agile team (Agile Practice Guide, page 39). In swarming and mobbing, multiple team members or the entire team focus collectively on resolving a specific impediment. While in pairing, only two team members work together to resolve an issue.

**Question 108 = B**

**Explanation:** Properly facilitating the meeting entails remaining neutral. A facilitator should also help attendees collaborate and reach a consensus regarding decisions without taking sides. Therefore, they should not participate in negotiations with the potential provider. While facilitating a meeting, the team member should also make sure everyone stays on topic and participates in the conversation.

**Question 109 = A**

**Explanation:** Following the new practices' implementation, the project manager and their team need to verify any performance improvements or deteriorations during the next sprint retrospective so the team can further adjust and reflect on the process. Evaluating the impact could be done by checking the burndown or burnup charts, measuring velocity, comparing the sprint performance to previous sprints, etc. The project manager should act as a servant leader, which means they shouldn't control their team by frequently joining the conferencing rooms or making unilateral decisions. On the other hand, the product owner should respect the self-organizing nature of the Agile team and not intervene in their work processes.

**Question 110 = B**

**Explanation:** In this case, the project is currently in the Collect Requirements process, which involves identifying and documenting the needs and requirements of stakeholders. Data gathering takes part in the Collect Requirements process to obtain stakeholders' requirements. It puts in use tools



and techniques like benchmarking, brainstorming, focus groups, interviews, questionnaires, and surveys.

**Question 111 = A, B**

**Explanation:** At the end of every increment, the customer reviews a subset of deliverables to provide feedback. Thus, their uncertainty about the final result will decrease over time. Change requests cannot be eliminated by following an incremental delivery, if anything you will actually become more receptive to change. Incremental delivery doesn't simplify work for your team either, since splitting work to demonstrate an increment every time to the customer may result in some overheads.

**Question 112 = C**

**Explanation:** The product owner has the authority to cancel an ongoing sprint for any reason they think is valid. There is no sense to continue working on something that is not needed anymore. The project manager should terminate the sprint immediately, but they need to do their best to understand what caused this extreme decision; dissatisfaction, obsolete sprint backlog items, canceled project, etc.

**Question 113 = D**

**Explanation:** The keyword in the question is "several". Ideally, the team should identify a limited list of improvement action items and focus on addressing and prioritizing it, rather than considering too many improvements and eventually losing focus. In a retrospective meeting, feedback concerning ways to improve work processes should be provided by the team, neither by the scrum master nor the product owner. The retrospective is a meeting intended to address lessons learned rather than plan for the next sprint or prioritize pending user stories.

**Question 114 = C**

**Explanation:** Working with the vendor to reach an agreement is a more direct problem-solving approach, and therefore should be the project manager's first choice. If direct negotiation fails, then the project manager and the vendor can involve a third party for mediation and arbitration. Obviously, this will be more costly, risky, and time-consuming. The procurement audit was most probably carried out before the issue occurred. Besides, it doesn't address the vendor's complaints about payment delays.

**Question 115**

**Explanation:**

Task A is not yet complete: Data. Work performance data is the raw measurements and observations made during project execution.

Task B is not accepted because of a security issue: Information. When data is analyzed, it becomes information.

Task C had a huge impact on the burndown chart: Report. Examining the whole picture in a burndown chart is a form of reporting.

Task D is added to the product backlog based on customer feedback: Practice. The activity of creating, refining, estimating, and prioritizing product backlog items is one of the agile practices.

Please note that in the real exam such a question usually comes in the form of “matching”.

### **Question 116 = C**

**Explanation:** The best course of action for the project manager to handle unresponsive stakeholders is to create an efficient communication plan as well as a stakeholder engagement plan. As a project manager, you can't disregard or ignore any stakeholders regardless of their attitude towards your project. If anything, you should give more attention and put more effort into engaging unresponsive ones in case they have a key role or big influence on your project. An efficient communication management plan and stakeholder engagement plan will help you identify these unresponsive stakeholders' level of interest and power and plan your communication and the way you're going to engage them accordingly, making it easier to ensure their collaboration and even possible to win their support. Refusing to manage the project doesn't mean the project will be canceled thus it won't change the fact that certain stakeholders will still lose their jobs. Plus, since the project was chosen for execution, it's intended to bring an added value in spite of its downside for certain involved stakeholders.

### **Question 117 = B**

**Explanation:** The issue log is the right document to note all issues and the way they were resolved (PMBOK 7th edition, page 185).

### **Question 118 = C**

**Explanation:** Backlog refinement provides a chance for the product owner along with the team to discuss and address anything associated with the stories' requirements. This can involve discussing requirements, potential approaches, and even some estimations in order to eventually build a clear idea of how to approach stories.

### **Question 119 = C**

**Explanation:** Lean advocates making decisions as late as possible. Decisions should be made based on as much information as can reasonably be gathered. Keep all your options open until you must make a decision. There are seven guiding principles of lean practices: Eliminate waste, Amplify learning, Decide as late as possible, Deliver as fast as possible, Empower the

team, Build integrity in, and See the whole. Reference: Effective Project Management Traditional, Agile, Extreme, Hybrid by Robert K. Wysocki, pages 360-361.

**Question 120 = C**

**Explanation:** Change requests that get approved involve either a defect repair or a corrective or preventive action. The situation implies that some of the buttons on the wireless controller developed by the project team are not functioning as required. This is considered a defect repair since the team has taken immediate action to correct the defective product components due to their non-conformance with requirements. This is neither a preventive nor a corrective action since it's not tackling an inconsistency with the agreed-upon project baseline. It's not a case of gold plating either, as changing non-functioning buttons was carried on to meet the product's initial specifications, not to enhance it or satisfy the customer.

**Question 121 = B**

**Explanation:** The requirements, in this case, were vague due to the project's nature. Thus, they can only be expressed at a high broad level. This can present a challenge when collecting requirements and, more importantly, when decomposing work during the project planning phase. Iterative and incremental approaches are quite suitable for projects with a high level of uncertainty, as they allow the scope to develop along the course of the project. In order to ensure that the product will be aligned with stakeholders' requirements, the incremental approach permits the delivery and demonstration of partial increments, thus allowing for continuous feedback. All of the other suggested actions are not suitable for a project with ambiguous requirements and a high degree of uncertainty.

**Question 122 = A**

**Explanation:** According to the RACI chart, Stefania is accountable for the activity of writing the RFP. Therefore, the project manager needs to talk to Stefania in order to investigate the issue. Michelle is the one responsible for writing the RFP, but she should not be held accountable if something goes wrong, as this situation implies.

**Question 123 = D**

**Explanation:** Since the Sprint hasn't yet started, the cross-functional team can still make changes to the Sprint Backlog items. During sprint planning, if the team realizes that they might not be able to accomplish the selected items, they can decide to remove some of them in consensus with the Product Owner, since they're the only person in charge of approving the sprint backlog items.

**Question 124 = C**

**Explanation:** The best course of action would be to have a meeting with the sponsor to further discuss the different options, such as finding another company, negotiating the price, reducing the study scope of the study, etc., as well as the consequences of skipping the study. If the sponsor is still determined on skipping the study, a change request should be issued. Likewise, if it's feasible to train the project team to carry out the study, formal approval should be acquired in order to go with this option. The project manager should not ignore the sponsor's request and hire the company: the sponsor is a key stakeholder and their feedback should be highly considered.

**Question 125 = A**

**Explanation:** The product backlog should be prioritized and organized based on the value that each item brings to the product and project. This value depends on several factors such as the item's complexity, criticality, and the risk associated with it. However, these factors are not the basis to determine the items' value. Each item's value is dictated by the Product Owner as well as the items' sequence in the product backlog.

**Question 126 = D**

**Explanation:** A servant leader promotes team growth, prioritizes their needs, and plans for successors by developing future servant leaders. This leadership style, however, does not entail that the project manager has to take instructions from their team.

**Question 127 = A**

**Explanation:** The project manager should refer to the project charter to find a 'high-level description' of the project. The project charter is a formal document that describes the project in its entirety, including its objectives, involved stakeholders, and the way its work will be carried out. This is a project planning document that can be used throughout the whole project's lifecycle. User stories and epics only represent the detailed requirements, not the entire high-level description of the project scope. The Work Breakdown Structure (WBS) also outlines the detailed requirements of projects that follow a predictive life cycle.

**Question 128 = D**

**Explanation:** A portfolio manager coordinates and manages a group of related or non-related projects and programs.

**Question 129 = C**

**Explanation:** In the "Define scope" process, the project manager decides what should be included in the study and what should not. The "Plan scope

management” process, on the other hand, describes how the offshore study will be defined, validated, and controlled. The “Collect requirements” process is already done since the project manager noted down the stakeholders’ requirements earlier. The process of “Define requirements” is a made-up term.

**Question 130 = C**

**Explanation:** The engagement assessment matrix classifies stakeholders into five groups based on their engagement level: unaware, resistant, neutral, supportive, and leading. The power/interest grid classifies stakeholders according to their levels of power and interest. The salience model, however, classifies stakeholders based on their power, urgency, and legitimacy. Directions of influence, on the other hand, classifies stakeholders according to their type of influence on the project: upward, downward, outward, and sideward.

**Question 131 = C**

**Explanation:** The Expected Monetary Value is calculated by multiplying the risk probability by the risk impact (PMBOK 7th edition, page 176):  $EMV = 0.7 \times \$10,000 = \$7,000$ . In this question, the risk impact is \$10,000. Contingency reserve comprises the sum of all the EMVs. Present value is rather used in the cost-benefit analysis.

**Question 132 = A**

**Explanation:** The project profit = Revenue - Operational cost - Tax liability =  $\$15,000 - \$5,000 - \$5,000 = \$5,000$ .

Return on the invested capital = Project profit / Invested capital =  $\$5,000 / \$50,000 = 10\%$

**Question 133 = C**

**Explanation:** A project management plan is a formal document that defines how a project is going to be carried out (PMBOK 7th edition, page 186). The project plan is created during the planning phase of the project life cycle, and it must be approved by stakeholders before the project can move on to execution. The project charter is a document that is meant to identify and authorize the Project Manager to start the project. The project management plan is created as part of the planning process group.

**Question 134 = B**

**Explanation:** Big user stories or large-scale features are known as Epics. Epics usually involve a high-level feature, requirement, or customer request with a few lines of description, as they might only depict the final desired output. Epics could expand over months and even take over an entire release or releases (Essential Scrum by Rubin, Kenneth, page 86).

**Question 135 = D**

**Explanation:** Sending the altered RFQ to all suppliers, highlighting the requirement that was previously missing, and allowing them to send updated responses to the RFQ would be fair to all suppliers. Moreover, in this situation, formal written communication is highly recommended as verbal communication might be misunderstood or forgotten. Extending the deadline without re-issuing the RFQ will not address the issue.

**Question 136 = A, D**

**Explanation:** It is important not to immediately respond to a difficult question without first taking some time to think about the answer. Repeating the question and asking for clarification will help the project manager take enough time to consider their response. It would be impolite to claim that the question was irrelevant to the meeting's topic. If the meeting is running late, the project manager could ask the stakeholder to discuss the topic after the meeting. Escaping the question is not a good idea either.

**Question 137****Explanation:**

- A. Inspects progress towards the sprint goal = Sprint execution
- B. Presents the project's performance to the stakeholders = Sprint review
- C. Discusses the improvements that can be applied in the upcoming sprints = Sprint retrospective
- D. Provides estimates of the required effort to complete user stories = Sprint planning

Please note that in the real exam such a question usually comes in the form of "drag & drop".

**Question 138 = A**

**Explanation:** Saving an endangered species of rhinos from extinction is the only correct example of a project since it has a unique outcome and a limited time frame. Governments and NGOs usually lead this kind of project which can take years. However, activities occurring after the project is complete, such as routinely keeping track of the endangered species population, could be considered operations. Periodically cleaning the local park, cyclically producing shoes, or routinely preparing dinner are all examples of operations rather than projects.

**Question 139 = B**

**Explanation:** In order to establish a proper connection with the audience and jury, the project manager should make eye contact. It is critical to maintaining eye contact with the receiving part of the communication process. The project manager should confidently look at the audience, without focusing

on one person. Instead, they should make a sweeping glance at the audience from the left to the right and from the front to the back of the room to try and hold the attention of each member of the audience.

**Question 140 = D**

**Explanation:** During backlog refinement, the team helps the product owner create or review emergent product backlog items as well as progressively refine larger ones. The team also estimates the size of product backlog items and helps the product owner prioritize them. As a general rule, the development team should allocate up to 10% of its time in each sprint to assisting the product owner with refinement activities (Essential Scrum by Rubin, Kenneth S, page 106).

**Question 141 = D**

**Explanation:** For sprint planning, and in order to estimate how much work the team can accomplish, you should measure the work that has been previously done, meaning you should rely on the team's average velocity:  $(30 + 34 + 30 + 26 + 30) / 5 = 30$ . By evaluating the velocity in the past sprints, you will be able to estimate how much work can be delivered in a particular duration or by a particular date and how many story points can your team commit to finishing in a sprint. Using the first or the last velocity is meaningless since one value is not enough to represent a team velocity. Using the most repetitive value isn't accurate either since the repetitive pattern does not represent the average (for example, this series 30, 35, 30, 35, 30 has an average of 32 points even though 30 is the most repetitive value).

**Question 142 = B**

**Explanation:** During the daily standup, the scrum master listens to the team members for any faced impediments and provides support in case of need. It's recommended that the standup meeting is facilitated by any team member rather than the project manager to ensure it does not turn into a status meeting. Ideally, it is a time for the team to self-organize and make commitments to each other (Agile Practice Guide, page 54).

**Question 143 = B**

**Explanation:** An internal project is a project in which the customer is a person or department within your company. An external project, however, is a project in which the customer is an external party, whether it is a person or an organization. The customer or the client is the person, department, or organization that is supporting the project's development financially. The end-user of a product is not necessarily the project client or customer. Some corporations focus almost entirely on internal projects. Internet and software companies, for instance, primarily create internal projects in which they are

their own client and their end-user is the general public (Fundamentals of Technology Project Management by Colleen Garton, Erika McCulloch, page 84). There is no indication in the question that the project is large or that it adheres to a traditional or agile approach.

**Question 144 = A**

**Explanation:** Creating exhaustively detailed formal documentation is considered a waste of time and effort in projects following the agile approach. According to the Agile Manifesto, delivering software that conveys the required value is prioritized over creating documentation. However, documentation is still necessary, thus, it should be created within the limits of fulfilling regulatory requirements or conformance checks when dealing with safety-critical products.

**Question 145 = B**

**Explanation:** In Agile, team members determine how plans and components should be integrated in order to deliver the final work (Agile Practice Guide, page 91).

**Question 146 = A**

**Explanation:** The compromise approach to conflict resolution is characterized by searching for solutions that bring a certain level of satisfaction to all parties involved in order to temporarily or partially resolve the conflict (PMBOK 7th edition, page 168). In the question, a temporary solution was suggested to ensure some degree of satisfaction for both the project manager and the functional manager (a lose-lose situation). On the other hand, smoothing emphasizes areas of agreement rather than areas of difference, leading to a yield-lose situation.

**Question 147 = C**

**Explanation:** It is the responsibility of the Product Owner to maintain and refine the backlog. Upon receiving a new requirement, it should be added to the backlog and then prioritized for implementation. Any stakeholder, not just the product owner, can submit a request.

**Question 148 = A**

**Explanation:** In order to implement the determined improvement actions in the upcoming sprint, they should be placed in the next sprint backlog. This step requires the consent of the Product owner, who should allow some work related to process improvements within the sprint. If not, they should be persuaded of the importance of continuous improvement as a crucial part of the Agile approach.

**Question 149 = A**



**Explanation:** In the burndown chart, the trend line shows how much work is pending. When the actual progress line is above the projected line, it indicates that there is more work pending than initially planned. Agile self-organized teams use empirical and value-based measurements, such as the burndown chart, to monitor the iteration status. Controlling the schedule when following an agile approach is different than when using the predictive approach; the team is responsible for completing iterations on time. Besides, if the iteration ends without completing all the work, no change requests can be issued since the schedule is fixed and the scope is variable in Agile.

**Question 150 = B, C**

**Explanation:** Individual and team assessment tools include attitudinal surveys, specific assessments, structured interviews, ability tests, and focus groups. Team-building is used for team development, while brainstorming is mostly used for collecting project requirements.

**Question 151 = A**

**Explanation:** SMART is an acronym that stands for Specific, Meaningful, Achievable, Relevant, and Timely (PMBOK 7th edition, page 97). Each letter in SMART can have other alternatives, except the “S” which commonly refers to “Specific” or “Strategic and Specific”.

**Question 152 = B**

**Explanation:** Apart from being responsible for guiding the team, the Scrum Master is also responsible for protecting the development team from any interruptions or distractions. This situation requires the Scrum Master’s intervention on behalf of the team to ask the sponsor subtly to stop interrupting the team work.

**Question 153 = C**

**Explanation:** A screening system could be used to short-list applicants based on predefined criteria, such as technical capabilities, years of experience, location, etc. Since the number of applications is high, it would be better to resort to screening. By defining go/no-go criteria, the project manager will be able to reduce the number of applications to treat. Random selection is not a suitable option because it does not ensure the selection of eligible resources. On the other hand, using a weighting system requires a thorough examination of each application since a score will be attributed according to a set of predefined criteria. Hence, this option would be time-consuming. It could, however, be used after applying the screening system. Altering the job description is not the right action since the job offer had already been published, and applications had been received. Thus, the question addresses the resource selection phase.

**Question 154 = D**

**Explanation:** In agile projects, the scrum team opts for a gradual method of work elaboration, in which they only refine the product backlog items that they intend to implement in the next sprint or in the near future. However, it's important for the team to strike the right balance between product backlog refinement tasks and their sprint work.

**Question 155 = C**

**Explanation:** Early delivery allows the team to obtain feedback in order to implement the necessary improvements accordingly.

**Question 156 = A**

**Explanation:** Velocity should not be used as a performance metric for assessing the team's productivity. When misused in such a scenario, velocity can result in imprudent and misleading behavior; team members might start to manipulate the system to show higher velocity numbers. They may also undermine quality to get more work "done" which will lead to increasing levels of technical debt (Essential Scrum by Rubin, Kenneth S, page 137). Velocity is used as a planning tool; for example, if your team's velocity is 20 story points and you intend to achieve user stories of 100 story points, you'll need 5 sprints to get all the work done. Velocity is also used as a team diagnostic metric since a consistent velocity is the hallmark of a healthy agile team.

**Question 157 = A**

**Explanation:** Since a Time and Material contract consists of quoting the spent and used labor and materials instead of determining a fixed price for the provided service and/or product, the customer should be informed of the schedule and budget changes in order to issue a correct invoice. Withholding similar information is considered unethical. On the other hand, adding more features requires the approval of the customer. Otherwise, this behavior will be considered Gold Plating. In T&M contracts, there are no incentive fees, unlike the Cost Plus Incentive Fee contract (CPIF) where savings are split between the two parties according to a pre-negotiated formula.

**Question 158 = C**

**Explanation:** The Scrum framework explicitly defines the role and responsibilities of the development team, the product owner, the customer, and other stakeholders. The customer or the product owner are the ones responsible for defining the product scope and features, prioritizing the derived user stories according to their values, and deciding which will be generated first. The development team, on the other hand, is responsible for determining how to carry out the work (the approaches and the techniques that will be implemented and followed for the development process). Upon completing and

delivering the development work, it is up to the customer to review and assess the user experience in order to confirm whether the delivered product meets their needs and expectations.

**Question 159 = D**

**Explanation:** Gold plating entails adding more features that are not included or agreed upon in the scope or product backlog, in order to please the customer. This does not involve scope creep because the customer didn't request the change. Customer obsession consists of hyperfocus on customers' requirements through consistently collecting their feedback to improve their user experience. The product owner should foreground what customers want by prioritizing their requirements in the product backlog. The iterative and incremental aspects of the agile approach ensure continuously delivering value to the customer.

**Question 160 = A**

**Explanation:** Emergency leaves are a common risk that can occur anytime in any type of project. Taking into consideration that agile promotes a work-life balance, team members should be encouraged to work according to their available capacity to keep everyone motivated and avoid draining their energy. Therefore, working extra hours is not an option. Asking for a replacement won't be practical for a short period of time since it'll take them more time to learn about the project. Sprint duration is timeboxed and should not be extended.

**Question 161 = A**

**Explanation:** Scope Baseline is the approved version of a scope statement, work breakdown structure (WBS), and its associated WBS dictionary (PMBOK 7th edition, page 188).

**Question 162 = A**

**Explanation:** Code of accounts is the identifier of the WBS components. Control accounts, planning packages, and work packages are components of the WBS rather than identifiers. Control accounts present the highest level of the WBS, while work packages are the lowest level.

**Question 163 = A**

**Explanation:** The Resource Management Plan covers staffing acquisition, timetable, training needs, recognition and rewards, release criteria, compliance, and safety. On the other hand, the Responsibility Assignment Matrix (RAM) is a useful tool for ensuring a clear division of roles and expectations. The Work Breakdown Structure (WBS) is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables.

**Question 164 = C**

**Explanation:** It will take the project team 3.3 iterations to complete the backlog work items (100 story points / 30 story points = 3.3 iterations). It would take 4 iterations to complete the work because the timebox of the iteration shouldn't be changed. Since the question specifically asks how many weeks are needed for completing work, then 8 weeks is the right answer.

**Question 165 = C**

**Explanation:** The cycle time is how long it takes for the team to complete a task. It's measured from the time they start working on the task. Lead time, on the other hand, starts from the moment the task is added to the board (Agile Practice Guide, page 64).

**Question 166 = B**

**Explanation:** Earned Value (EV) refers to the value of completed work, based on the approved budget assigned to that work. Cost Variance (CV) is the amount of budget deficit or surplus at a given point in time, expressed as the difference between the earned value and the Actual Cost (AC). Schedule Variance (SV) is a measure of schedule performance expressed as the difference between the earned value and the Planned Value (PV).

**Question 167 = C**

**Explanation:** The change control board is established within an organization to review all change requests and decide whether to approve or reject them. The appropriate board structure should involve the project manager, project team members, and the sponsor. Along with these members, the change control board (CCB) could also include key stakeholders such as subject matter experts and consultants. The product owner and Scrum master are roles under the scrum framework, which doesn't include a change control board.

**Question 168 = A**

**Explanation:** As the buyer, the project manager is responsible for issuing the source selection criteria, Request For Quotes (RFQ), and Purchase Order (PO) as procurement documents. Proposals, which involve all information required in the request for quotes, are created by the seller. Source selection criteria are set by the buyer and used to choose the most convenient provider. A request for quote (RFQ) is used to solicit selected suppliers to submit quotes and bids for certain tasks or products. A purchase order (PO) is issued by the buyer for the seller in order to indicate the ordered products or services' quantity, type, and prices.

**Question 169 = D**

**Explanation:** The correct value is “Responding to Change over Following a Plan”. All of the other alternatives are the right values of the Agile Manifesto (Agile Practice Guide, page 8).

**Question 170 = D**

**Explanation:** The project manager should choose a Time and Materials (T&M) contract. This type of agreement allows them to only pay the contractor for the actual cost of the invested time (usually involves specific hourly rates), as well as the actual cost of the used materials and equipment.

**Question 171 = D**

**Explanation:** Identifying the main cause of the issue by performing a root cause analysis is what the project manager should do in the first place, as there is no mention in this scenario of why remote team members feel like they are treated as second-class employees. For instance, they might be feeling isolated due to a lack of collaborative tools or they might be feeling discriminated against due to cultural differences. After finding out the root cause of the issue, the project manager can discuss the matter with the concerned members to come up with an appropriate solution.

**Question 172 = C**

**Explanation:** Information radiators, such as the Kanban board, are a visible display of up-to-date information concerning the team’s work status. A milestone is a point or an event in the project that does not display status information. Brainstorming, on the other hand, is a data-gathering technique, whereas a prototype is a method of getting early feedback on requirements.

**Question 173 = C**

**Explanation:** The scrum master needs to coach the two senior team members and bring to their attention that the scrum team is responsible for tracking the total work remaining in the sprint backlog as an indicator of whether or not they will achieve the sprint goal. They can also attend the standup meeting in order to detect any bottlenecks and help tackle and remove them. In order to get a clear idea about the sprint backlog progress, the scrum master can simply check the burndown chart, but it’s not their responsibility to continuously track the sprint backlog work progress.

**Question 174 = A**

**Explanation:** A projectized organization allows project managers to have the most control over their projects. In this type of organization, the project manager is responsible for making practically all of the decisions as all organizational units report directly to the project manager. Furthermore, most of the organization’s resources are fully dedicated to project work.

**Question 175 = A**

**Explanation:** Since the project is already behind schedule and under budget, the project manager can consider crashing it by compressing the testing phase and adding more resources. If this is not feasible due to any potentially arising complexity or lack of resources, they need to decline the program manager's request and complete the testing in two weeks as they previously planned. The project manager shouldn't submit a change request to squeeze testing activities in one week as it will result in lowering the product quality. Even if it means completing the project behind its initial schedule, it is important to perform all of the project aspects that were agreed upon by the customer. Fast-tracking means performing multiple activities concurrently, so it's not intended to reduce a certain activity's duration.

**Question 176 = C**

**Explanation:** No matter how late a change request is made, it should be considered as long as the project is still running. Refusing or accepting is beyond the project manager's authority; it falls under the Change Control Board (CCB) responsibilities. The project manager should evaluate and discuss the change request with relevant stakeholders before presenting it to the CCB in order to argue whether it should be implemented or refused.

**Question 177 = B**

**Explanation:** It's not among the product owner's responsibilities to tell a self-organizing agile team how to do their work. However, it's among their responsibilities to let them know what they should do through defining requirements and user stories, when they should do it by defining priorities, and why they do it by defining a vision.

**Question 178 = C**

**Explanation:** Since it's based on short development iterations, Agile approaches allow for early and frequent feedback by delivering a working piece of the product at the end of each iteration to the customer. Since traditional projects can only obtain customer feedback at the end, it is often too late to incorporate the feedback or fix any issues at that stage, unlike Agile projects where new changes are welcomed and integrated into the product development process.

**Question 179 = D**

**Explanation:** Waste time involves the time lost due to interruptions, unproductive meetings, low internet speed, server connection latency, etc. User story estimates should not include waste time; they should only include all known activities needed to complete the story such as research, execution, troubleshooting, testing, etc.

**Question 180 = D**

**Explanation:** The duration of a daily Scrum meeting is time-boxed as 15 minutes; it does not change depending on the length of a Sprint or the size of the team (Agile Practice Guide, page 53).

# Full-Exam Result Sheet

Assign "1" point to each question answered correctly, and then count your points to get your final score.

1.	21.	41.	61.	81.	101.	121.	141.	161.
2.	22.	42.	62.	82.	102.	122.	142.	162.
3.	23.	43.	63.	83.	103.	123.	143.	163.
4.	24.	44.	64.	84.	104.	124.	144.	164.
5.	25.	45.	65.	85.	105.	125.	145.	165.
6.	26.	46.	66.	86.	106.	126.	146.	166.
7.	27.	47.	67.	87.	107.	127.	147.	167.
8.	28.	48.	68.	88.	108.	128.	148.	168.
9.	29.	49.	69.	89.	109.	129.	149.	169.
10.	30.	50.	70.	90.	110.	130.	150.	170.
11.	31.	51.	71.	91.	111.	131.	151.	171.
12.	32.	52.	72.	92.	112.	132.	152.	172.
13.	33.	53.	73.	93.	113.	133.	153.	173.
14.	34.	54.	74.	94.	114.	134.	154.	174.
15.	35.	55.	75.	95.	115.	135.	155.	175.
16.	36.	56.	76.	96.	116.	136.	156.	176.
17.	37.	57.	77.	97.	117.	137.	157.	177.
18.	38.	58.	78.	98.	118.	138.	158.	178.
19.	39.	59.	79.	99.	119.	139.	159.	179.
20.	40.	60.	80.	100.	120.	140.	160.	180.

**Total:**

N° of Correct Answers	% of Correct Answers
----- / 180	-----



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# About The Author

Yassine is a PMP® certified Instructor & Author with more than 10 years of experience in the IT field as a Project manager. Managing and leading both on-site and remote projects, in the public and private sectors, Yassine is passionate about helping and sharing his Project Management expertise and knowledge.

Relying on his academic background along with his real-life experience managing projects in Telecommunications, Retail, Financial Services, and more, Yassine aims to present practical rich content suitable for beginners as well as professionals in the project management field.

Yassine strongly believes in the practical methodology, offering easy to apply knowledge that he is certain about its efficiency considering that he practices what he preaches in his daily position as a Project Manager.

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