



# Monitoring and Control

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# Monitoring and control

Once the project is started attention must be **focused on progress and respect of the planned schedule**

## Monitoring

Concerns the activity of **collecting data** related to what is happening

## Control

Concerns the **interpretation of the data and the comparison** with the schedule to understand if the project is proceeding as planned or a revision is needed

It is important to define plans that can be monitored. **Clearly defined and visible completion points for activities**

# How projects do not respect plans

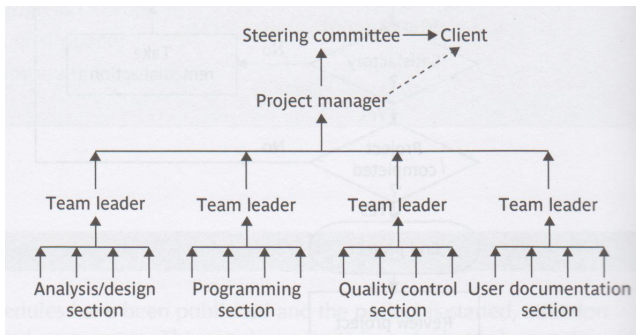
4 main sources of misalignment between the project execution and its results and the plan:

- 1 delays in meeting target dates
- 2 shortfalls in quality
- 3 inadequate functionality
- 4 costs over target

Addressing 2 and 3 are more in line with the objectives of SE courses. Here we consider 1 and 4

# Responsibility and communication

“Communication infrastructure” for reporting on progress **generally reflects the organization chart** for the project, and information flow from bottom to top.



# Reporting

Reporting can be **written or oral, formal or informal, and regular or ad hoc**

Report type	Examples	Comment
Oral, formal, regular	Weekly or montly progress meetings	while reports may be oral, formal written minutes should be kept
Oral, formal, ad hoc	End of stage review meeting	While largely oral, likely to receive and generate written reports
Written, formal, regular	Job sheets, progress reports	Normally weekly using forms
Written, formal, ad hoc	Exception reports, change reports	
Oral, informal, ad hoc	Canteen discussion, social interaction	Often provides early warning; <b>must be backed up by formal reporting</b>

Reporting period should somehow be **aligned with project checkpoints and duration of units of work**

# Collecting the data 1/2

When there is a series of products to be developed partial completion of activities is easier to estimate as a **fraction of the series provides a good estimation for the percentage of progress** (e.g. counting screen layout)

## Partial completion reporting

Number of hours worked on the project, timesheets with estimates for completion, and general accounting systems

### Time Sheet

*Staff:* John Brown    *Week ending:* 13/01/17

#### Rechargeable hours

Project	Activity Code	Description	Hours	% complete	Scheduled Completion	Estimated Completion

#### Non-rechargeable hours

...

# Collecting the data 2/2

## Red/amber/green (RAG) reporting

ask team member for the **likelihood of meeting the planned target date**

- identify the key elements for assessment in a piece of work
  - break these key elements into constituent elements
  - access each of the second level elements on the scale *green* for “on target” *amber* for “not on target but recoverable”, and *red* for “not on target and recoverable only with difficulty”
  - review all the second level assessment to arrive at first level
  - review to produce overall assessment
- 
- Traffic-light assessment highlight risks of non-achievement
  - Colors generally have different consequences for critical and non-critical activities

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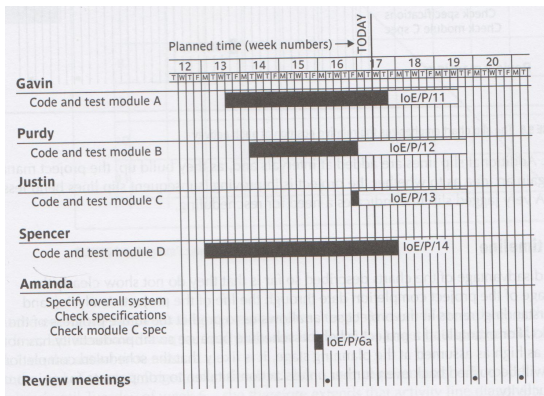
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# Visualizing progress - Gantt chart

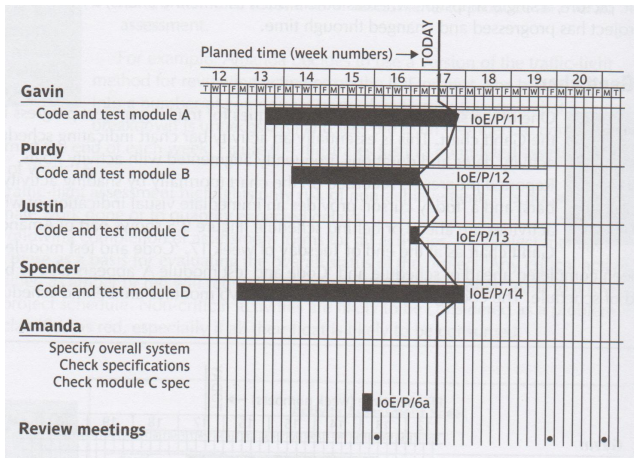
It is important to find ways to **visualize the status of the project** given the collected data

- **Gantt chart** - bars shaded to represent work done, and today cursor to represent the moment in time



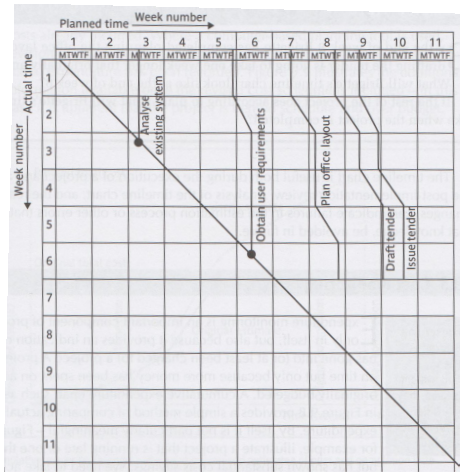
# Visualizing progress - Slip Chart

- **Slip Chart** - as for Gantt charts but now with a bent cursor



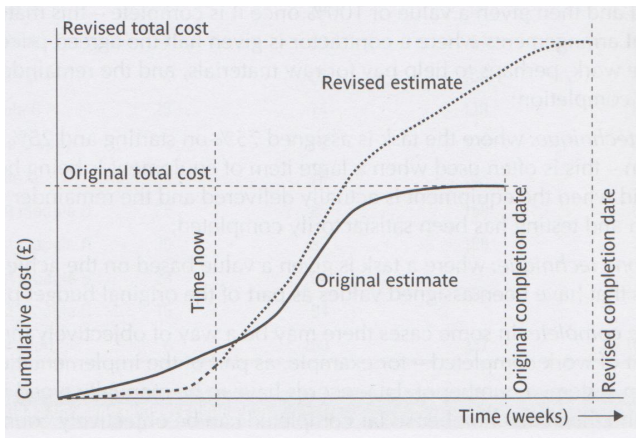
# Visualizing progress - Timeline

- **Timeline** - activities are represented as lines going up-down, bent are introduced as consequence of rescheduling. When the lines encounters the diagonal it is supposed to end - **it permits to show progress through time**



# Cost monitoring

As time progress actual costs can be observed and **plotted in a diagram together with the planned ones** - in addition estimates can be revised to see the potential future trend



# Earned value analysis

The value assigned in the plan is considered as “earned” when the corresponding activity or workpackage is performed/terminated (planned value - PV - or budget cost of work scheduled - BCWS). In particular different strategies have been proposed

- 0/100
- 50/50
- 75/25
- milestone based
- percentage complete

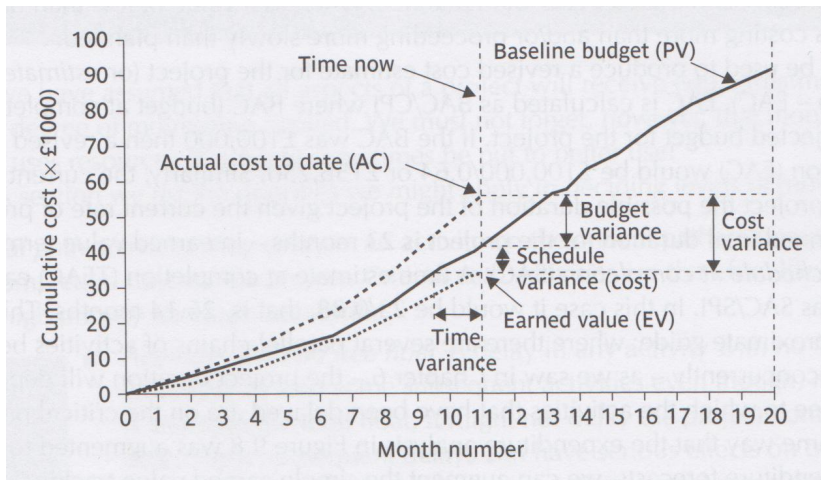
The information are reported in the baseline budget and monitored earned value diagram

# Indexes

Different indexes are considered in order to monitor the project

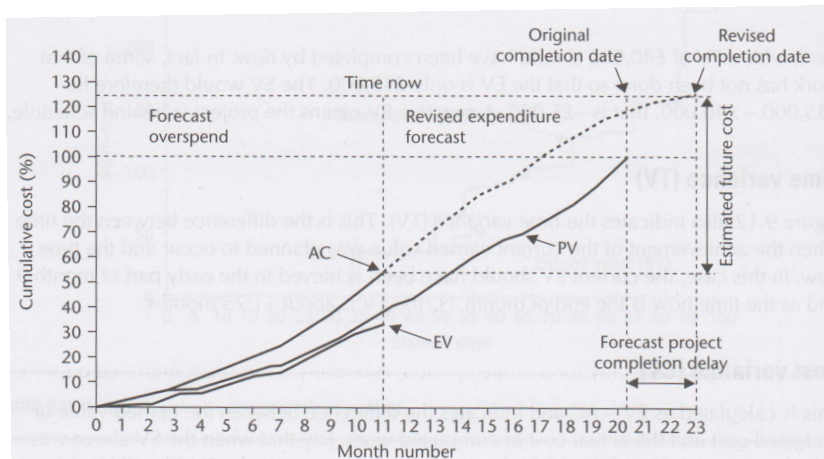
- Schedule variance ( $SV = EV - PV$ )
- Time Variance (TV)
- Cost variance ( $CV = EV - AC$ )
- Performance ratios
  - Cost Performance Index ( $CPI = EV/AC$ )
  - Schedule Performance Index ( $SPI = EV/PV$ )

# Earned value monitoring strategy



## EV and revised cost forecasts

CPI can be used to produce a revised cost estimate (**Estimate At Completion - EAC**) where  $EAC = BAC/CPI$  (Budget at Completion - BAC). Similarly for schedule using SPI





# Prioritizing monitoring

Monitoring can be costly therefore **can be useful to not ask for the same level of monitoring for each activity**. A priority list can be introduced


- Critical path activities
- Activities with no free float
- Activities with less than a specified float
- High-risk activities
- Activities using critical resources

# Getting back to the plan

- Shorten the critical path
  - Adding resources
  - Increase use of current resources
  - Reallocate staff to critical activities
  - Reduce scope
  - Reduce quality
- Reconsider the precedence requirements

# Resources

Study material can be found here:

-  **Bob Hughes and Mike Cotterell**  
*Software Project Management, 5th Ed.*  
McGraw-Hill, 2009
  - Chapter 8 - Monitoring and Control