

# **iMCA**

## **UNIT - V**

### **Software Project Management**

**1601602 Software Engineering**

# Project Planning

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- Project Planning includes:
  - Estimation of cost, time and resources.
  - Specifying procedure and modules
  - Arranging activities to be performed
  - Assigning time and resources for each activity
  - Establishing milestones to review project progress

## Types of Project Plan

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- **S/W Development Plan**: central plan to describe how the system will be developed.
- **Testing & Validation Plan**: defines s/w testing schedule and defines how s/w will be validated by the clients
- **Quality Assurance Plan**: specifies quality procedures and standards to be maintained.

## Types of Project Plan

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**Configuration Management Plan:** defines how changes will be managed with maintaining consistency

- **Maintenance Plan:** defines how maintainance will be performed.
- **HR Plan/ Staff development Plan:** describes the procedure to determine number of people required and skills needed for s/w development.

## Activities for S/w Development Plan

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- Estimate Attributes of the Project
- Make Work Breakdown Structure (WBS):
- Schedule Project Work Components
- Determine the H/w and S/w resources
- Risk Management Plan
- Project Monitoring & Control

## Earned Value Monitoring

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- Earned Value Analysis (EVA) is one of the key tools and techniques used to have an understanding of how the project is progressing.
- Earned Value Analysis is an objective method to measure project performance in terms of scope, time and cost.
- 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 Monitoring

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- Earned Value is a measure of ‘Progress’ to assess ‘Percentage of Completeness’
- Earned Value is an approach where you monitor the project plan, actual work, and work completed value to see if a project is on track.
- Earned Value shows how much of the budget and time should have been spent, considering the amount of work done so far.

# Key Elements of Earned Value Monitoring

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**Planned Value (PV)** – also known as budgeted cost of work scheduled or BCWS ( Budgeted Cost of Work Scheduled ). Amount of approved cost that is to be spent on project during decided time.

**Actual Cost (AC)** – also known as actual cost of work performed or ACWP(Actual Cost of Work Performed). Total cost incurred in accomplishing project in decided time.

**Earned Value (EV)** – also known as Budgeted Cost of Work Performance at a specified point (BCWP) value of the work actually completed.

**Work Breakdown Structure (WBS):** it is a hierarchical distribution of the total work to be performed by a team to achieve a project's final objective. It is usually presented in the form of a document or spreadsheet.



# Earned Value Monitoring – Indicators of Schedule

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**Schedule Variance (SV):** It is the variance between Earned Value and Planned Value. It let us identify how much you are ahead or behind schedule in terms of costs.

$$SV = EV - PV$$

- If  $SV < 0$  then the project is behind the schedule.
- If  $SV = 0$  then the project is on schedule.
- If  $SV > 0$  then the project is ahead of the schedule.

**Schedule Performance Index (SPI):** It is the measurement of progress achieved against progress planned.

$$SPI = EV/PV$$

- If  $SPI < 1$  then the project is running behind the schedule.
- If  $SPI = 1$  then the project is progressing exactly as planned.
- If  $SPI > 1$  then the project is progressing well against the schedule.

# Earned Value Monitoring – Indicators of Cost

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**Cost Variance (CV):** It is calculated by subtracting the Actual Cost (AC) from Earned Value (EV). It lets us know whether you are under or over budget.

$$CV = EV - AC$$

- If  $CV < 0$  then the project is over the budget.
- If  $CV = 0$  then the project is on budget.
- If  $CV > 0$  then the project is under the budget.

**Cost Performance Index (CPI):** It is the measurement of the value of work completed against the actual cost.

$$CPI = EV/AC$$

- If  $CPI < 1$  then the project is over the budget.
- If  $CPI = 1$  then the project cost is on budget.
- If  $CPI > 1$  then the project is under the budget.

# Earned Value Monitoring – Indicators of Project Completion

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**Estimated at Completion (EAC):** It is an indicator for forecasting how much the total project will cost.

$$\text{EAC} = \text{BAC}/\text{CPI}$$

**Estimate to Complete (ETC):** It is an estimation of funds required to complete the remaining work in a project. This EVM metric is used for forecasting the budget needed for the remaining project work.

$$\text{ETC} = (\text{BAC} - \text{EV})/\text{CPI}$$

# Steps in Earned Value Monitoring

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## Step 1: Collect the inputs:

Budget at Completion (BAC)

Planned Value (PV)

Earned Value (EV)

Actual Cost (AC)

## Step 2: Analyse the schedule status:

Schedule Variance (SV)

Schedule Performance Index (SPI)

## Step 3: Analyse the cost status:

Cost Variance (CV)

Cost Performance Index (CPI)

# Steps in Earned Value Monitoring

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## Step 4: Forecasting the project status:

Estimate to Complete (ETC)

Estimate at Completion (EAC)

## Step 5: Prepare some reports with the analysis and plans.

Collect the % complete of each task.

Collect Planned Value (PV) for each task.

Calculate Earned Value (EV) for each task.

Obtain Actual Cost (AC) for each task.

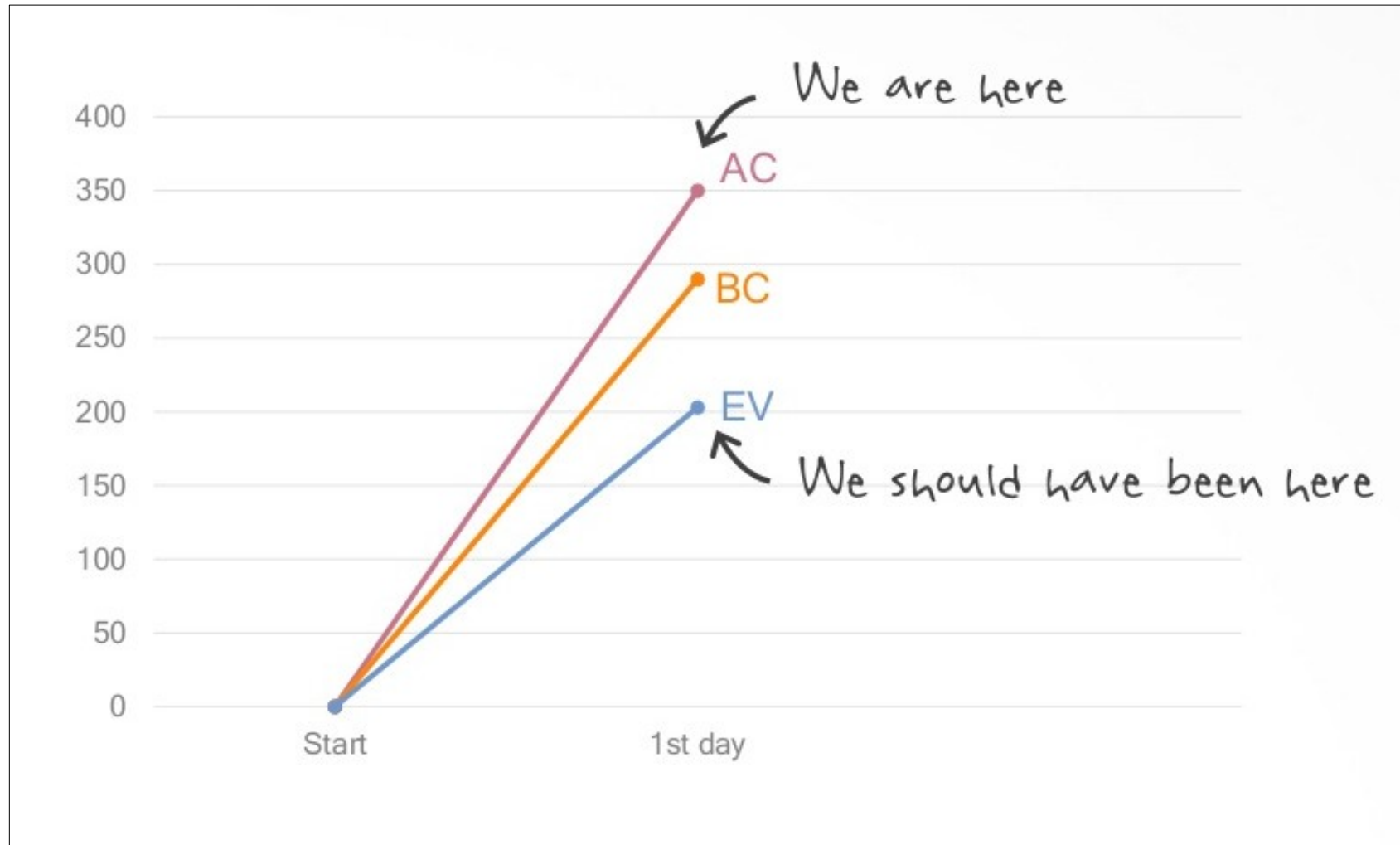
Perform schedule status for each task.

Perform cost status for each task.

Perform forecasting for each task.

Compile the results and create a global report.

# Earned Value Monitoring



The project is witnessing 58% more spend on costs (203/350) over the budget. This is called the cost performance index.

# Earned Value Monitoring



## Earned Value Monitoring – Example

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- Let's consider a very simple example of a software project A which is to be completed in one year (12 months) and the total cost is \$3,00,000.
- The start date of the project is 01 October 2019 and the end date of the project is 30 September 2020.
- We will assume that the budget is the same for each month. (25000)
- Let's consider that the analysis of the project is performed after 6 months (31 March 2020).
- The review performed on the project has shown that only 40% of the work has been completed after 6 months and the actual cost is \$100,000.
- Calculate the indicators and make the Earned Value Analysis.



## Earned Value Monitoring – Example Solution

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- The first step for EVM is to collect the inputs (initial data):
- Budget At Completion, BAC = \$300,000.
- Earned Value (EV) =  $(0.4 * BAC) = \$120,000$ .
- Planned Value (PV) for 6 months is \$150,000.
- Actual Cost is \$100,000.
- Schedule Variance (SV):  $SV = EV - PV = \$120,000 - \$150,000 = -\$30,000$ .
- The result is negative so the project is behind the schedule. It is also easy to observe that the Earned Value is lower than the Planned Value.
- Schedule Performance Index (SPI):  $SPI = EV/PV = 0.8$

## Earned Value Monitoring – Example Solution

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- SPI = 0.8 means that the project has performed 80% of the work, it was supposed to at this status point. SPI is less than 1 which means that the project is behind the schedule. For every estimated hour of work on the project, the project team is completing only 0.8 hours, which means 48 minutes. Because it is less than 1, the project is running behind the schedule.
- Cost Variance (CV):  $CV = EV - AC = \$120,000 - \$100,000 = \$20,000$ .
- The value of project A at the current state is greater than the money spent on it, which means that the project is under budget.
- Cost Performance Index (CPI):  $CPI = EV/AC = 1.2$
- The CPI for the analyzed project is greater than 1, so the project is performing well against the budget.

# Earned Value Monitoring – Example Solution

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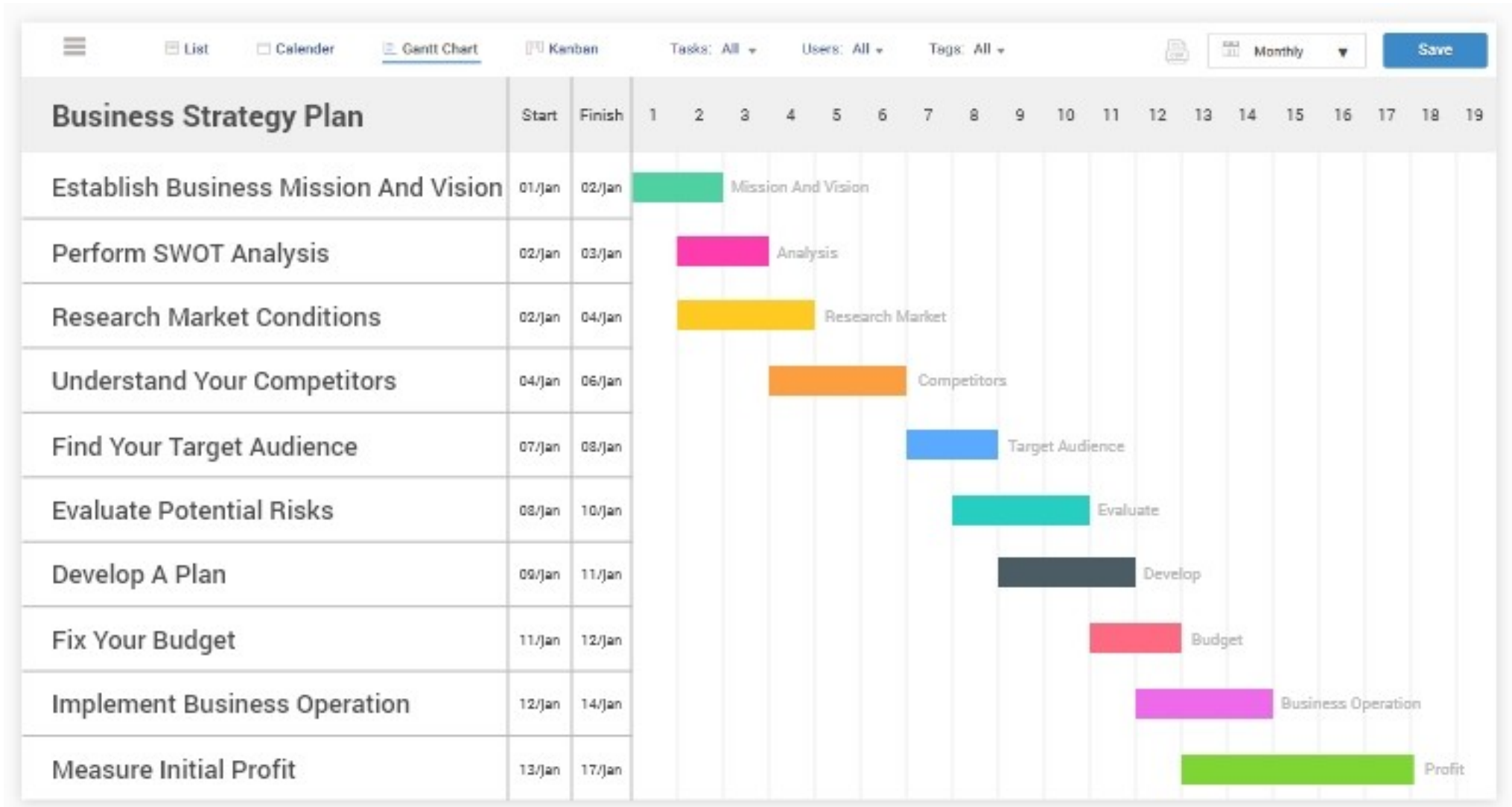
- Estimate at Completion (EAC):  $EAC = BAC/CPI = \$250,000$
- According to this result, based on the existing analysis, if the project will continue in the same conditions, then at the end of the project the budget will be \$250,000.
- Estimated at Completion is an indicator for forecasting of how much the total project will cost. So, the total cost will be less than estimated in case the project will go in this direction.
- Estimate to Complete (ETC):  $ETC = (BAC - EV)/CPI = \$150,000$
- Estimate to Complete (ETC) is a forecast of how much more money we will need to be spent to complete the project. To finalize the project, if the work will continue like this until the first evaluation after 6 months, the total amount of money to finalize the project will be \$150,000.

# Gantt Chart










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- It represents project schedule graphically.
- A Gantt chart is a bar chart that provides a visual view of tasks scheduled over time.
- A Gantt chart is used for planning projects of all sizes.
- It is a useful way of showing what work is scheduled to be done on a specific day.
- It can also help you view the start and end dates of a project in one simple chart.
- Gantt charts are most commonly used for tracking project schedules.
- It was developed by Henry Gantt

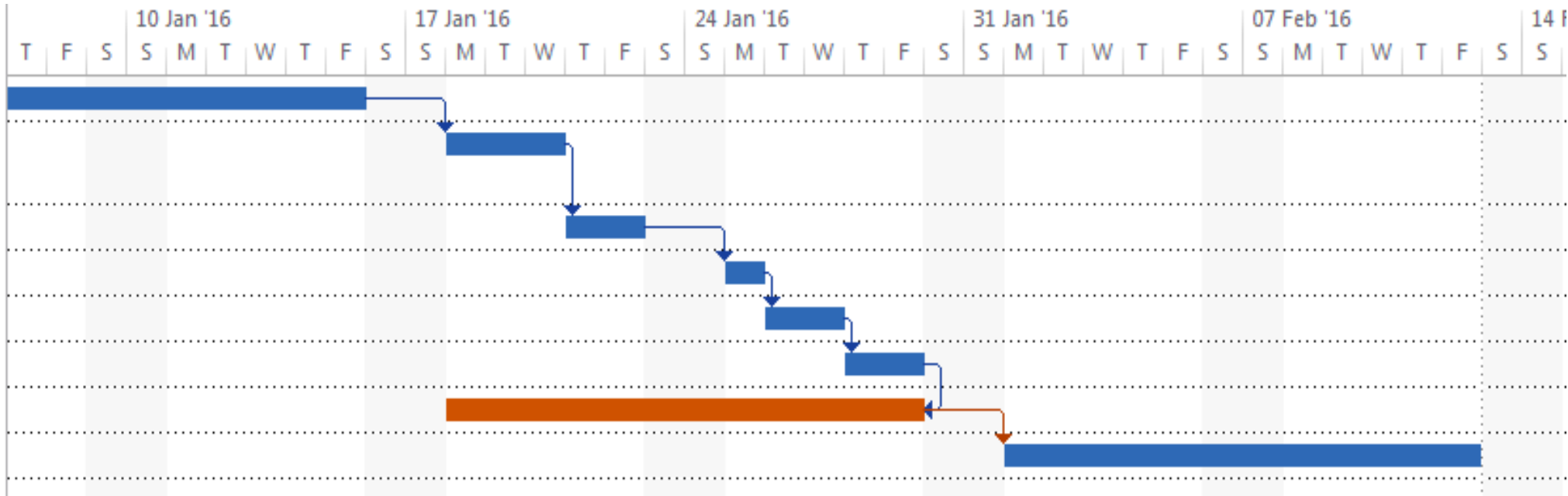
# Gantt Chart



# Gantt Chart – Example

		Task Mode ▾	Task Name ▾	Duration ▾	Start ▾	Finish ▾
1			Site Survey	10 days	Mon 04/01/16	Fri 15/01/16
2			Site visit/file review/data	3 days	Mon 18/01/16	Wed 20/01/16
3			Hydrology	2 days	Thu 21/01/16	Fri 22/01/16
4			Hydraulics	1 day	Mon 25/01/16	Mon 25/01/16
5			Replacement Options	2 days	Tue 26/01/16	Wed 27/01/16
6			Design Sheet	2 days	Thu 28/01/16	Fri 29/01/16
7			Report Preparation	10 days	Mon 18/01/16	Fri 29/01/16
8			Client and A.T. review	10 days	Mon 01/02/16	Fri 12/02/16

# Gantt Chart



# Causes Of Project Failure

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- Incorrect estimation of time
- Unrealistic schedule
- Insufficient budget
- External dependencies
- Unexpected expansion of project scope
- Insufficient s/w testing
- Breakdown in communication
- Poor understanding of user requirements
- Improper monitoring and control
- Lack of experience and training



# Types of Risk

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- Schedule related risk
- Financial risk
- Technical risk
- Operational risk
- Other risk

# Risk Management Activities

