



## Unit-4 Software Project Management

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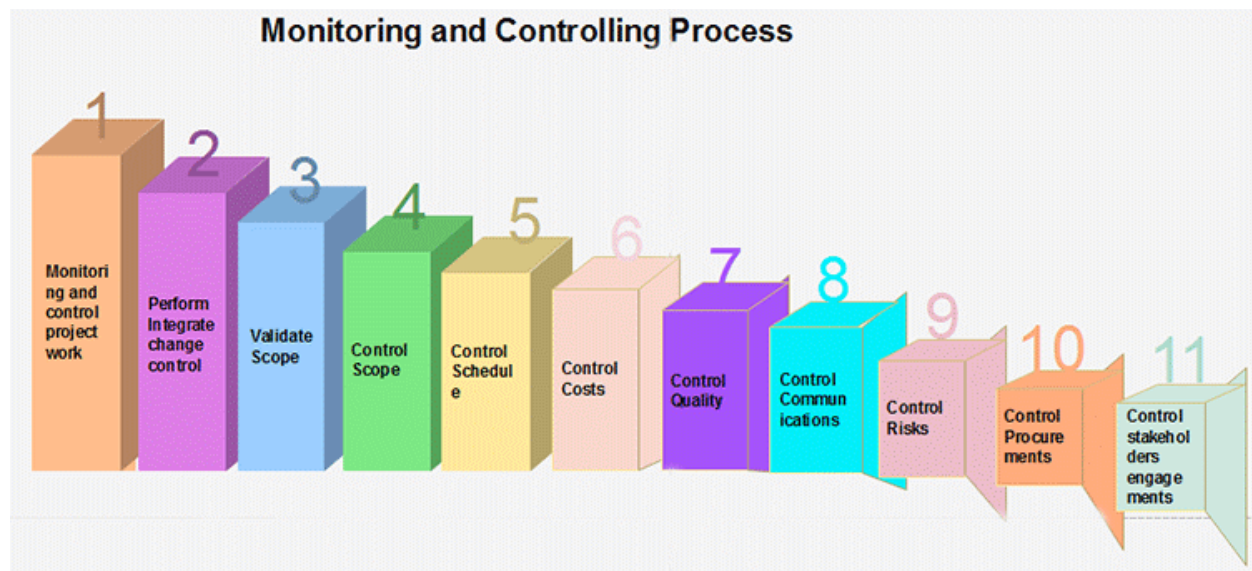
## Unit-4

### Contents covered under this chapter:

- Project Management/ Monitoring and Control
  - Framework for Management and control
- Collection of data Visualizing progress
- Cost monitoring Earned Value Analysis
- Prioritizing Monitoring
- Project tracking
- Change control
- Software Configuration Management
- Managing contracts – Contract Management.

#### **1- Project Monitoring and Control**

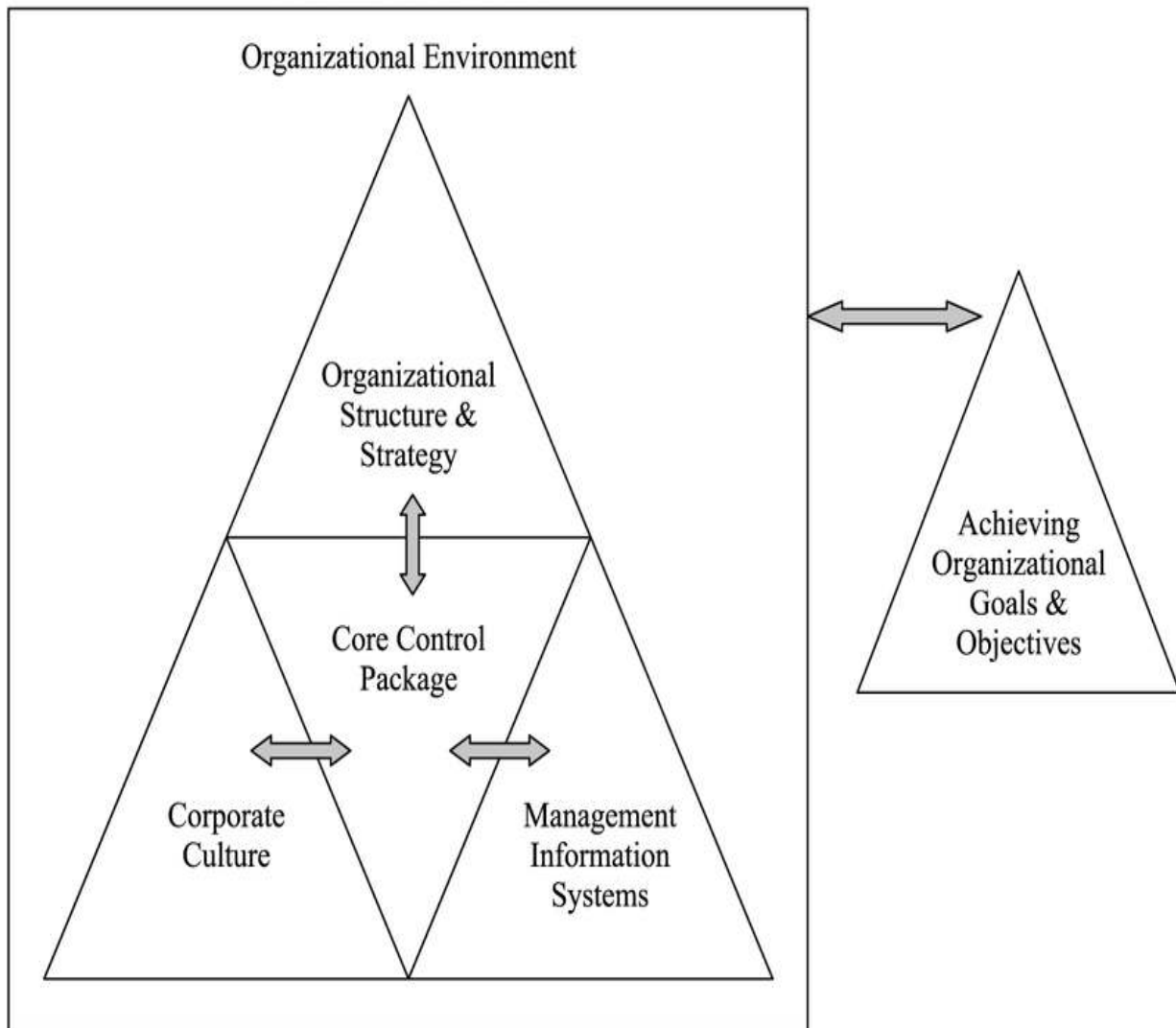
Monitoring and Controlling are processes needed to track, review, and regulate the progress and performance of the project. It also identifies any areas where changes to the project management method are required and initiates the required changes. The Monitoring & Controlling process group includes eleven processes, which are:



1. **Monitor and control project work:** The generic step under which all other monitoring and controlling activities fall under.

2. **Perform integrated change control:** The functions involved in making changes to the project plan. When changes to the schedule, cost, or any other area of the project management plan are necessary, the program is changed and re-approved by the project sponsor.
3. **Validate scope:** The activities involved with gaining approval of the project's deliverables.
4. **Control scope:** Ensuring that the scope of the project does not change and that unauthorized activities are not performed as part of the plan (scope creep).
5. **Control schedule:** The functions involved with ensuring the project work is performed according to the schedule, and that project deadlines are met.
6. **Control costs:** The tasks involved with ensuring the project costs stay within the approved budget.
7. **Control quality:** Ensuring that the quality of the project's deliverables is to the standard defined in the project management plan.
8. **Control communications:** Providing for the communication needs of each project stakeholder.
9. **Control Risks:** Safeguarding the project from unexpected events that negatively impact the project's budget, schedule, stakeholder needs, or any other project success criteria.
10. **Control procurements:** Ensuring the project's subcontractors and vendors meet the project goals.
11. **Control stakeholder engagement:** The tasks involved with ensuring that all of the project's stakeholders are left satisfied with the project work.

## ORGANIZATIONAL MANAGEMENT CONTROL SYSTEM



**Source:** Adapted from Herath (2001, p. 94)

**A project management framework** is a set of processes, tasks and tools that provide guidance and structure for the execution of a project. The framework helps organizations map out the progression of the individual project steps, from beginning to completion. The framework includes all aspects of the project, from required resources and tools to specific processes and tasks.

Project management frameworks typically will be organized into three main components: the project lifecycle, the project control cycle, and tools and

templates. The project lifecycle provides a timeline with goals and milestones for five different stages. The project control cycle provides functions for monitoring and management. Tools and templates can provide organizations with ready-made frameworks that can be applied to project implementations. Popular project management frameworks include Agile, Scrum, PRINCE2, Integrated Project Management (IPM), waterfall and Lean.

The project management frameworks are as follows:

- **The project lifecycle** is comprised of five different stages: initiation, planning, execution, management and review. The purpose of the project lifecycle is to provide a timeline with goals and milestones to accomplish at each stage.
  - **Stage 1: Initiation.** This is the beginning stage of the project. Initiation activities include brainstorming, research, feasibility analysis and stakeholder interviews. The focus of the initiation stage should be to identify which key components are required to put the project into action.
  - **Stage 2: Planning.** Here, those planning the projects should determine who specifically will be involved in the projects, which teams, and plan out progress milestones and success benchmarks. Risk analysis and management should be addressed in detail.
  - **Stage 3: Execution.** This stage consists of the actual production of deliverables, and the specific action items required from each of the individual team members to drive progress for the project.
  - **Stage 4: Management.** This stage focuses on documentation, monitoring and reporting project progress at each milestone. Key takeaways should be shared with stakeholders.
  - **Stage 5: Review.** This occurs at the end of the project. Here, project leaders and team members involved will look back and analyze what went well in the project, any setbacks/hiccups that came up, and

discuss how they can be improved with all relevant stakeholders, customers and manufacturing partners.

- **The project control cycle** involves the active monitoring and management of the project. Key functions of this component include managing and mitigating risks, tracking progress across teams and team members, and communicating project status with external stakeholders. Furthermore, communications channels across different teams and projects are opened. The project control cycle has five of its own stages.
  - **Stage 1:** This stage involves drafting the initial plan, for teams involved in the project to follow.
  - **Stage 2:** Here, the focus is on monitoring project progress across the involved teams.
  - **Stage 3:** At this stage, project managers should evaluate actual progress and compare it to what progress was planned to be completed by that time.
  - **Stage 4:** Project managers should look to identify if progress has deviated at all from the original plan and analyze the implications if so.
  - **Stage 5:** If necessary, corrective action should be taken to steer the project back in the right direction.
- **Tools and templates** offer ready-made structure to organizations looking to implement project management frameworks. There are many tools and templates available, many of which have reached widespread use.

## 2- Visualizing progress:

A manager needs some way of presenting that data to the greatest effect. Some methods of presenting picture are,

**Gantt chart** – It is used to track project progress .It is the simple and the oldest form of representing the progress of the project. It consists of an activity bar that

indicates the scheduled activity dates and the duration along with the activity floats.

**Slip chart** – It is a visual indication of activities that are not progressing to schedule. Alternative view of Gantt chart by providing a visual indication of those activities which are not on schedule. The more bend in the greater the variation in the project plan. If the slip line deviates more towards the non achievement of project objectives then it has to be reconsidered. Additional slip lines can be included at regular intervals.

**Ball charts** – The way of showing whether or not targets have been met or not. It is represented in the form of circles that indicate the start and the end point completion of activities. Circles of the ball chart mostly contain only two dates, the original and the revised one. An activity is denoted by a red circle and green color denotes that the activity is ahead of its schedule. Slippage in the project completion date but it is overcome by the timeline charts

**TimeLine** - The timeline is a method of recording and displaying the way in which targets have changed throughout the duration of the project.

### 3- **Earned Value Analysis in Project Management**

Earned Value Analysis (EVA) is one of the key tools and techniques used in ***Project Management***, to have an understanding of how the project is progressing. EVA implies gauging the progress based on earnings or money. Both, schedule and cost are calculated on the basis of EVA.

## Features of EVA

- Earned Value Analysis is an objective method to measure project performance in terms of scope, time and cost.
- EVA metrics are used to measure project health and project performance.
- Earned Value Analysis is a quantitative technique for assessing progress as the software project team moves through the work tasks, allocated to the Project Schedule.
- EVA provides a common value scale for every project task.
- Total hours to complete the project are estimated and every task is given an Earned Value, based on its estimated (%) of the total.
- Earned Value is a measure of 'Progress' to assess 'Percentage of Completeness'

## Need for EVA

- EVA provides different measures of progress for different types of tasks. It is the single way for measuring everything in a project.
- Provides an 'Early Warning' signal for prompt corrective action. The types of signals can be the following:
  - a) **Bad news does not age well** – Holding on to the bad news does not help. The project manager needs to take an immediate action.
  - b) **Still time to recover** – In case, the project is not going as per schedule and may get delayed, the situation is needed to be taken care of by finding out the reasons that are causing delay and taking the required corrective action.
  - c) **Timely request for additional funds** – While there is time to recover, the need for additional resources or funds can be escalated with an early warning.
- It allows 'rolling up' the progress of many tasks into an overall project status.
- It provides with a uniform unit of measure (dollars or work-hours) for the progress.



## Key Elements of EVA

- **Planned Value (PV)** – The approved cost baseline for the work package. It was earlier known as Budgeted Cost of Work Scheduled (BCWS).
- **Earned Value (EV)** – The budgeted value of the completed work packages. It used to be known as Budgeted Cost of Work Performance at a specified point (BCWP).
- **Actual Cost (AC)** – The actual cost incurred during the execution of work packages up to a specified point in time. It was previously called Actual Cost of Work Performed (ACWP).

These three values are combined to determine *at that point in time* whether or not work is being accomplished as planned. The most commonly used measures are the cost variance:

Cost Variance (CV) = EV – AC and the schedule variance:

Schedule Variance (SV) = EV - PV

These two values can be converted to efficiency indicators to reflect the cost and schedule performance of the project. The most commonly used cost-efficiency indicator is the cost performance index (CPI). It is calculated thus:

$CPI = EV / AC$

The sum of all individual EV budgets divided by the sum of all individual AC's is known as the cumulative CPI, and is generally used to forecast the cost to complete a project.

The schedule performance index (SPI), calculated thus:

$SPI = EV / PV$

is often used with the CPI to forecast overall project completion estimates.

A negative schedule variance (SV) calculated at a given point in time means the project is behind schedule, while a negative cost variance (CV) means the project is over budget.

## 4- Prioritizing Monitoring:

- The process of prioritizing projects is an activity for defining what projects within a portfolio to perform in what sequence.
- It is an attempt to make the project portfolio more effective through identifying the most effective way of implementing the projects.
- **Project Prioritization Process** is a structured and consistent activity that aims to analyze the current operational environment to identify any projects running in parallel within the same portfolio, develop a scoring model including ranking criteria, and apply that model to prioritizing the projects in

order to determine the execution order that ensures the highest efficiency of the overall portfolio.

- The process serves as a framework for managing the effectiveness of parallel projects.

#### **Steps involved for prioritizing monitoring:**

- Collection – you must collect and gather all the data about your projects.
- Ranking – you must develop and use a ranking model that includes criteria for prioritizing.
- Verification – you must approve the ranked projects.

## **5- Project Tracking**

**Project Tracking** is a method of project management for following the progress (or lack thereof) of activities involved in projects. Potential issues can be spotted and solved by team members and leaders. Tracking projects from the beginning, dealing with problems quickly, and proactively making decisions is what successful project managers do.

Managing all tasks and activities involved, handling multiple files involved, and most importantly, the people who make up the team make this incredibly challenging.

Project tracking begins early in the project with planning and goes on until the completion of a project. Monitoring project progress to identify potential problems in a timely manner and take corrective action. Measuring project performance regularly to identify variances from the project management plan to make sure projects are on track.

**There are multiple benefits** and many reasons to engage with project tracking, from increased chances of project success to creating a united team. Keeping up to

date on the progress of the project and awareness of project status, it is easy to spot any potential issues that could prevent project success. Complete transparency is essential for accurate decision-making. Project tracking keeps all team members and stakeholders in touch with deadlines and goals, enabling the project lead to manage with confidence.

There are four key benefits that effective project tracking should deliver.

### **Real Time Information**

Firstly, stay up to date and get the most accurate information available. Everyone involved in the project needs to see the status and progress of the project in an instant. This is crucial for senior management to make decisions at the top level of the project along with team leaders on behalf of the team. Using cloud-based simple project management software, reporting to senior management should be painless. By tracking projects, teams can be aligned, along with project objectives and activities. Stay in touch and watch goals become reality.

### **Problem Identifiers**

With project tracking, there is no place for problems or issues to hide. Any budding issues are recognizable in an instant. This allows leaders to act and take back control of the situation. Team members can offer assistance and keep each other motivated to get jobs done. Problem-solving maintains the structure of the project and allows resources to spend time on the things that matter. Once the issues are gone, the project is back on track and success is on the horizon.

### **Team Motivation**

Collaboration is a key factor of every project. If every member has clarity on their role, they can work toward the group objectives. As projects progress and the task list diminishes with every day, team motivation to carry on and complete the project intensifies. By working together and creating an empowered team, project tracking keeps everyone in the loop and on the same page.

## **Easy and Accurate Reporting**

Reporting is often a painful task that project managers are required to do. Senior management wants an overall view of each of the projects in an instant. Using one system in order to manage and track projects makes reporting [quick and simple](#). Time is valuable so having all information in one place with more detail available if needed, perfect for reporting to senior executives.

## **6- Change control**

**Change control** is a process used to manage change requests for projects and big initiatives. It's part of a change management plan, which defines the roles for managing change within a team or company. While there are many parts to a change process, the easiest way to think about it is that it involves creating a change log where you'll track project change requests.

In most cases, any stakeholder will be able to request a change. A request could be as small as a slight edit to the project schedule or as large as a new deliverable. It's important to keep in mind that not all requests will be approved, as it's up to key stakeholders to approve or deny change requests.

Since the change control process has many moving parts and differs from company to company, it's useful to implement tools that can help the lifecycle process flow smoothly. Tools such as workflow management software can help you manage work and communication in one place.

## **Change control vs. change management**

- Change control: A change control process is important for any organization to have, and can help the flow of information when it comes to project changes. A successful process should define success metrics, organize your workflow, enable teams to communicate, and set your team up for future success.
- Change management: A change management plan consists of coordinating budget, schedule, communication, and resources. So while a change control process consists of a formal document that outlines a request for change and the impact of the change, change management is the overarching plan.

## **Benefits of a change control process**

### **Increased productivity**

A change control process will eliminate confusion around project deliverables and allow the focus to be on executing rather than collecting information. This results in increased productivity and efficiency, especially with the help of productivity software. Without a process in place, productivity can suffer due to time spent on work about work. With limited bandwidth available for the most important work, over one-quarter (26%) of deadlines are missed each week.

### **Effective communication**

Properly documenting change can help alleviate communication issues. When goals and objectives are clearly defined, team communication can flourish. Keep in mind, a change control process won't fix all communication issues. It may be helpful to also incorporate work management software to keep communication about projects in one place. A change control process can then also be shared with executive stakeholders in order to easily provide context for change requests.

## **Better teamwork and collaboration**

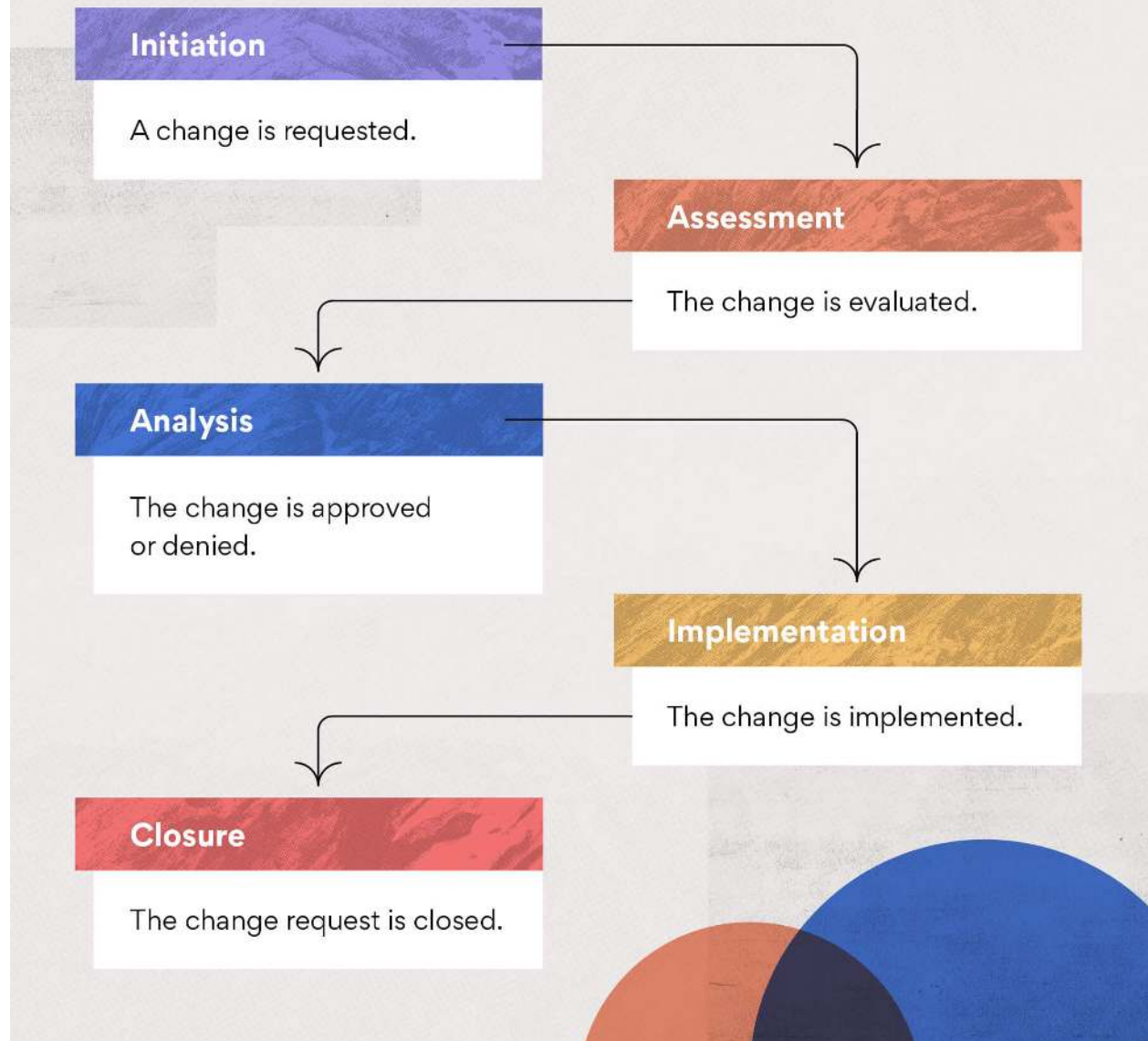
Not only is effective communication a benefit in its own right, but it can also help improve collaboration. With clear communication on project changes, it's easier to collaborate and work together.

For example, when changes are clearly communicated the first time around, stakeholders have more time to focus on creativity and teamwork. Without effective communication, stakeholders are forced to spend time piecing information together instead of working creatively with team members.

## **The five steps of a change control process**

Similar to the five project management phases, there are five key steps when it comes to creating a change control process. Though some processes differ slightly, they all contain a few key elements. From initiation to implementation, each one of these basic steps helps change requests move efficiently through the pipeline and prevent unnecessary changes.

# The five steps of a change control process



## 1. Change request initiation

In the initiation phase of the change control process, a change is requested. There are numerous reasons why you might request a change. For example, a creative

deliverable is taking longer than anticipated. A request would then be made to adjust the deliverable due date. While a request may be more likely to come from a stakeholder or project lead, a proposed change can be requested by anyone.

A team member who wishes to make a request should submit one via a change request form. As the project manager, you should store the change log in a place that's easy to find and everyone has access to.

Once the request form has been filled out, you will update the change log with a name, brief description, and any other details you see fit, such as the date and name of the requester. The log is a record of all project changes, which can be beneficial for managing multiple projects that span many months.

## **2. Change request assessment**

Once the request has been filled out and the initial form has been submitted and approved, the request will then be assessed. This is different from the initial form submission since the assessment is when the actual change will be evaluated.

The assessment phase isn't necessarily where a decision is made, but rather, reviewed for basic information. The information will likely be assessed by a project or department lead, who will review details such as the resources needed, the impact of the request, and who the request should be passed on to.

If the change request passes the initial assessment, it will then be passed on to the analysis phase where an actual decision will be made.

## **3. Change request analysis**



The change impact analysis phase is where there will be a final decision on whether the request is approved or denied by the appropriate project lead. While you may also give input on the decision, it's a good idea to get official approval from a leader as well. In some cases, there may even be a change control board that is in control of any change approvals.

An approved change request will require signoff, and from there, be communicated to the team and continue through the rest of the five-phase process. It should be documented on the change log and anywhere else project communication lives to ensure all project stakeholders understand the shifts needed.

If the change request is denied, it should also be documented on the change log. While communicating a denied request to the team isn't necessary, it could be helpful in order to prevent confusion.

#### **4. Change request implementation**

If the change request is approved, the process will move on to the implementation phase. This is where you and the project stakeholders will work to make the project change.

Implementing a change will look different depending on what stage the project is in, but it usually consists of updating project timelines and deliverables, as well as

informing the project team. Then the actual work can begin. It's a good idea to evaluate the project scope to ensure any changes to the timeline won't have a huge impact on projected goals.

It's best to disseminate the request's information in a shared workspace and the change log to ensure productivity isn't lost by trying to look for new information. You may even want to send out a revised business case to cover all of your bases.

## **5. Change request closure**

Once the request has been documented, disseminated, and implemented, the request is ready to be closed. While some teams don't have a formal closure plan in place, it's helpful to have one in order to store information in a place that all team members can reference in the future.

In the closing phase, any documentation, change logs, and communication should be stored in a shared space that can be accessed later on. You should also store the initial change form and any revised project plans you created along the way.

Once documents are in the appropriate place, you can close out any open tasks and work on successfully completing your project. Some project leads also host a post-mortem meeting before officially closing the projec

## **7-Software Configuration Management**

When we develop software, the product (software) undergoes many changes in their maintenance phase; we need to handle these changes effectively.

Several individuals (programs) work together to achieve these common goals. This individual produces several work product (SC Items) e.g., Intermediate version of modules or test data used during debugging, parts of the final product.

The elements that comprise all information produced as a part of the software process are collectively called a software configuration.

As software development progresses, the number of Software Configuration elements (SCI's) grow rapidly. **These are handled and controlled by SCM. This is where we require software configuration management.**

A configuration of the product refers not only to the product's constituent but also to a particular version of the component.

Therefore, SCM is the discipline which

- Identify change
- Monitor and control change
- Ensure the proper implementation of change made to the item.
- Auditing and reporting on the change made.

Configuration Management (CM) is a technique of identifying, organizing, and controlling modification to software being built by a programming team.

**The objective is to maximize productivity by minimizing mistakes (errors).**

CM is used to essential due to the inventory management, library management, and updation management of the items essential for the project.

### **Why do we need Configuration Management?**

Multiple people are working on software which is consistently updating. It may be a method where multiple version, branches, authors are involved in a software project, and the team is geographically distributed and works concurrently. It changes in user requirements, and policy, budget, schedules need to be accommodated.

## **Importance of SCM**

It is practical in controlling and managing the access to various SCIs e.g., by preventing the two members of a team for checking out the same component for modification at the same time.

**It provides the tool to ensure that changes are being properly implemented.** It has the capability of describing and storing the various constituent of software. SCM is used in keeping a system in a consistent state by automatically producing derived version upon modification of the same component

## **8- Contract management**

**Contract management** is when someone takes on the responsibility of managing contracts for employees or vendors or other parties. Contract managers need legal knowledge to accurately lead the contract management process. Not all companies have set contract managers, but major defense firms or companies that frequently work with the government tend to use contract managers.

Managing contracts is an overlooked form of management. Managers interact frequently with employees, and some of those discussions and situations naturally relate to compensation. Some of these conversations will deal with contract management. Other times, businesses need to manage contract agreements with other businesses. It's not talked about much, but contract management is an important business topic. If you're unsure of how the contract management process works, it's important to understand the basics.

## **Elements of successful contract management**

It isn't enough that an organization has professionals in place to handle contract management. Employees must be augmented with the presence of processes and software companions to satisfy increasing compliance and analytical needs. When a contract management strategy is successfully implemented, organizations can expect to see:

- The expected business benefits and financial returns are being realized.
- The supplier is cooperative and responsive to the organization's needs.
- The organization encounters no contract disputes or surprises.
- The delivery of services is satisfactory to both parties.

## Stages of the contract management process?

While there are many components of contract management, we can summarize the process by breaking it into five clear stages: creation, collaboration, signing, tracking and renewal.

We can further identify individual steps within the stages. In all, we can break the process down into nine steps, each of which contributes to one of the five overarching stages. This makes it easier to manage the end-of-quarter crunch that tends to happen when it's time for a new round of contracts. Here are the steps of each stage:

### **Creation**

**1. Initial requests.** The contract management process begins by identifying contracts and pertinent documents to support the contract's purpose.

**2. Authoring contracts.** Writing a contract by hand is a time-consuming activity, but through the use of automated contract management systems, the process can become quite streamlined.

### **Collaboration**

**3. Negotiating the contract.** After drafting the contract, employees should be able to compare versions of the contract and note any discrepancies to reduce negotiation time.

### **Signing**

**4. Approving the contract.** Getting management approval is the step where most bottlenecks occur. Users can preemptively combat this by creating tailored approval workflows, including parallel and serial approvals to keep decisions moving at a rapid pace.

**5. Execution of the contract.** Executing the contract allows users to control and shorten the signature process through the use of electronic signature and fax support.

## Tracking

**6. Obligation management.** This requires a great deal of project management to ensure deliverables are being met by key stakeholders and the value of the contract isn't deteriorating throughout its early phases of growth.

**7. Revisions and amendments.** Gathering all documents pertinent to the contract's initial drafting is a difficult task. When overlooked items are found, systems must be in place to amend the original contract.

**8. Auditing and reporting.** Contract management does not mean drafting a contract and then pushing it into the filing cabinet without another thought. Contract audits are important in determining both organizations' compliance with the terms of the agreement and any possible problems that might arise.

## Renewal

**9. Renewing.** Manual contract management methods can often result in missed renewal opportunities and lost business revenue. Automating the process allows an organization to identify renewal opportunities and create new contracts.