LECTURE 10

Project execution & closure

Content

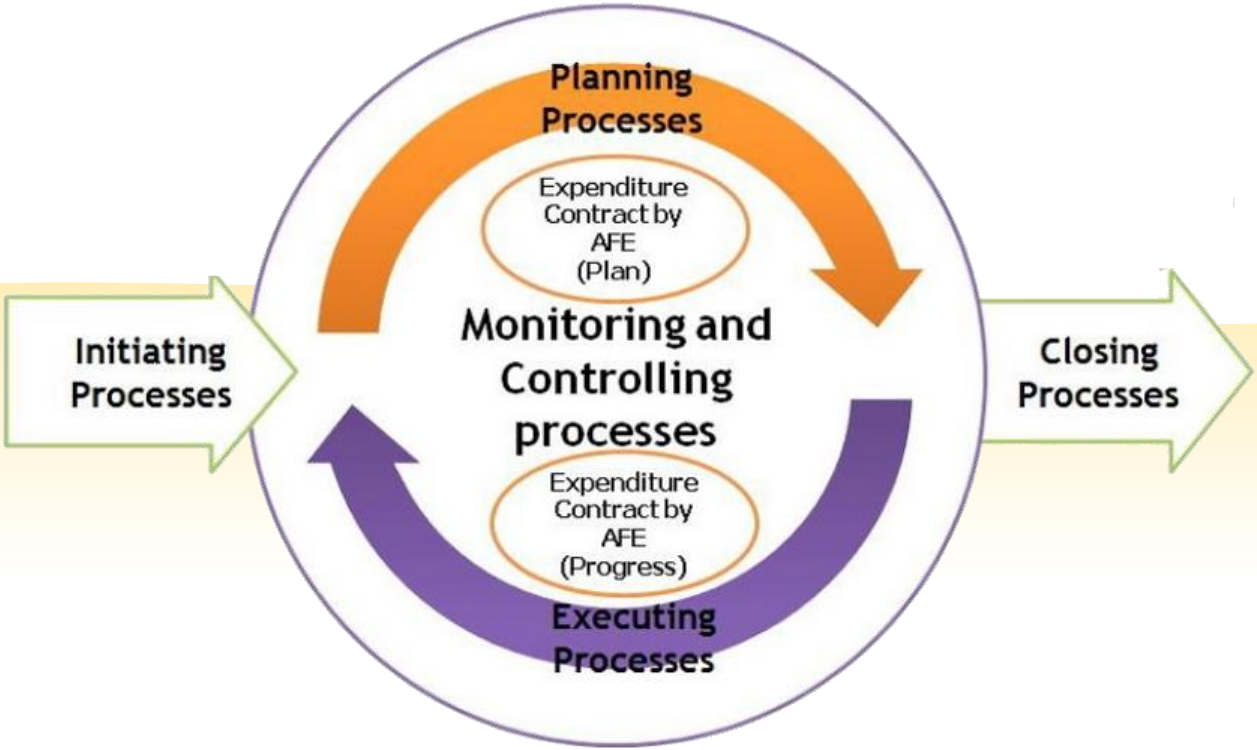
Introduction

- Projects are inherently dynamic in nature and have unpredictability about them.
- These two factors call for continuous monitoring and control of projects lest they go haywire.
- To control and manage this element of unpredictability, you need to have tools and techniques that can be employed to make the journey comfortable.
- For software projects, first of all you need to have a well defined process model, the application of which will help in reducing uncertainty and in achieving consistency.
- The process model will set steps to be followed for completing all project tasks and thus help in planning the project.

Introduction

- A good process model also allows measuring both project processes and the work products.
- Measuring project processes and comparing them with those from best practices will provide information about productivity, costs and schedule, and where the project is heading.
- Measuring the quality of product/work product and comparing them against those achieved with best practices will provide information about the quality of the work products developed as compared to what could be achieved using best practices.
- When you have a good project plan in hand, you can execute your project with much ease

Introduction



Project Monitoring

- A project plan consists of a project schedule and project budget apart from other plan components like communication plan, quality plan, configuration plan, resource plan, etc.
- To track the project execution against the plan, there are major and minor milestones defined in the project schedule.
- When the execution reaches any of these milestones, costs and schedule can be compared to know how the execution is faring against the project plan. Then there are tools like status reports, Goldratt's critical chain method, Gantt charts, earned value management (EVM), etc. that help in monitoring and controlling the project.

Project Monitoring Methodology

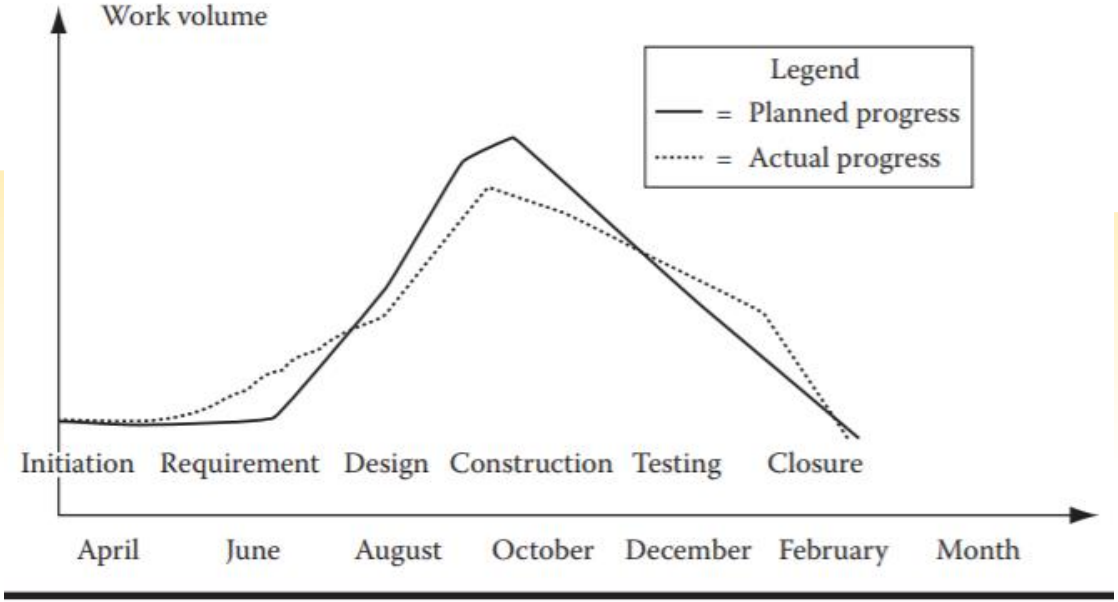
- **Monitor against Project Plan**:
  - Monitoring against the project plan is the most obvious method to get project progress reports.
  - The project plan is treated as a baseline against which the actual progress is measured.
  - Major and minor milestones are provided in the project plan for dividing the whole project plan for easy tracking.
  - If for some reason a milestone is not achieved as per plan, then the project manager has to explain to the customer why the milestone could not be achieved as per plan.

Project Monitoring Methodology

- **Monitor against Project Plan**:
  - And if this occurs, what should be done to achieve the next miles tones on time?
  - There are some techniques available like resource leveling, resource optimization, schedule optimization, etc., which can be applied to put the project on track.

Project Monitoring Methodology

- **Monitor against Project Plan**:



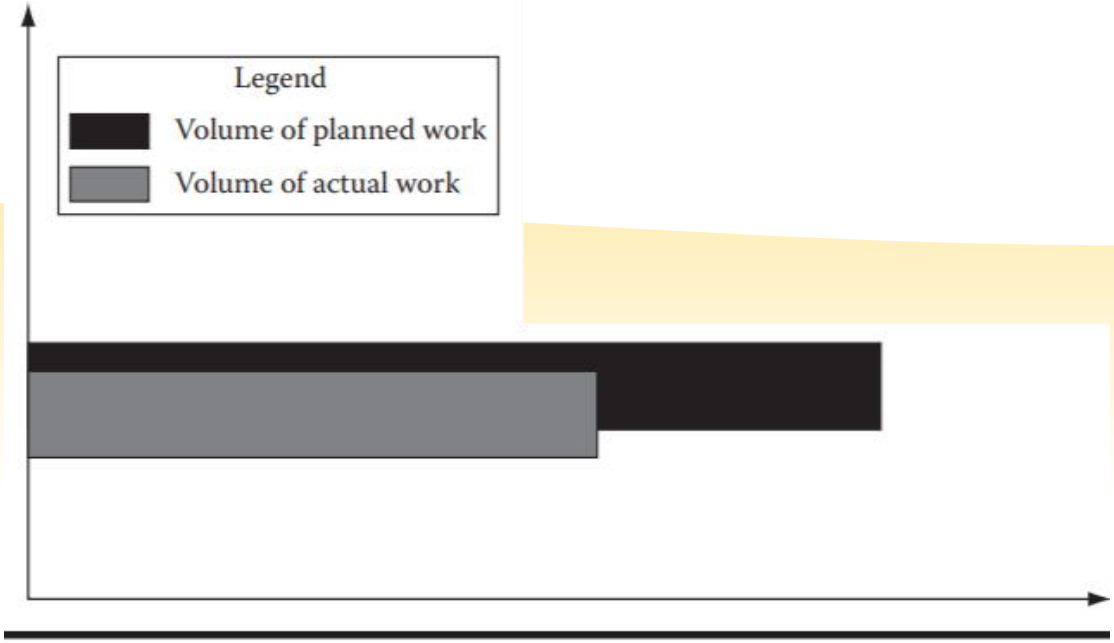
Project plan vs. actual progress.

Project Monitoring Methodology

- **Measure Task Progress and Status Reports**:
  - How can you measure the progress of a project task?
  - If you have a task and you want to measure it, then you need to have information about planned task and actual start dates, planned volume of work, actual volume of work, and task duration.
  - From the planned and actual volume of work, one can figure out the remaining work to be done to complete the task.

Project Monitoring Methodology

- **Measure Task Progress and Status Reports**:



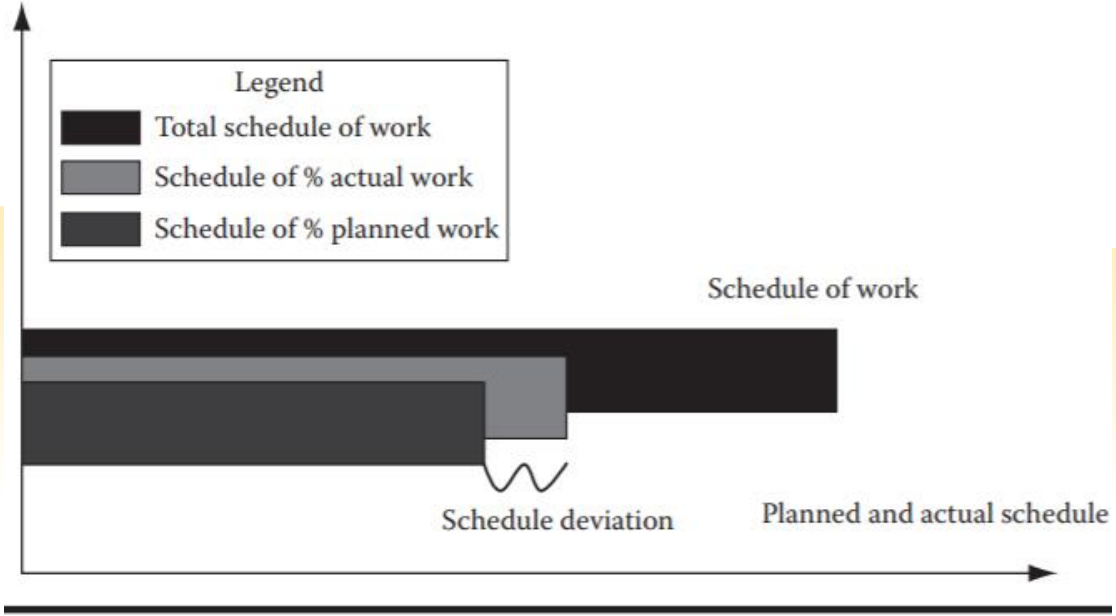
Progress tracking of a task.

Project Monitoring Methodology

- **Measure Task Progress and Status Reports**:
  - If the volume of work is ignored and only dates are taken into consideration, task progress calculation will be wrong. Suppose a task starts on April 11 and finishes on April 20. That means the duration of the task is 10 days. If the project manager is asked to provide a status report of the task up to April 16, then without me asuring the volume of work if he says it is 60% (since 6 days of work has been done out of 10 days) then he is wrong.
  - This figure is only the planned work and not the actual work.

Project Monitoring Methodology

- **Measure Task Progress and Status Reports**:



Project schedule deviation.

Project Monitoring Methodology

- **Measure Task Progress and Status Reports**:
  - Now suppose the work involves writing source code of size 5 KLOC (kilo lines of code). That means his team should be writing 0.5 KLOC of source code per day.
  - Now if he measures and finds that up to April 16 his team has written 3.5 KLOC. That means his team has completed 70% of work. Compared to the planned completion of 60% of work (0.5 × 6/5% = 60%), his team is actually ahead of schedule. This calculation is done for projects where volume and cost of work per day during the entire project period are constant. But this does not happen in reality. To have meaningful calculations, this aspect also has to be taken care of.

Project Monitoring Methodology

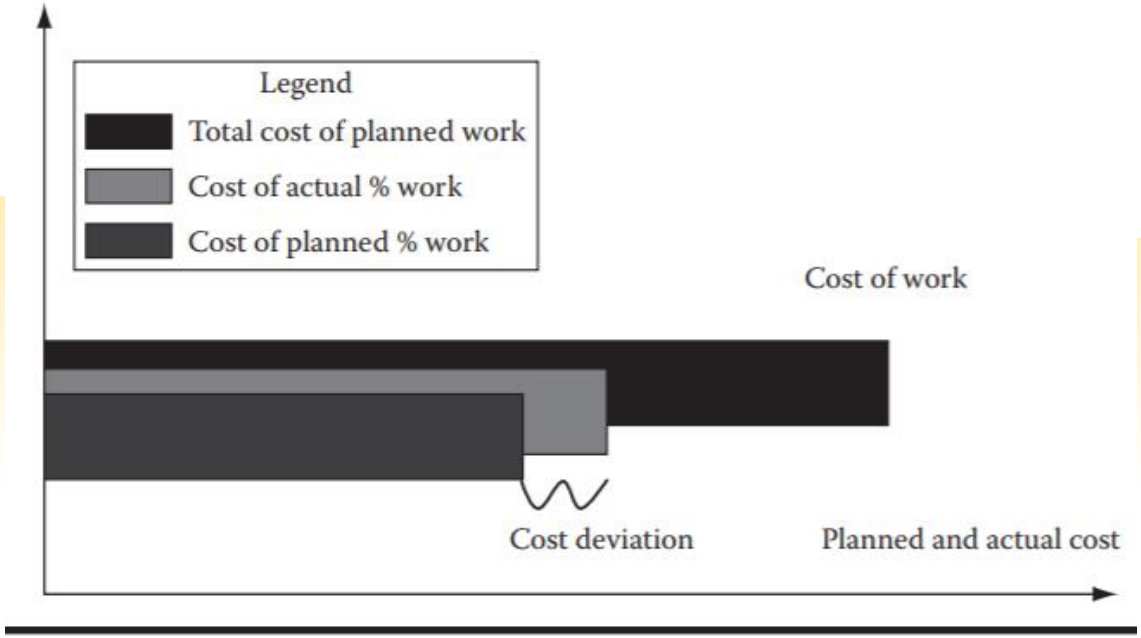
- **Identify Deviations**:
  - When project monitoring is done, the focus of the measurements is to find the deviations from the planned schedule and costs.
  - In the example given earlier, the schedule performance achieved is 70% compared to planned 60%. That means the team is ahead of schedule by a +10% margin (Figure: Project schedule deviation).

Project Monitoring Methodology

- **Identify Deviations**:
  - Now suppose total planned cost for the task is $100. If you break the cost on a daily basis then it comes to $10 per day.
  - In our example, up to April 16, planned cost is $60. Now suppose the actual cost comes to $65. So we have a deviation of +5%.
  - Again these calculations are based on constant volume of work and cost per day, which does not happen in reality.

Project Monitoring Methodology

- **Identify Deviations**:



Project cost deviation.

Project Monitoring Methodology

- **Performance Indicators**:
  - Performance indicators are used to know the performance of project in terms of cost, schedule, and quality.
  - EVM is a good tool for creating and monitoring performance indicators. Performance indicators work only if baseline information is available.
  - If for some reason, baseline information about cost, schedule, or quality could not be kept or is not accurate enough to be reliable, these indicators do not work. It is because there is no accurate planned data available against which the actual execution data can be compared.

Project Monitoring Methodology

- **Monitor against Project Schedule**:
  - A project plan is generally a high-level plan for a project and it does not include details like resource allocation to tasks, task details, etc.
  - A project schedule includes these things, and thus, project schedule tracking and monitoring means measuring the progress of tasks as well as evaluating the performance of resources in the tasks on a daily basis.
  - So while project plans are tracked at the milestone level, project schedules are tracked at task level. Project schedule tracking and monitoring may include information like resource utilization percent, resource loading, task progress, etc.

Project Monitoring Methodology

- **Periodic Measurement**:
  - Projects are extremely dynamic and unpredictable in nature. It is very important that project progress at task level is tracked and measured very frequently to know if everything is progressing well or if there are problems at any time.
  - Actual measurements should be always compared with planned figures, and if any deviations are found, a plan should be made to fix these deviations.
  - In good organizations, each project team member logs his daily activity in a centralized project monitoring system.

Project Monitoring Methodology

- **Periodic Measurement**:
  - Reports from this kind of system can be used to track task progress in terms of schedule.
  - Example: For cost tracking, the project manager can make a simple sheet and keep it updated with the number of hours the resources have worked on the project tasks. Multiplying these hours by their hourly pay rate will give the expense of each task. If more than one resource is working on a task, adding expenses for all the resources working on that task will give the figures of expense of that task. You can then compare the actual expense of the work done so far against the budgeted cost for that work.

Project Monitoring Methodology

- **Earned Value Management**:
  - For any project, specific time duration and specific budget are allocated while making the project plan.
  - In ideal conditions, execution of the project will be completed at exactly the same time and at the same budget. In reality, this never happens. Sometimes, the project may be completed before the stipulated time duration or at less cost.
  - But these cases are rare. Most often, the project overruns both the time duration and cost. Large projects warrant huge budgets, resources, and time.

Project Monitoring Methodology

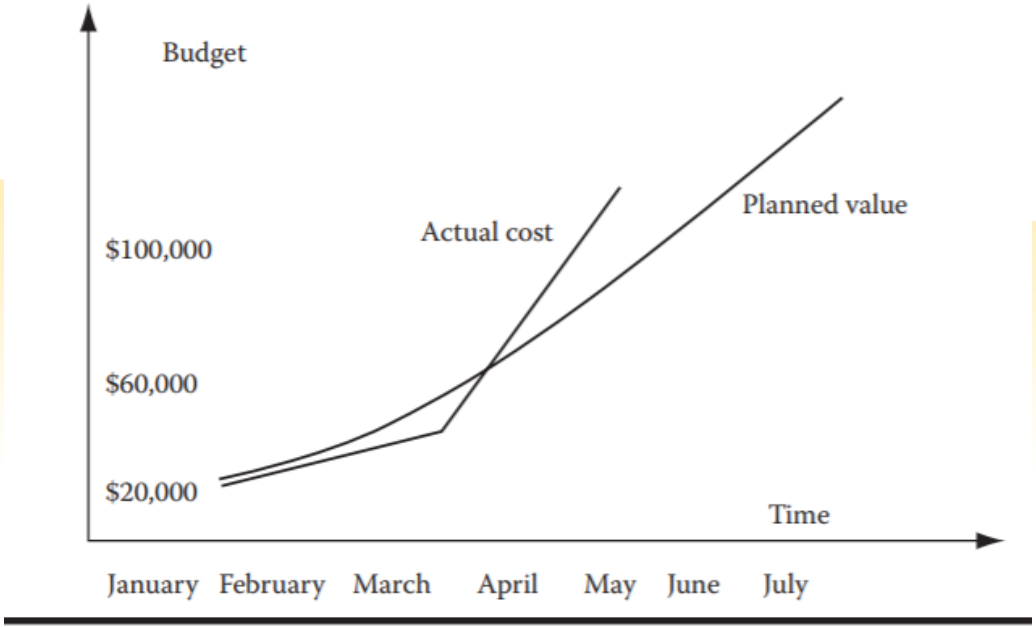
- **Earned Value Management**:
  - It is very important that they are tracked and monitored closely, and timely reports are given to the stakeholders so that they know how the project is progressing.
  - Their reputation and very often jobs are at stake based on the success or failure of the project. So they must get timely status reports about progress of the project.
  - During reporting, if proper project monitoring information is not communicated to the stakeholders, they may not know how the project is progressing.

Project Monitoring Methodology

- **Earned Value Management**:
  - They may be reported only about the percentage of project completion against planned schedule or about the percentage of budget spent so far.
  - But from this information, it is not clear if the project is actually progressing as per plan or if it is lagging behind.
  - This is because there is a third dimension that has not been accounted in these calculations.
  - This dimension is the volume of work performed over different periods of time during the project are not the same.

Project Monitoring Methodology

- **Earned Value Management**:



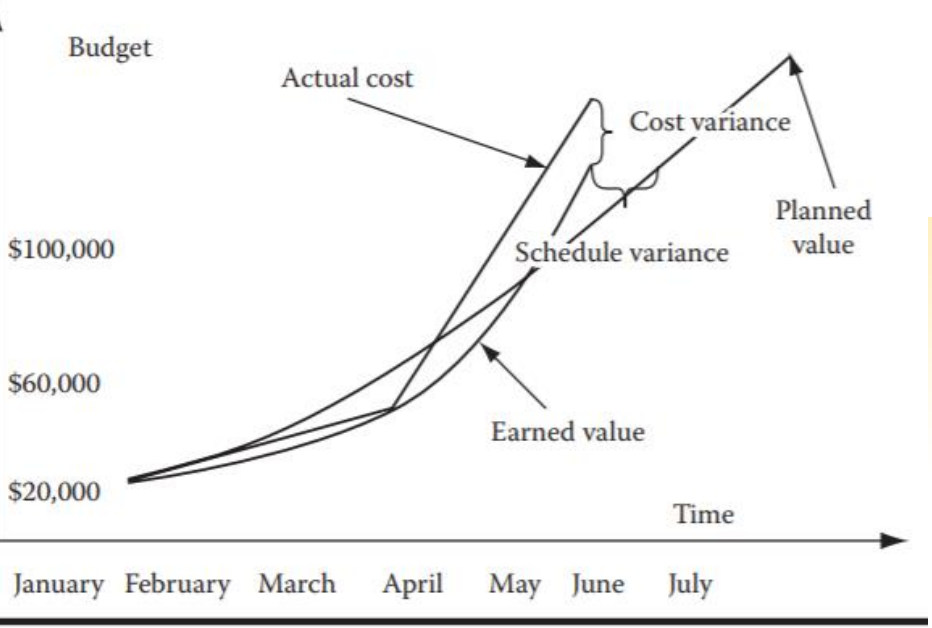
Project progress measurement without EVM.

Project Monitoring Methodology

- **Earned Value Management**:
  - As you can see in above figure, it is difficult to conclude whether the project is progressing well or not as the actual schedule and cost cannot be compared against any value.

Project Monitoring Methodology

- **Earned Value Management**:



Project progress measurement with EVM.

Project Monitoring Methodology

- **Earned Value Management**:
  - With the above figure, the actual cost and schedule figures can actually be compared against planned data.
  - It is because this time, we are tracking the project progress using earned value (EV).
  - The project duration and the project budget are outlined at the beginning of the project.

Project Monitoring Methodology

- **Earned Value Management**:
  - When the project execution starts, we will be recording actual project progress in terms of budget and time consumed by project tasks.
  - Based on the budget consumed by a task, task progress is measured and we also record how much task progress should have been done after consuming that much of budget. This is known as EV.
  - So we have three values here: planned value (PV), EV, and actual value (AV).

Project Monitoring Methodology

- **Measure Resource Utilization**:
  - Resource utilization is a measure of efficiency with which available resources within an organization are utilized in projects.
  - Resource utilization is evaluated more frequently at program or line of business level.
  - For instance, suppose a software service company has a practice division for application development services for financial services. It has a total IT staff of 80 people. It has five projects running. In these projects, a total of 76 people are engaged. That means there are four people who are not assigned to any project. That means this practice division has 95% of resource utilization.

Project Monitoring Methodology

- **Measure Resource Loading**:
  - Resource utilization in projects can be tracked using information as to how many hours of project work is allocated to the resource and how many hours of actual work the resource has put in.
  - So if a resource is allocated 20h of work and he actually puts in 25h of work, the resource utilization is 125%. From other points of view, resource loading also comes into picture.

Project Monitoring Methodology

- **Measure Resource Loading**:
  - Suppose a task requires 20h to be completed. A resource allocated to this task works 8h a day.
  - So under normal loading conditions, he will finish this task in 2.5 days. Now suppose as per schedule, this task needs to be completed in 2 days (16 h). In this situation, the resource can only complete 80% of the work under normal loading conditions.

Project Monitoring Methodology

- **Measure Resource Loading**:
  - The project manager then has two choices: he can assign additional resource to this task to complete it in 16h or he can increase the workload of the existing resource.
  - To complete this task within the schedule, the resource should be loaded with 125% of workload.
  - He may need to work some extra hours every day (overtime of 2h per day in addition to his 8h of regular work).

Project Monitoring Methodology

- **Monitor Skills and Knowledge of Project Team**:
  - During project planning and detailed scheduling, resource matching to project tasks is done.
  - When there is some gap in required and available skills, a training plan is made to bridge this gap.
  - During execution, this training part is also to be tracked to ensure that the planned training has been successfully completed and that the resource who has received the training now can do his task competently.
  - Sometimes it may also happen that during planning, some tasks and the required skills to do them are not properly planned.

Project Monitoring Methodology

- **Monitor Skills and Knowledge of Project Team**:
  - During execution, it is realized that training may be needed.
  - In such cases, arrangement should be quickly made for training. If there is a delay in starting that task, the project plan should be adjusted accordingly.
  - The additional time may either be taken from the schedule buffer or be adjusted against any slack in the project schedule. One more possibility may be regarding resource skills. Sometimes, a resource may leave the project and the project may need to find a replacement.
  - In such a situation, the project manager may need to do resource skills matching and find a suitable replacement

Project Monitoring Methodology

- **Monitor Risks**:
  - Everything to be done in a project comes with a risk.
  - If a software design is to be made, there is a risk that the design is faulty.
  - When doing software testing, there is a risk that the testing is not good enough.
  - When doing a particular project task, there is a risk that it may not be completed on time due to resource shortage or underestimation of the effort required for the task.

Project Monitoring Methodology

- **Monitor Risks**:
  - For each kind of risk that may arise, a contingency plan is needed so that the project does not get affected.
  - Risk identification has to be done and its impact and probability has to be assessed at all times during the execution of the project.

Project Monitoring Methodology

- **Monitor Issues**:
  - Several kinds of issues keep arising during the execution of the project.
  - These issues need to be addressed and solutions to be found and applied so that project progress is not affected.
  - There may be some doubts about the design for which a developer needs a clarification.
  - That clarification is to be provided on time so that the developer’s time is not wasted.

Project Monitoring Methodology

- **Monitor Issues**:
  - All kinds of issues keep arising and the project manager needs to resolve them satisfactorily and in time.
  - Issues are time sensitive and thus require solution within a certain time frame.
  - But all issues are not same. Some have more impact on the project while others do not have much of an impact.
  - So if there is more than one issue at hand, then the project manager should first analyze the impact and accordingly make a list of issues with set priorities and assigning top priority to resolve the issues that have most severe impact on the project.

Project Monitoring Methodology

- **Status Reports**:
  - The customer needs status reports to know whether the project is progressing well or lagging behind in some respect.
  - The project manager needs to prepare status reports and send them to the customer. Generally, these status reports are sent after completion of any milestone in the project.
  - These milestones could be anything and could be set after discussion with the customer. But most often, these milestones denote completion of one phase of the project (requirements, design, construction, testing, etc.).

Project Monitoring Methodology

- **Status Reports**:
  - The status report should contain information about cost, schedule, and quality as to how the project execution is faring against the project plan.
  - If the project is lagging behind in any of these aspects, then a good explanation should be included as to why it happened.
  - The report should also contain a remedy plan to put the project on track.

Project Monitoring Methodology

- **Status Reports**:
  - The report should also contain information regarding achievements, challenges faced, and issues resolved during the report period.
  - Depending on the requirements of the customer, the report can be detailed or succinct.
  - *Many project managers make a mistake of not making a good rapport with the customer*.

THANK YOU !