IT PROJECT MANAGEMENT

SHORT QUESTIONS

1. **Define Backward Pass?**
   The backward pass starts from the right side of the network diagram and proceeds to the left. It determines the Latest Start (LF) and Latest Finish (LF) of each task. These are defined as follows:
   • Latest Start (LS): The latest date that the task can start.
   • Latest Finish (LF): The lates date that the task can finish.
2. **What is RMMM? * 2019**
   RMMM stands for Risk Mitigation Monitoring and Management. The goal of RMMM is to identify as many potential risks as possible.
3. **What is portfolio management? * 2018 * 2019**
   Portfolio management refers to the centralized management of one or more portfolios to achieve strategic objectives. Portfolio management focuses on ensuring that projects and programs are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with and aligned to organizational strategies.
4. **Differentiate between project, process and product? *2018 * 2019 * 2020**
   Project: A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end.
   Process: A process is a set of interrelated actions and active performed to create a pre-specified product, service, or Result. Each process is characterized by its inputs, the tools and techniques that can be applied, and the resulting outputs.
   Product: An artifact that is produced, is quantifiable, and can be either an end item in itself or a component item. Additional words for products are material and goods. Contrast with result. See also deliverable.
5. **Define stakeholder? * 2020**
   A stakeholder defined as an "individual or group that has an interest in any decision or activity of an organization."
6. **What is Configuration?**
   A configuration is the set of characteristics that define a final product or deliverable. This includes all functional and physical specifications. Physical specifications may include the color, size, weight, shape, and materials.

7. **What is Quadruple constraints?**
   In project management, there is a well-known theory called Triple Constraint, but many people think that it should add one more constraint to be the Quadruple Constraint. Quadruple Constraint consists of SCOPE, SCHEDULE, COST and QUALITY. The last one which make the Triple Constraint to become the Quadruple Constraint.
8. **What's the difference between BCWP and BCWS?**
   Budgeted Cost of Work Performed (BCWP) is the budgeted cost of the value of work that has actually been accomplished or completed to date. It can be used to address the entire project, individual task or work packages. It's compared against Actual Cost of Work Performed (ACWP). BCWP is a tool used in Earn Value Management (EVM) and is also called Earned Value.
   Budgeted Cost of Work Scheduled (BCWS) is the sum of the budgets for all work scheduled to be accomplished with a given time period. It also includes the cost of previous work completed and can address a specific period of performance or a date in time.
9. **What is Gantt Chart? * 2018 * 2020**
   A Gantt chart can be helpful to visualize the project timeline and whether they are tracking to the proper constraints.
10. **What is procurement management? * 2018**
    Project procurement management is a section of the Implementation Plan to determine how "the ordered products necessary for producing deliverables can be delivered on time and within the allocated budget".
11. **What's difference between testing and debugging? * 2018**
    Testing:
    Testing is the process of verifying and validating that a software or application is bug free, meets the technical requirements as guided by its design and development and meets the user requirements effectively and efficiently with handling all the exceptional and boundary cases.
    Debugging:
    Debugging is the process of fixing a bug in the software. It can defined as the identifying, analyzing and removing errors. This activity begins after the software fails to execute properly and concludes by solving the problem and successfully testing the software.

12. **Define preliminary investigation? * 2018**
    Preliminary investigation is the first phase. In this phase, the system is investigated. The objective of this phase is to conduct an initial analysis and findings of the system.
13. **How can slack be negative?**
    Negative slack indicates that there is not enough time scheduled for the task and is usually caused by constraint dates.
14. **Differentiate between schedule variance and cost variance? * 2019 * 2020**

Schedule variance	Cost variance
Schedule variance (SV) is a measure of schedule performance expressed as the difference between the earned value and the planned value. It is the amount by which the project is ahead or behind the planned delivery date, at a given point in time. It is a measure of schedule performance on a project. It is equal to the earned value (EV) minus the planned value (PV).	Cost variance (CV) is the amount of budget deficit or surplus at a given point in time, expressed as the difference between earned value and the actual cost. It is a measure of cost performance on a project. It is equal to the earned value (EV) minus the actual cost (AC).

15. **Define term "Statement of Work"?**
    A statement of work (SOW) is a document routinely employed in the field of project management. It defines project-specific activities, deliverables and timelines for a vendor providing services to the client.
16. **What is Change Control? * 2018**
    Change Control is focused on identifying, documenting and controlling changes to the project and the project baselines. In the change management system, you manage the changes related to the project scope, planning, and baselines.

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17. **What is meant by Cost estimation of any project?**
    Cost estimation in project management is the process of forecasting the financial and other resources needed to complete a project within a defined scope. Cost estimation accounts for each element required for

the project—from materials to labor—and calculates a total amount that determines a project's budget.

18. **What is the method of time estimation of the project?**
    Step 1: Understand what's required. Start by identifying all of the work that needs to be done within the project.
    Step 2: Order these activities. Now, list all of the activities you identified in the order in which they need to happen.
19. **Define Version Control?**
    Version control is a method of tracking changes to document and files so that you can always know which version is the current iteration. Projects typically result in the creation of a lot of documents, from project reports to deliverables.
20. **What is project mitigation?**
    Mitigation is a strategic risk response wherein a project team takes active steps to reduce the probability or impact of a negative risk to a project.
21. **Write the four points of agile manifesto?**
    - Individuals and interactions over processes and tools.
    - Working software over comprehensive documentation.
    - Customer collaboration over contract negotiation.
    - Responding to change over following a plan.
22. **What is meant by resource allocation?**
    Resource allocation is the process of assigning and scheduling available resources in the most effective and economical way possible.
23. **Write name of any four software process models?**
    - Waterfall Model
    - V Model
    - RAD Model
    - Spiral Model
    - Agile Model
24. **Write name of at least four quality factors of project?**
    - customer satisfaction,
    - process improvement,
    - fact-based management,
    - empowered performance.
25. **What is the roll of software matrices?**
    Managers can use software metrics to identify, prioritize, track and communicate any issues to foster better team productivity. This enables

effective management and allows assessment and prioritization of problems within software development projects

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26. What is software project management?

Software project management is the art and science of planning and leading software projects. It is a sub-discipline of project management.

27. Define quantitative approach?

Quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques.

28. What is outsourcing in project management?

Outsourcing allows a company to subcontract a particular area within the organization. A company may outsource project management or any other task or department for one or more reason.

29. What is the basic structure of the V model?

The V-Model is an SDLC model where execution of processes happens in a sequential manner in a V-shape. It is also known as Verification and Validation model.

30. What are the different types of contract?

- cost-reimbursable contracts
- Fixed Price Contract
- time and Material contracts (T&M)
- Cost Plus Fixed Fee Contracts (CPFF)
- Cost Plus Incentive Fee Contracts (CPIF)
- Cost plus Award Fee Contracts (CPAF).

31. List different stages of project life cycle?

- Initiation
- Planning
- Execution
- Closure

32. What is brainstorming? * 2020

A general data gathering and creativity technique that can be used to identify risks, ideas, or solutions to issues by using a group of team members or subject matter experts.

33. **Define RAG?**

    In project management, RAG stands for Red Amber Green and relates to project status reporting which is utilized by project manager to indicate how well a certain project is performing.

34. **What is the object driven or product driven? * 2020**

    In object driven projects the main objective of the final outcome is considered. But doesn't take much effort to build the finalized fully functioning expected version at the initial iteration.

35. **Explain the dependency diagram? * 2020**

    The dependency diagram is built using the lowest level of decomposition in the work breakdown structure (WBS).

36. **Define Project success and project failure? * 2020**

    Project success: The achievement of something desired, planned or attempted. It is also said that success is an event that accomplishes its intended purpose.

    Project failure: A project that fails to perform a duty or an expected action, non-occurrence or non-performance.

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37. **What is Management?**

    Management: Management is a set of principles relating to the functions of planning, organization, directing, and controlling, and the application of these principles in harnessing physical, financial, human, and informational resources efficiently and effectively to achieve organizational goals.

38. **Define Business Case?**

    The business case or similar document describes the necessary information from a business standpoint to determine whether or not the project is worth the required investment. It is commonly used for decision making by managers or executives above the project level.

39. **What is Cash Flow Forecasting?**

    The cash flow forecasting is a financial planning tools that shows the predicted flow of cash in and out of project or organization each month. Forecasting will enable you to plan ahead so that you can anticipate periods of cash shortage and take corrective action.

40. **What is the ROI?**

Return on Investment gives you the AMOUNT you would get in return as a result of your investment.

41. **Define Blueprint?**
    Blueprint is a complete cloud-based solution for collaborative requirements definition and management with support for the entire requirements lifecycle. ... Blueprint is accessible using popular web-browsers, is easy to maintain, and highly scalable to support large distributed enterprise development teams.
42. **What is meant by risk reduction?**
    Risk Mitigation, within the context of a project, can be defined as a measure or set of measures taken by a project manager to reduce or eliminate the risks associated with a project. ... The project manager takes complete authority of reducing the probability of occurrence of risks while executing a project.
43. **Define approaches of agile method?**
    Agile methods or Agile processes generally promote a disciplined project management process that encourages frequent inspection and adaptation, a leadership philosophy that encourages teamwork, self-organization and accountability, a set of engineering best practices intended to allow for rapid delivery of high-quality
44. **Define NPV?**
    A project's net present value (hereafter NPV) is defined as the sum of the discounted value of all receipts minus the sum of the discounted value of all expenditures. All discounting is to the beginning of the project. A rate frequently used for discounting is the firm's cost of capital.

LONG QUESTIONS

Q1. What is Preliminary Investigation? What's the Importance of this Investigation? At which point during SDLC this investigation is being done? What is the end products of this investigation?

Preliminary Investigation:

Preliminary investigation is the first phase. In this phase, the system is investigated. The objective of this phase is to conduct an initial analysis and findings of the system. A brief feasibility study is performed to assess whether or not a full-scale project should be undertaken.

Importance of Preliminary Investigation:

The preliminary investigation is carried out to determine the scope and objectives of the new system and to investigate whether there is a feasible solution. New applications normally originate from end-user requests and are weighed against the other requests for IS resources before approval to develop the system is granted. At this stage an analyst or small project team is authorized to investigate the real potential of the new application. During this brief study the analyst must investigate the problem and the existing system sufficiently to be able to identify the true extent and purpose of the new application.

The purpose of the preliminary investigation is to determine whether the problem or deficiency in the current system really exists. The project team may re-examine some of the feasibility aspects of the project. At this point, the purpose is to make a "go" or "no-go" decision.

End Result

The output from this preliminary investigation is a statement of scope and objectives (often termed the project charter) together with a feasibility report. This document is submitted to management where a decision is made as to whether or not the development project should continue.

Q2. What is difference between ROI and payback period? Explain With Example?

Return on Investment

Return on Investment gives you the AMOUNT you would get in return as a result of your investment. It is a metric you already understand, even if you don't think you do. It's the annual return you receive on an investment and it's the same percentage number a bank tells you when you deposit funds. If the bank is offering a 5% interest rate, then you intuitively know a deposit of $100 today will return $5 a year from now and you'll still have your $100 deposit.

Example: I have invested 15000$ and return on investment in terms of percentage is 5% after 3 years, so Return on Investment after 3 years= 0.05 * 15000 = 750$

Payback Period:

Payback Period is nothing more than time needed before you recover your investment.

Payback Period gives you the number of years would you be paid back the amount you invested.

Example: I have invested 10,000$ and every year, I am getting say 1000$, so the payback period is 10 years. (1000$ * 10years = 10,000$)

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The payback period is the period of time over which the return is received. The return on investment is the amount of money received from your investment.

Q3. Write a note on two of following:

a) Skill Requirement for project manager

1. Communication

Project managers must have strong communication skills to be able to convey messages to clients and team members. They need this skill to effectively share their vision, goals, ideas and issues. They also need communication skills to produce presentations and reports.

2. Leadership

Strong leadership skills are critical for project managers. They allow leaders to oversee and coordinate tasks as well as motivate and encourage the team and define the road map to successfully complete the project.

3. Team management

Besides leading a team from a strategic perspective, project managers also need to manage from an operational point of view. An effective team manager excels at administering and coordinating groups of individuals by promoting teamwork, delegating tasks, resolving conflict, setting goals, and evaluating performance. Leadership is about inspiring others to walk with you; team management makes sure your team has the right shoes.

4. Organization

To ensure processes are running smoothly and in line with common goals, project managers must have strong organizational skills. While this includes the ability to multitask, it also includes prioritizing tasks, compartmentalizing projects and documenting everything for easy access and future reference.

5. Negotiation

A project manager must be effective at negotiating terms with suppliers, clients and other stakeholders. You must also employ negotiation skills when working with your team as well to bring everyone in line with strategic goals or manage interpersonal conflicts within the team.

6. Problem-solving

A project manager must be able to gather information, weigh the associated pros and cons and then formulate the best solution. Strong problem-solving skills will allow project managers to have a structured approach to solving problems to achieve a positive result.

b) Process Groups in Project Management

The five PMBOK process groups are:

Initiating: Processes required to launch a new project or a new project phase. The initiating process group is generally when a project is formally approved and assigned a project manager. The group includes two primary

processes: developing the project charter and identifying the project stakeholders.

The two outcomes of this process group are the project charter document and the stakeholder register. The stakeholder register lists who the project stakeholders are, what their stake in the project is, and what they expect in regards to frequency and form of communication.

The project charter should include the business case for the project, as well as a high-level overview of the project's scope, deliverables, and objectives.

Planning: Processes related to defining and planning the extent of the project, as well as planning how it will be executed.

The planning group is the largest of the five process groups, consisting of 24 processes in total. This group of processes is designed to help you plan your entire project in detail, from the scope, schedule, and budget, through to how you will manage the key stakeholders. The primary outcome of this planning stage is a project management plan (PMP).

For larger projects, the PMP may have sub-plans to further outline some of the critical areas, such as the project schedule or quality management. For smaller projects, processes may simply be covered in separate subsections or fleshed out in an appendix.

The PMP is a "living document" that is updated and revised throughout the project as changes occur.

Executing: Processes related to the actual completion of project activities and tasks. The executing group is where most of the action happens on a project. It is also where most of the budget is spent and where the actual project deliverables are produced.

The executing process group includes ten project management processes. It is primarily focused around managing project activities and tasks to ensure progress is occurring, communications are happening, risk responses are being implemented, and stakeholders are being engaged.

The most significant role for the project manager during this phase is directing and managing the project work and managing the project knowledge. Other typical responsibilities of the project manager include

acquiring project resources, developing and managing the project team, and managing communications.

Monitoring & Controlling: Processes covering everything related to tracking, monitoring, reporting on, and controlling project performance and progress.
The controlling and monitoring process group is the second largest, containing twelve project processes. These processes happen throughout the entire project and are in place to ensure there is sufficient oversight. This will also help identify and mitigate any potential issues.
Inevitably, something unexpected will come up during the project life cycle. The processes in this process group are designed to help you update the plan, modify your team's activities, and get everything back on track.
One of the essential processes in this group is monitoring the project work. This requires the tracking of the overall project and its key aspects. This process is critical in limiting overages and project errors. Often, project management software is used to monitor and report on progress.

Closing: Processes required to finalize and complete a project or project phase. The closing process group only has one primary process: close out the project or phase. This process involves ensuring the customer has accepted all final phase or project deliverables. Documentation should also be completed and stored and any loose ends of the project or phase should be tied up.

Q4. How to Define Project Scope? Explain Project Activities and work breakdown structure?

Project scope is the part of project planning that involves determining and documenting a list of specific project goals, deliverables, features, functions, tasks, deadlines, and ultimately costs. In other words, it is what needs to be achieved and the work that must be done to deliver a project.

Below is an overview of some of the key processes to follow in order to define scope correctly.

- Define the Product Requirements:
- Define the Process Requirements:
- Involve the correct stakeholders:
- Identify the limitations

- Change Management

Activities:

1. Project Planning: It is a set of multiple processes, or we can say that it a task that performed before the construction of the product starts.

2. Scope Management: It describes the scope of the project. Scope management is important because it clearly defines what would do and what would not. Scope Management create the project to contain restricted and quantitative tasks, which may merely be documented and successively avoids price and time overrun.

3. Estimation management: This is not only about cost estimation because whenever we start to develop software, but we also figure out their size(line of code), efforts, time as well as cost.

4. Scheduling Management: Scheduling Management in software refers to all the activities to complete in the specified order and within time slotted to each activity. Project managers define multiple tasks and arrange them keeping various factors in mind.

For scheduling, it is compulsory -

- Find out multiple tasks and correlate them.
- Divide time into units.
- Assign the respective number of work-units for every job.
- Calculate the total time from start to finish.
- Break down the project into modules.

5. Project Resource Management: In software Development, all the elements are referred to as resources for the project. It can be a human resource, productive tools, and libraries.

Resource management includes:

- Create a project team and assign responsibilities to every team member
- Developing a resource plan is derived from the project plan.
- Adjustment of resources.

6. Project Risk Management: Risk management consists of all the activities like identification, analyzing and preparing the plan for predictable and unpredictable risk in the project.

Several points show the risks in the project:

- The Experienced team leaves the project, and the new team joins it.
- Changes in requirement.
- Change in technologies and the environment.
- Market competition.

7. Project Communication Management: Communication is an essential factor in the success of the project. It is a bridge between client, organization, team members and as well as other stakeholders of the project such as hardware suppliers.

From the planning to closure, communication plays a vital role. In all the phases, communication must be clear and understood. Miscommunication can create a big blunder in the project.

8. Project Configuration Management: Configuration management is about to control the changes in software like requirements, design, and development of the product.

Work Breakdown Structure:

Dividing complex projects to simpler and manageable tasks is the process identified as Work Breakdown Structure (WBS).

Usually, the project managers use this method for simplifying the project execution. In WBS, much larger tasks are broken down to manageable chunks of work. These chunks can be easily supervised and estimated.

WBS is not restricted to a specific field when it comes to application. This methodology can be used for any type of project management.

Characteristics of the Work Breakdown Structure:

Not every breakdown of project deliverables can be classified as a WBS. For it to be called a work breakdown structure, it must have certain characteristics:

Hierarchy: The WBS is hierarchical in nature. Each “child” level exists in a strict hierarchical relationship with the parent level. The sum of all the child elements should give you the parent element.

100% rule: Every level of decomposition must make up 100% of the parent level. It should also have at least two child elements.

Mutually exclusive: All elements at a particular level in a WBS must be mutually exclusive. There must be no overlap in either their deliverables or their work. This is meant to reduce miscommunication and duplicate work.

Outcome-focused: The WBS must focus on the result of work, i.e. deliverables, rather than the activities necessary to get there. Every element should be described via nouns, not verbs. This is a big source of confusion for beginners to WBS.

Following are a few reasons for creating a WBS in a project:

- Accurate and readable project organization.
- Accurate assignment of responsibilities to the project team.
- Indicates the project milestones and control points.
- Helps to estimate the cost, time and risk.
- Illustrate the project scope, so the stakeholders can have a better understanding of the same.

Q5. What is Risk Management? Also Describe framework for dealing with risks and mention the Boehm’s top 10 development risks?

When you’re planning your project, risks are still uncertain: they haven’t happened yet. But eventually, some of the risks that you plan for do happen, and that’s when you have to deal with them. There are four basic ways to handle a risk.

Avoid: The best thing you can do with a risk is avoid it. If you can prevent it from happening, it definitely won’t hurt your project. The easiest way to avoid this risk is to walk away from the cliff, but that may not be an option on this project.

Mitigate: If you can't avoid the risk, you can mitigate it. This means taking some sort of action that will cause it to do as little damage to your project as possible.

Transfer: One effective way to deal with a risk is to pay someone else to accept it for you. The most common way to do this is to buy insurance.

Accept: When you can't avoid, mitigate, or transfer a risk, then you have to accept it. But even when you accept a risk, at least you've looked at the alternatives and you know what will happen if it occurs. If you can't avoid the risk, and there's nothing you can do to reduce its impact, then accepting it is your only choice.

Boehm's Ten Development Risks:

- Personnel shortfalls (managerial risk)
- Unrealistic schedules and budgets (managerial risk)
- Developing wrong software functions (technical risk)
- Developing wrong interface (technical risk)
- Unnecessary perfectionism (managerial risk)
- Continuous requirements changes (managerial risk)
- Shortfalls in outsourced tasks (technical/managerial risk)
- Shortfalls in outsourced components (technical/managerial risk)
- Realtime performance shortfalls (technical risk)
- Straining computer science capabilities (technical risk)

Q6. Describe Project closure analysis? What is role of closure analysis? Describe at least four major elements in project closure analysis?

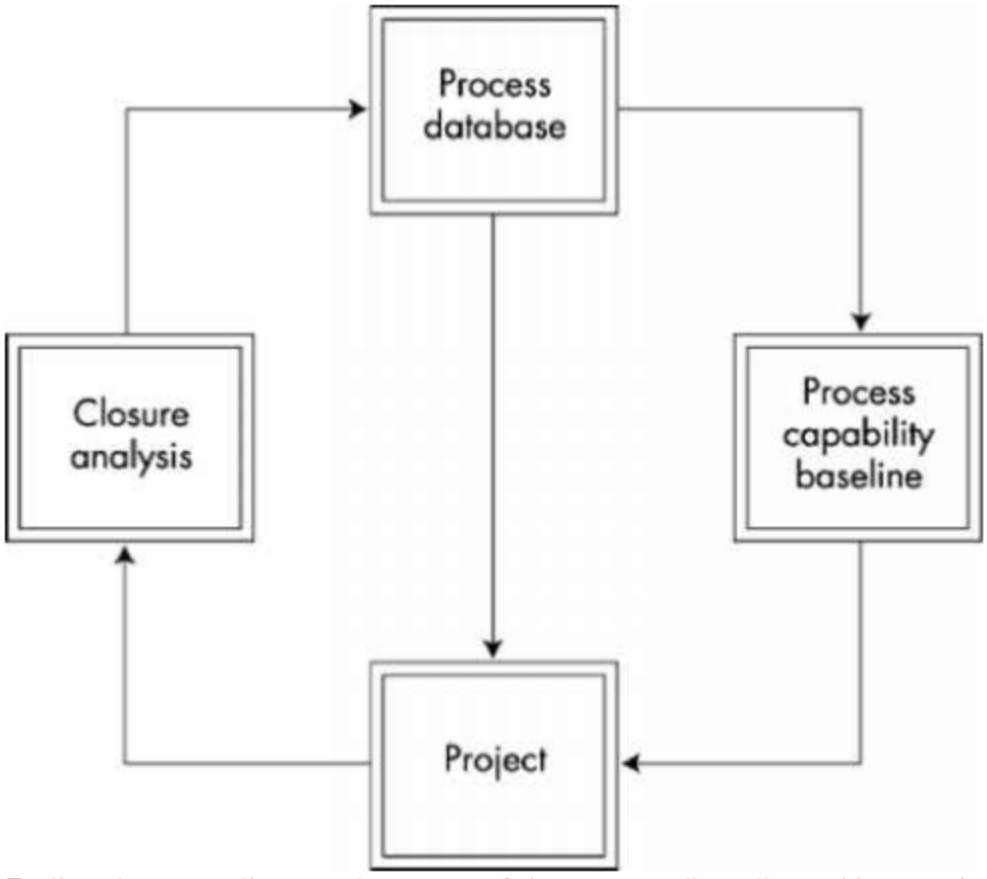
Project Closure Analysis:

Project closure analysis is the key to learning from the past so as to provide future improvements. To achieve this goal, it must be done carefully in an atmosphere of safety so that lessons can be captured and used to improve the process and future projects. Before we describe the details of the closure analysis report, we briefly discuss the role of closure analysis and its implementation.

Role of Closure Analysis:

The objective of a postmortem or closure analysis is "to determine what went right, what went wrong, what worked, what did not, and how it could be made better the next time." Relevant information must be collected from the project, primarily for use by future projects. That is, the purpose of having an identified completion analysis activity, rather than simply saying, "The project is done," is not to help this project but rather to improve the organization by leveraging the lessons learned. This type of learning can be supported effectively by analysis of data from completed projects. This analysis is also needed to understand the performance of the process on this project, which in turn is needed to determine the process capability.

As noted earlier, the data obtained during the closure analysis are used to populate the process database (PDB). The data from the PDB can be used directly by subsequent projects for planning purposes. This information is also used in computing the process capability, which is used by projects in planning and for analyzing trends. Figure illustrates the role of closure analysis.



Elements in Project Closure Analysis:

General and Process-Related Information

The closure report first gives general information about the project, the overall productivity achieved and quality delivered, the process used and process deviations, the estimated and actual start and end dates, the tools used, and so on. This section might also include a brief description of the project's experience with tools. The information about tools can be used by other projects to decide whether use of the tool is warranted

Risk Management

The risk management section gives the risks initially anticipated for the project along with the risk mitigation steps planned. In addition, this section lists the top risks as viewed in the post-project analysis (they are the real risks for the project). This information can be used by later projects and can

be used to update risk management guidelines. Notes may also be provided on the effectiveness of the mitigation steps employed.

Effort

The closure analysis report also contains the total estimated effort and the actual effort in person-hours. The total estimated effort is obtained from the project management plan. The total actual effort is the sum of the total effort reported in all WARs submitted by the project members, including the project leader. If the deviation between the actual and the estimated values is large, reasons for this variation are recorded.

Defects

The defects section of the closure analysis report contains a summary of the defects found during the project. The defects can be analyzed with respect to severity (percentage of defects that were major, minor, or cosmetic), stage detected (percentage of total detected defects detected by which activity), stage injected (which activity introduced what percentage of total defects), and so on. Injection rate and defect distribution are also determined.

Causal Analysis

When the project is finished, the performance of the overall process on this project is known. If the performance is outside the range given in the capability baseline, there is a good chance that the variability has an assignable cause. Causal analysis involves looking at large variations and then identifying their causes, generally through discussion and brainstorming.

Q7. Describe the term “Configuration Management”. Differentiate between Configuration Control and version control?

Configuration management:

Configuration management is a process of tracking and controlling the changes in software in terms of the requirements, design, functions and development of the product.

Configuration management is about to control the changes in software like requirements, design, and development of the product.

For example, suppose you are developing a product and the client requests the addition of some extra features.

Since this change is related to the configuration of the product, you will deal with this change using the configuration management system.

Configuration Control focuses on the specifications of both the deliverables and the processes.

The Primary goal is to increase productivity with fewer errors.

Some reasons show the need for configuration management:

- Several people work on software that is continually update.
- Help to build coordination among suppliers.
- Changes in requirement, budget, schedule need to accommodate.
- Software should run on multiple systems.

Tasks perform in Configuration management:

- Identification
- Baseline
- Change Control
- Configuration Status Accounting
- Configuration Audits and Reviews

People involved in configuration management:

- Project manager
- Configuration manager
- Developer
- User

Difference between configuration control and version control:

Configuration control refers to setting runtime dependencies and we often discuss “configuring” an application to run. An example would be a JMX control or even more basic – specifying whether you are accessing a QA/UAT or production database. There are lots of jobs out there where you

focus on configuration management in the sense of configuring a package to run (actually customizing the runtime experience). This is often done through XML or properties files such as an application server(e.g. WebSphere).

Version control refers to checking in and storing specific versions of the source code and now there is a real difference between configuration control and version control. Years ago the terms were used almost interchangeably although back then we didn't have too many real version control tools.

Q8. Write a detail note on step Wise planning with diagram?

- Step 0: Select project
- Step 1: Identify project scope and objectives
- Step 2: Identify project infrastructure
- Step 3: Analyse project characteristics
- Step 4: Identify project products and activities
- Step 5: Estimate effort for each activity
- Step 6: Identify activity risk
- Step 7: Allocate resources
- Step 8: Review/publicize plan
- Step 9 and 10: Execute plan and lower level of planning

Step 0 : Select project:

This is called step 0 because in a way of project planning, it is outside the main project planning process. Possibility study suggests us that the project is worthwhile or not.

Step 1 : Identify project scope and objectives:

The activities in this step ensure that all parties to the project agree on the objectives and are dedicated to the success of the project.

- 1: Identify objectives and practical measures of the effectiveness in meeting those objectives
- 2: Establish project authority.
- 3: Stake-holders analysis – Identify all stakeholders in the project and their interest.

- 4: Modify objectives in the light of stakeholder analysis.
- 5: Establish method of communication

Step 2 : Identify project Infrastructure:

Projects are rarely carried out in a vacuum. There is usually some kind of infrastructure into which the project must fit. Where the project managers are new to the organization, they must find out the precise nature of this infrastructure.

- 1: Identify relationship between the project and strategic planning
- 2: Identify installation standards and procedures.
- 3: Identify project team organization.

Step 3: Analyze project Characteristics:

The general purpose of this part of planning operation is to ensure that the appropriate methods are used for the project.

- 1: Distinguish the project as either objective- product driven
- 2: Analyze other project characteristics
- 3: Identify high level project risks
- 4: Take into account user requirement concerning implementation.
- 5: Select development methodology and life cycle approach.
- 6: Review overall resources estimates

Step 4 : Identify project products and activities:

The more detailed planning of the individual activities now takes place. The longer term planning is broad and in outline, while the more immediate tasks are planned in some detail.

- 1: Identify and describes project products (or deliverables)
- 2: Document generic product flows
- 3: Record product instance
- 4: produce ideal activity network

- 5: Modify the ideal to take into account need for stages and checkpoints.

Step 5: Estimate effort for each activity:

- 1: Carry out bottom-up estimates
- 2: Revise plan to create controllable activities.

Step 6: Identify activity risks:

- 1: Identify and quantify activity based risks
- 2: Plan risk reduction and contingency measures where appropriate
- 3: Adjust overall plans and estimates to take account of the risks

Step 7: Allocate resources:

- 1: Identify and allocate resources
- 2: Revise plans and estimates to take into account resource constraints

Step 8: Review / Publicize plan:

- 1: Review quality aspects of the project plan.
- 2: Document plans and obtain agreement.

Step 9 & 10: Execute plan / lower level of planning:

Once the project is started, plans will need to be drawn up in greater detail for each activity as it becomes due. Detailed and lower level of planning of the soon stages will need to be delayed because more information will be available nearer the start of the stage.

Q9. Briefly Explain Change Management and Configuration Management?

Project environments are dynamic and changes are constant in areas like process, planning, or scope. You can group these changes into two categories:

- Change Management
- Configuration Management

“Change Management” is the first category. Here you manage changes related to project management plans, processes, and baselines.

In the second category, you manage changes related to product scope, which is known as configuration management.

Change Management System:

Change Control is focused on identifying, documenting and controlling changes to the project and the project baselines. In the change management system, you manage the changes related to the project scope, planning, and baselines.

For example, you run out of money and you need additional funding to complete the project, therefore, you will raise a change request for additional funds.

In the change management system, the change request is analyzed for any possible impact on any other project objectives. Afterwards, the request is either approved or rejected.

To minimize disruption, a change management system must ensure that all parameters are identified and analyzed for any possible impact.

If the change request is approved, you will update the concerned baseline, update the project documents, and inform the concerned stakeholders.

Change Management Activities:

You do the following during change management:

- Identify the changes.

- Prepare a proper documentation for the changes.
- Review, analyze, and make a decision for the change request.
- Make sure that request is implemented, registered and communicated.

Configuration Management System:

Configuration management is a process of tracking and controlling the changes in software in terms of the requirements, design, functions and development of the product.

Configuration management is about to control the changes in software like requirements, design, and development of the product.

For example, suppose you are developing a product and the client requests the addition of some extra features.

Since this change is related to the configuration of the product, you will deal with this change using the configuration management system.

Configuration Control focuses on the specifications of both the deliverables and the processes.

The Primary goal is to increase productivity with fewer errors.

Some reasons show the need for configuration management:

- Several people work on software that is continually update.
- Help to build coordination among suppliers.
- Changes in requirement, budget, schedule need to accommodate.
- Software should run on multiple systems.

Tasks perform in Configuration management:

- Identification
- Baseline
- Change Control
- Configuration Status Accounting
- Configuration Audits and Reviews

People involved in configuration management:

- Project manager
- Configuration manager
- Developer
- User

Q10(a). Discuss the Conventional work breakdown structure?

Work Breakdown Structure:

Dividing complex projects to simpler and manageable tasks is the process identified as Work Breakdown Structure (WBS).

Usually, the project managers use this method for simplifying the project execution. In WBS, much larger tasks are broken down to manageable chunks of work. These chunks can be easily supervised and estimated.

WBS is not restricted to a specific field when it comes to application. This methodology can be used for any type of project management.

Characteristics of the Work Breakdown Structure:

Not every breakdown of project deliverables can be classified as a WBS. For it to be called a work breakdown structure, it must have certain characteristics:

Hierarchy: The WBS is hierarchical in nature. Each “child” level exists in a strict hierarchical relationship with the parent level. The sum of all the child elements should give you the parent element.

100% rule: Every level of decomposition must make up 100% of the parent level. It should also have at least two child elements.

Mutually exclusive: All elements at a particular level in a WBS must be mutually exclusive. There must be no overlap in either their deliverables or their work. This is meant to reduce miscommunication and duplicate work.

Outcome-focused: The WBS must focus on the result of work, i.e. deliverables, rather than the activities necessary to get there. Every element should be described via nouns, not verbs. This is a big source of confusion for beginners to WBS.

Following are a few reasons for creating a WBS in a project:

- Accurate and readable project organization.
- Accurate assignment of responsibilities to the project team.
- Indicates the project milestones and control points.
- Helps to estimate the cost, time and risk.
- Illustrate the project scope, so the stakeholders can have a better understanding of the same.

Conventional work breakdown structures frequently suffer from three fundamental flaws.

1.Conventional work breakdown structures are prematurely structured around the product design.

2. Conventional work breakdown structures are prematurely decomposed, planned, and budgeted in either too little or too much detail.

3. Conventional work breakdown structures are project-specific, and cross-project comparisons are usually difficult or impossible.

(b). What are activities of Software management team?

A software project is concerned not only with the actual writing of software. In fact, where a software application is bought in 'off-the-shelf', there might be no software writing as such. This is still fundamentally a software project because so many of the other elements associated with this type of project are present. Usually, there are three successive processes that bring a new system into being:

I. The feasibility study:

This is an investigation to decide whether a prospective project is worth starting. Information will be gathered about the general requirements of the proposed system. The probable developmental and operational costs, along with the value of the benefits of the new system are estimated. With a large system, the feasibility study could be treated as a project in its own right. This evaluation may be done as part of a strategic planning exercise where a whole range of potential software developments are evaluated and put into an order of priority. Sometimes an organization has a policy where a series of projects is planned as a programme of development.

2. Planning: If the feasibility study produces results that indicate that the prospective project appears viable, then planning of the project can take place. In fact, for a large project, we would not do all our detailed planning right at the beginning. We would formulate an outline plan for the whole project and a detailed one for the first stage. More detailed planning of the later stages would be done as they approached. This is because we would have more detailed and accurate information upon which to base our plans nearer to the start of the later stages.

3. Project execution The project can now be executed.

Q11. Explain COCOMO and PMI's process group with diagram?

COCOMO Model:

Cocomo (Constructive Cost Model) is a regression model based on LOC, i.e number of Lines of Code. It is a procedural cost estimate model for software projects and often used as a process of reliably predicting the various parameters associated with making a project such as size, effort, cost, time and quality. It was proposed by Barry Boehm in 1970 and is based on the study of 63 projects, which make it one of the best-documented models.

The key parameters which define the quality of any software products, which are also an outcome of the Cocomo are primarily Effort & Schedule:

Effort: Amount of labor that will be required to complete a task. It is measured in person-months units.

Schedule: Simply means the amount of time required for the completion of the job, which is, of course, proportional to the effort put. It is measured in the units of time such as weeks, months.

Models of COCOMO:

Different models of Cocomo have been proposed to predict the cost estimation at different levels, based on the amount of accuracy and correctness required. All of these models can be applied to a variety of projects, whose characteristics determine the value of constant to be used

in subsequent calculations. These characteristics pertaining to different system types are mentioned below.

i. Organic – A software project is said to be an organic type if the team size required is adequately small, the problem is well understood and has been solved in the past and also the team members have a nominal experience regarding the problem.

ii. Semi-detached – A software project is said to be a Semi-detached type if the vital characteristics such as team-size, experience, knowledge of the various programming environment lie in between that of organic and Embedded. The projects classified as Semi-Detached are comparatively less familiar and difficult to develop compared to the organic ones and require more experience and better guidance and creativity.

iii. Embedded – A software project with requiring the highest level of complexity, creativity, and experience requirement fall under this category. Such software requires a larger team size than the other two models and also the developers need to be sufficiently experienced and creative to develop such complex models.

Types of Models:

COCOMO consists of a hierarchy of three increasingly detailed and accurate forms. Any of the three forms can be adopted according to our requirements. These are types of COCOMO model:

- Basic COCOMO Model
- Intermediate COCOMO Model
- Detailed COCOMO Model

The first level, Basic COCOMO can be used for quick and slightly rough calculations of Software Costs. Its accuracy is somewhat restricted due to the absence of sufficient factor considerations.

Intermediate COCOMO takes these Cost Drivers into account and Detailed COCOMO additionally accounts for the influence of individual project phases, i.e in case of Detailed it accounts for both these cost drivers and also calculations are performed phase wise henceforth producing a more accurate result.

PMI Process GROUPS

The five PMBOK process groups are:

Initiating: Processes required to launch a new project or a new project phase. The initiating process group is generally when a project is formally approved and assigned a project manager. The group includes two primary processes: developing the project charter and identifying the project stakeholders.

The two outcomes of this process group are the project charter document and the stakeholder register. The stakeholder register lists who the project stakeholders are, what their stake in the project is, and what they expect in regards to frequency and form of communication.

The project charter should include the business case for the project, as well as a high-level overview of the project's scope, deliverables, and objectives.

Planning: Processes related to defining and planning the extent of the project, as well as planning how it will be executed.

The planning group is the largest of the five process groups, consisting of 24 processes in total. This group of processes is designed to help you plan your entire project in detail, from the scope, schedule, and budget, through to how you will manage the key stakeholders. The primary outcome of this planning stage is a project management plan (PMP).

For larger projects, the PMP may have sub-plans to further outline some of the critical areas, such as the project schedule or quality management. For smaller projects, processes may simply be covered in separate subsections or fleshed out in an appendix.

The PMP is a "living document" that is updated and revised throughout the project as changes occur.

Executing: Processes related to the actual completion of project activities and tasks. The executing group is where most of the action happens on a project. It is also where most of the budget is spent and where the actual project deliverables are produced.

The executing process group includes ten project management processes. It is primarily focused around managing project activities and tasks to ensure progress is occurring, communications are happening, risk responses are being implemented, and stakeholders are being engaged.

The most significant role for the project manager during this phase is directing and managing the project work and managing the project knowledge. Other typical responsibilities of the project manager include acquiring project resources, developing and managing the project team, and managing communications.

Monitoring & Controlling: Processes covering everything related to tracking, monitoring, reporting on, and controlling project performance and progress.
The controlling and monitoring process group is the second largest, containing twelve project processes. These processes happen throughout the entire project and are in place to ensure there is sufficient oversight. This will also help identify and mitigate any potential issues.
Inevitably, something unexpected will come up during the project life cycle. The processes in this process group are designed to help you update the plan, modify your team's activities, and get everything back on track.
One of the essential processes in this group is monitoring the project work. This requires the tracking of the overall project and its key aspects. This process is critical in limiting overages and project errors. Often, project management software is used to monitor and report on progress.

Closing: Processes required to finalize and complete a project or project phase. The closing process group only has one primary process: close out the project or phase. This process involves ensuring the customer has accepted all final phase or project deliverables. Documentation should also be completed and stored and any loose ends of the project or phase should be tied up.

Q12. Elaborate Multiple Mistakes related to Product, Process, People and technology?

The set of mistakes that researchers have identified is known as "Classic Mistakes". Those bad practices have been chosen so often, by so many people. And those mistakes have predictable bad-results on the development of the project.

Four categories of classic mistakes:

1) People related

2) Process related

3) Product related

4) Technology related

People related classic mistakes:

Undermined motivation – Studies have shown that giving suspicious talks at the beginning, asking to work overtime reduces the motivation of the people. Sometimes team leaders take long vacations while team is working overnights.

Weak personnel – If a team need an efficient development throughout the project, the recruitment needs to hire talented developers. Also carefully filter people who could do most of the work until the end of the project.

Uncontrolled problem employees – Failure to take actions for problems with team members and team leads will eventually affect the development speed. Some higher management should actively look into those and sort out.

Heroics – Heroics within the team increases the risk and discourages cooperation among the other members of the team.

Adding people to a late project – Adding new people when the project is behind schedule, can take more productivity away from team members.

Process related classic mistakes

This type of mistakes talks about issues that may arise in management and technical methodologies.

Overly optimistic schedules – This sort of scheduling will result in failure by under-scoping the project and hurt long-term morale and productivity of the developers.

Insufficient risk management – If projects risks are not actively managed, the project will lead in to slow-development mode.

Contractor failure – weak relationship with contractors can lead to slow-down the project

Omitting necessary tasks from estimates – People forget about the less visible tasks and those tasks add up.

Code-like-hell programming – Developers should be sufficiently motivated rather forcing them to work hard.

Product related classic mistakes

This type of mistakes talks about which can affect the outcome of the project.

Requirements gold-planting – More requirements that are not really necessary, and pay less attention on complex features

Feature creep – On average 25% of requirements can be changed and affect the project schedule.

Developer gold planting – It is frequent that developers attempt to try new technologies that they saw in other projects, which is not actually necessary.

Technology related classic mistakes

This type of mistakes is about technologies use during the project.

Silver-bullet syndrome – Thinking that certain approach will solve every issue, and that approach has not already used by developers.

Overestimated savings from new tools or methods – New practices will introduce a new risk as team has to go through a learning-curve to become familiar.

Switching tools in the middle of a project – Using new tools will add a learning curve, rework and inevitable mistakes to project schedule

Q13. Explain the risk that are involved in delaying the project also explain version control and configuration control?

Risks involved in delaying the project:

There are number of risks that causes a project to be delayed are as follows:

1. Expansion of functionality: The expansion of functionality is a phenomenon in which new functionalities continue to be conceived and requested as the project proceeds. The software can never be completed in this way.

2. Gold plating: Gold plating is a phenomenon in which programmers and designers try to make many details of the software or design too elaborate. Much time is spent improving details, even though the improvements were not requested by the customer or client.

3. Neglecting quality control: Time pressure can sometimes cause programmers or project teams to be tempted to skip testing. This frequently causes more delays than it prevents.

4. Working on too many projects at the same time Dividing work across many different projects (or other tasks) causes waiting times that lead to many delays in projects.

5. Poor design The absence (or poor realisation) of designs leads to delays, as it requires many revisions at later stages.

6. Research-oriented projects Project in which software must be made and research must be conducted are difficult to manage. Research is accompanied by high levels of uncertainty. When or if progress will be achieved in research is unclear. When software development is dependent upon the results of research, the former frequently comes to a standstill.

7. Mediocre personnel Insufficiently qualified personnel can cause project delays. Technically substantive knowledge of the subject of the project plays a role, as do knowledge and skills in working together to play the game of the project.

8. Customers fail to fulfil agreements Customers are not always aware that they are expected to make a considerable contribution to the

realisation of a project. When customers do not react in a timely manner to areas in which they must be involved, projects can come to a standstill.

9. Tension between customers and developers The tension that can arise between customers and developers can cause additional delays, as it disturbs the necessary base of trust and the working atmosphere.

Configuration control refers to setting runtime dependencies and we often discuss “configuring” an application to run. An example would be a JMX control or even more basic – specifying whether you are accessing a QA/UAT or production database. There are lots of jobs out there where you focus on configuration management in the sense of configuring a package to run (actually customizing the runtime experience). This is often done through XML or properties files such as an application server(e.g. WebSphere).

Version control refers to checking in and storing specific versions of the source code and now there is a real difference between configuration control and version control. Years ago the terms were used almost interchangeably although back then we didn’t have too many real version control tools.

Q14. Explain Function point estimation, COCOMO estimation and Line of code software estimation techniques with examples?

1. Lines of Code (LOC):

Estimation is done on behalf of number of line of codes in the software product.

As the name suggest, LOC count the total number of lines of source code in a project. The units of LOC are:

- KLOC- Thousand lines of code
- NLOC- Non comment lines of code
- KDSI- Thousands of delivered source instruction

The size is estimated by comparing it with the existing systems of same kind. The experts use it to predict the required size of various components of software and then add them to get the total size.

Advantages:

- Universally accepted and is used in many models like COCOMO.
- Estimation is closer to developer's perspective.
- Simple to use.

Disadvantages:

- Different programming languages contains different number of lines.
- No proper industry standard exist for this technique.
- It is difficult to estimate the size using this technique in early stages of project.

2. Function Point Analysis:

Estimation is done on behalf of number of function points in the software product.

In this method, the number and type of functions supported by the software are utilized to find FPC(function point count). The steps in function point analysis are:

- Count the number of functions of each proposed type.
- Compute the Unadjusted Function Points(UFP).
- Find Total Degree of Influence(TDI).
- Compute Value Adjustment Factor(VAF).
- Find the Function Point Count(FPC).

Advantages:

- It can be easily used in the early stages of project planning.
- It is independing on the programming language.
- It can be used to compare different projects even if they use different technologies (database, language etc).

Disadvantages:

- It is not good for real time systems and embedded systems.

- Many cost estimation models like COCOMO uses LOC and hence FPC must be converted to LOC.

3. COCOMO:

COCOMO stands for COnstructive COst MOdel, developed by Barry W. Boehm. It divides the software product into three categories of software: organic, semi-detached and embedded.

The Constructive Cost Model (COCOMO) is an algorithmic software cost estimation model developed by Barry Boehm. The model uses a basic regression formula, with parameters that are derived from historical project data and current project characteristics.

COCOMO consists of a hierarchy of three increasingly detailed and accurate forms. The first level, Basic COCOMO is good for quick, early, rough order of magnitude estimates of software costs, but its accuracy is limited due to its lack of factors to account for difference in project attributes (Cost Drivers). Intermediate COCOMO takes these Cost Drivers into account and Detailed COCOMO additionally accounts for the influence of individual project phases.

1.Basic COCOMO:

Basic COCOMO computes software development effort (and cost) as a function of program size. Program size is expressed in estimated thousands of lines of code (KLOC).

COCOMO applies to three classes of software projects:

- Organic projects - "small" teams with "good" experience working with "less than rigid" requirements
- Semi-detached projects - "medium" teams with mixed experience working with a mix of rigid and less than rigid requirements
- Embedded projects - developed within a set of "tight" constraints (hardware, software, operational, ...)

The basic COCOMO equations take the form:

Effort Applied = ab(KLOC)bb [man-months]

Development Time = cb(Effort Applied)db [months]

People required = Effort Applied / Development Time [count]

Basic COCOMO is good for quick estimate of software costs. However it does not account for differences in hardware constraints, personnel quality and experience, use of modern tools and techniques, and so on.

2.Intermediate COCOMO:

Intermediate COCOMO computes software development effort as function of program size and a set of "cost drivers" that include subjective assessment of product, hardware, personnel and project attributes. This extension considers a set of four "cost drivers", each with a number of subsidiary attributes:-

Product attributes

- Required software reliability
- Size of application database
- Complexity of the product

Hardware attributes

- Run-time performance constraints
- Memory constraints
- Volatility of the virtual machine environment
- Required turnabout time

Personnel attributes

- Analyst capability
- Software engineering capability
- Applications experience
- Virtual machine experience
- Programming language experience

Project attributes

- Use of software tools

- Application of software engineering methods
- Required development schedule

The Intermediate Cocomo formula now takes the form:

E=*ai*(KLoC)*(bi)*EAF

where E is the effort applied in person-months, KLoC is the estimated number of thousands of delivered lines of code for the project, and EAF is the factor calculated above. The coefficient ai and the exponent bi are given in the next table.

Software project	***ai***	***bi***
Organic	3.2	1.05
Semi-detached	3.0	1.12
Embedded	2.8	1.20

The Development time D calculation uses E in the same way as in the Basic COCOMO.

3.Detailed COCOMO:

Detailed COCOMO - incorporates all characteristics of the intermediate version with an assessment of the cost driver's impact on each step (analysis, design, etc.) of the software engineering process 1. the detailed/ model uses different efforts multipliers for each cost drivers attribute these Phase Sensitive effort multipliers are each to determine the amount of effort required to complete each phase.

Q15. Explain Extreme Programming its core values, core practices and limitations?

Extreme Programming:

Extreme Programming (XP) is an agile software development framework that aims to produce higher quality software, and higher quality of life for the development team. XP is the most specific of the agile frameworks regarding appropriate engineering practices for software development.

VALUES

The five values of XP are communication, simplicity, feedback, courage, and respect and are described in more detail below.

Communication

Some people compare software development with team sports activities where participants rely on each other and transfer knowledge from one to another. XP stresses the importance of the appropriate kind of communication – face to face discussion with the aid of a white board or other drawing mechanism.

Simplicity

Simplicity means “what is the simplest thing that will work?” The purpose of this is to avoid waste and do only necessary things such as keep the design of the system as simple as possible so that it is easier to maintain, support, and revise.

Feedback

Feedback helps teams to identify areas for improvement and optimization their practices. Feedback also supports simple design.

Courage

You need courage to raise organizational issues that reduce your team’s effectiveness. You need courage to stop doing something that doesn’t work and try something else. You need courage to accept and act on feedback, even when it’s difficult to accept.

Respect

The members of your team need to respect each other in order to communicate with each other, provide and accept feedback that honours your relationship, and to work together to identify simple designs and solutions.

PRACTICES WHERE TO USE EXTREME ROGRAMMING:

The core of XP is the interconnected set of software development practices listed below.

The twelve practices where we use extreme programming are listed below:

- The Planning Game
- Small Releases
- Metaphor
- Simple Design
- Testing
- Refactoring
- Pair Programming
- Collective Ownership
- Continuous Integration
- 40-hour week
- On-site Customer
- Coding Standard

ROLES IN EXTREME PROGRAMMING:

It tells four types of roles for the people.

- Customer
- Developer
- Tracker
- Coach

EXTREME PROGRAMMING LIMITATIONS

- Extreme Programming is focused on the code rather than on design. That may be a problem because good design is extremely important for software applications.
- Additionally, in XP projects the defect documentation is not always good.
- One more disadvantage of XP is that this methodology does not measure code quality assurance. It may cause defects in the initial code.
- XP is not the best option if programmers are separated geographically.