Project Tracking and Control

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Total Number of slides = 67

Module Objectives and Outline

At the end of this module, you would be able to

- **Track and monitor the project**
- **Report on the project status**
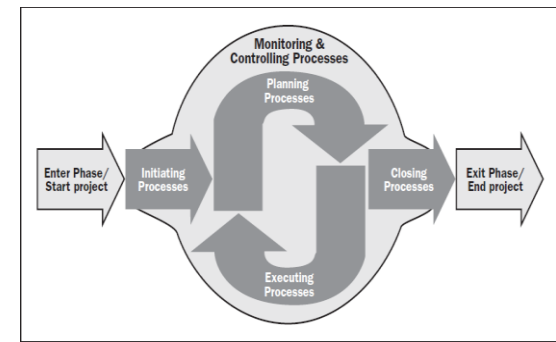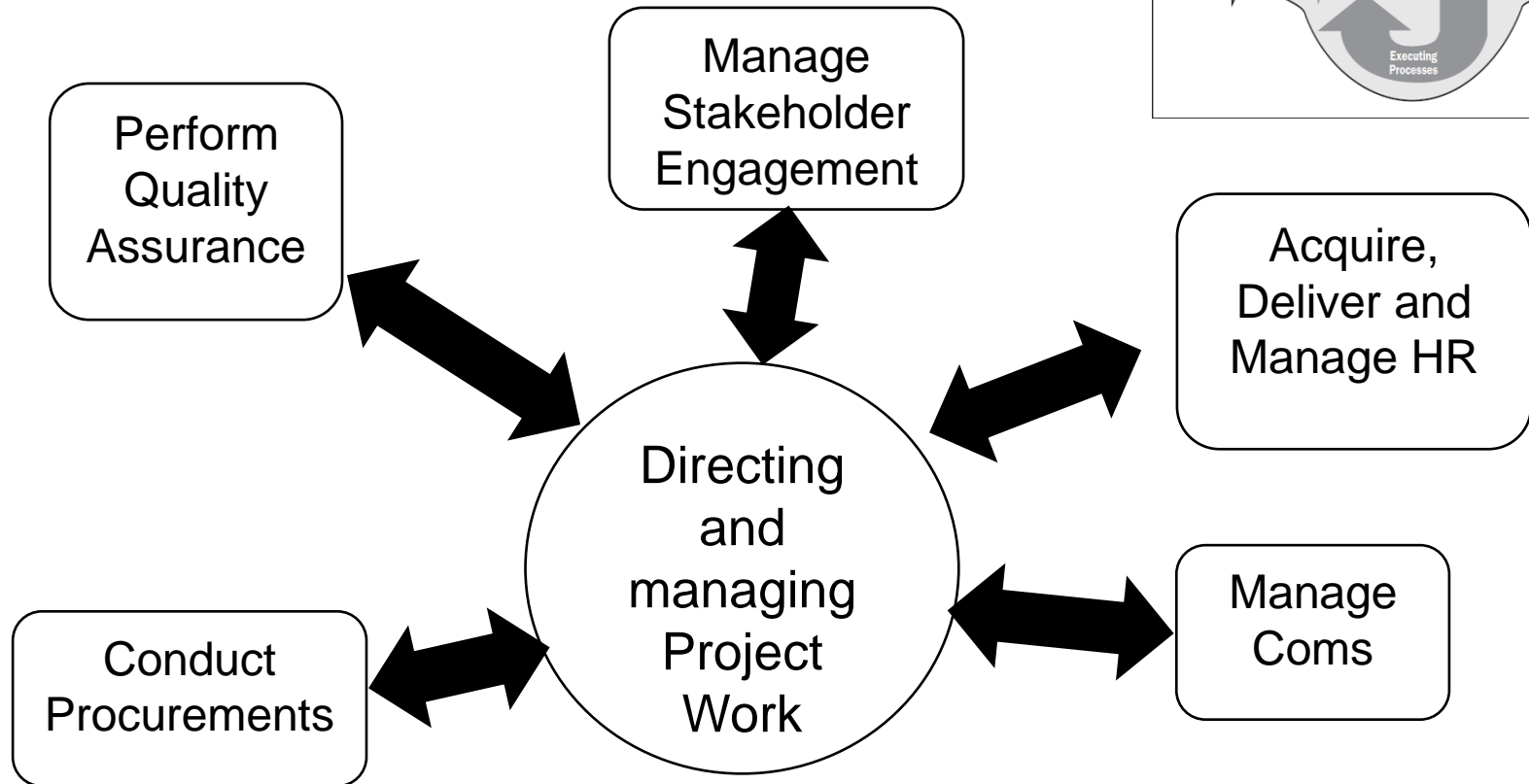- **Control the project**

Outline

- **Objectives of Managing Project Tracking and Control**
- **Project tracking, analysis and reporting**
- **Project Control**
- **Summary**

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Objectives of Managing Project Tracking and Control

- **Ensure the "plan" is followed**
  - Or the plan is changed to match reality
- **Ensure that there are no surprises**
- **Ensure project meets it's objectives :**
  - Scope
  - Time
  - Cost
  - Quality
- **Deploy resources to attain the project objectives**
- **Anticipate problems**
- **Accept and manage change**

Executing

Manage Stakeholder Engagement

Perform Quality Assurance

Acquire, Deliver and Manage HR

Directing and managing Project Work

Conduct Procurements

Manage Coms
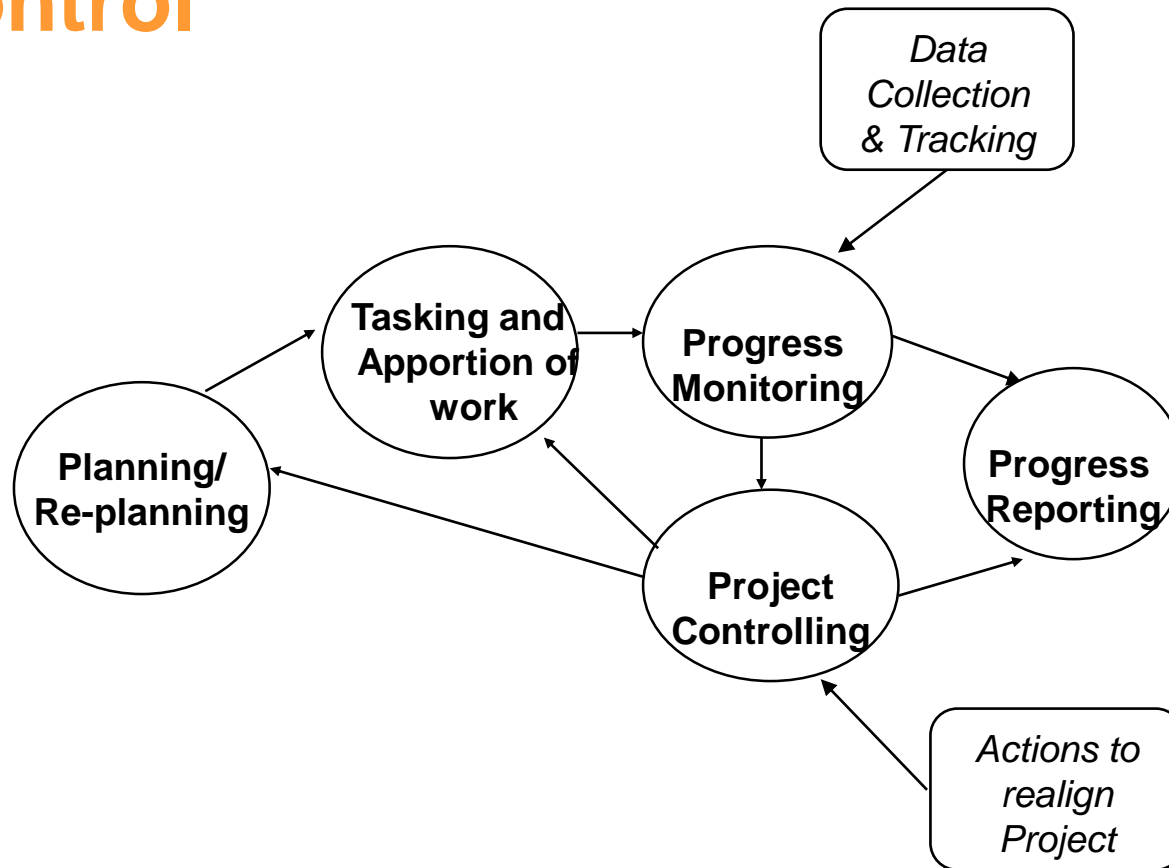
- To lead and perform the work defined in the PMP and implement approved changes to achieve the project objectives

The Basics of Project Tracking and Control

Tracking and Control in "Conventional" versus SCRUM (Agile) projects

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Conventional Projects

- **The PM reviews progress at a regular progress meeting**

- **The PM collects, collates and analyses the progress information**

- **The PM updates the project plan (or the immediate next month plan)**

- **On the basis of the revised plan, the PM assigns team members to the tasks in the new plans**

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SCRUM (Agile) Projects

- **A project status meeting occurs every day**

- **During the meeting, each team member discusses**
  - **Their achievements in the past 24 hours yesterday**
  - **Their plans for today**
  - **What obstacles are preventing their progress**

- **Other team members will offer advice or support or make commitments to overcome these obstacles**

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Project Re-planning (I)

- **The initial Project Plan provided the basis against which to control the project. The key elements are:**

ELEMENTS	DESCRIPTION
WORKPLAN	Defines the project activities to be performed
SCHEDULE	Specifies when activities should start and end
STAFF EFFORT ESTIMATES	Amount of effort which can be expended to achieve each deliverable
BUDGET	Defines costs that can be incurred whist performing the project
MILESTONES	Critical delivery dates to be met if work is to be on schedule
BASELINES	Original timescales and milestones that were initially agreed

We now need to

Detail this plan for day-to-day project control
Modify the plan to accommodate changes

Project Re-planning (II)

- **Update and Redefine base project plan to reflect current position and/or changes to the project**
- **Determine:**
  - What current and yet to be started tasks need to be modified
  - What new tasks need to be added
  - What are now the milestones and end dates
  - Are these acceptable?
  - Are activities on the critical path under-resourced?
- **Reassign effort from tasks with float or spare capacity If necessary**
  - Add extra resources or extra budget
  - Revisit precedence analysis
  - Reschedule project deliverables to produce achievable milestones
- **Create more DETAILED PLANS to exert a greater degree of control**
  - Insert more checkpoints or milestones
  - Determine detailed resource allocation
- **Obtain RE-APPROVAL if necessary from senior management and client/user**

Tasking the Project Staff

- **Purpose** :
- <u>Precise Instructions</u> describing the work members have to do
- Instructions to carry out the workplan
- Tasking is a process of resource allocation

Each tasking instruction to a project team member should specify:

- *Work* to be performed. This should explicitly reference the **Work Plan** section of the **Project Plan**
- DELIVERABLES to be produced
- STANDARDS and GUIDELINES to be applied
- TOOLS and METHODOLOGIES to be used
- ACCEPTANCE CRITERIA for the deliverables
- BUDGET - the number of staff days available to complete the task
- TIMESCALES - Start and End dates

Example of a Work Instruction Form

WORK INSTRUCTION FORM	
Project Name:	
Task title:	
Generated by :	**Signature:**
For use by:	**Date:**
Related documents	
Project Plan reference:	**QA plan reference:**
Standards:	
Instructions:	
Deliverables from this task:	
Acceptance criteria:	
Budget	**Start date**
	End date
Reviewed and completed	**(Signature)**
	Date

Issues in Tasking Project Staff

▪ Allocate work optimally to team members and outside resources

– TASKING must be done with respect to skills, workloads and availability of associated resources

– TASKING should not ignore training needs

– Matching skills to the job is vital to ensure high motivation and productivity

Progress Monitoring and Analysis

- **Enables the project manager to understand the CURRENT STATE of the project:**
  - What has been expended ?
  - What has been achieved ?
  - What are the changes to original plan?
  - What risks are occurring?

- **Enables the project manager to REPORT THE STATUS of the project to:**
  - Project Team
  - Senior Management
  - Client/User

- **Serves as a source for PROBLEM and RISK IDENTIFICATION and RESOLUTION**

- **Encourages team COMMUNICATION and TEAMWORK**

What Metrics to collect for progress monitoring?

- **Quantitative metrics**
  - Effort expended (Man-hours/days/weeks)
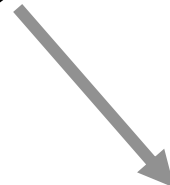   - » Total
    - » On each task
  - Cost
  - Tasks Started/Completed
  - Product size
  - Milestones Achieved
  - Elapsed Time
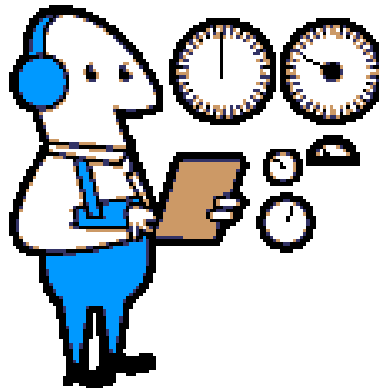
- **Qualitative metrics**
  - User Satisfaction
  - Staff Morale
  - Staff Turnover
  - Quality measurements
  - Risks/Problems occuring
  - Change requests from User
  - Other scope changes/Technology changes
  - Approval problems
  - Significant omissions

Sources of Project Progress Data

Progress Reports

Incident Tracking List

Time Reports

Expense claims

PM

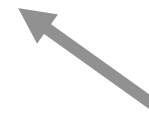Produced on a weekly or monthly basis by task leaders in a project team to describe technical progress on their assigned tasks and highlight problems

Reporting issues that are affecting project performance (Issue Management)

Used by a project team member to record the number of hours spent each week on each project activity, as defined in the WORK PLAN section of the PROJECT PLAN

Recording of extra costs (outside staff costs) that are incurred by the project

Samples : Time Reporting Form, Task assignment and status

Time Reporting Form		ISS/Forms/TRS

Project Name FCS Accounts Payable Project

Staff Name	Date	Ref ISS/FCS2/MR.1/

Report Period	Start date
	End date

Task Description	Time Spent during Week Ending						Total	
							This Month	To Date

(empty rows follow)

TASK ASSIGNMENT & STATUS (TAS) FORM	
Project :	IT2000 Project
Task :	1.1 Produce Project Plan
Project Plan Ref :	IT2000/PP.DOC/V1.0
Assigned To /Task Leader:	PL
Other resources assigned	None
Task inputs :	1. Original Proposal (OBJSOFT/MKTG/PROP301) 2. Minutes of meetings with clients. (IT2000/MINS/MINS1)
Standards :	Project Planning Standards (OBJSOFT/QM/V3.6)
Instructions :	Produce Project Plan
Deliverables :	Project Plan
Acceptance Criteria :	Internal review for adherence to Project plan stds as described in the above standards

Planned Start Date :	Duration (days):	Effort (days)		Planned End date
05/01/98	3	PL	3	07/01/XX
Authorised By :	Peter Foo	Date		20/12/XX

Task Status :	Actual start date	Effort this period (days)		Est. effort to complete (days)		Completion date	Comfort code
Not started O	05/01/98	PL	4	PL	0	08/01/98	No Prob. O
Started O							Maybe Prob. O
Completed O							
Approved O							Slippage . O
Additional	Needed more effort in order to understand how the OO

Sample Incident/Issue Tracking List Form

Issue Tracking List					
S/No.	Date Reported	Category	Issue	status	Remarks

Consolidating Team Progress Records

Typically the following documents or charts need to be updated by the Project Manager after reading the individual progress reports

- **Work Plan Progress Records**
    - A set of tables that show the actual progress against the estimates for the entire project /sub-project. These show for all tasks,
        » Planned and actual duration,
        » Planned and actual assignment,
        » Planned and actual start date/end date
        » Estimated and actual effort expended for each task
        » Estimated effort to complete of tasks in progress
- **Manpower Phasing Summary**
    - A Summary showing the actual manpower availability against estimated manpower availability (by weekly/bi-weekly/monthly) for the entire project/sub-project duration
- **Gantt Charts**
    - The Gantt chart will need to be updated showing the actual progress of the project

Progress Review Meetings

- **An important medium of communication in a project**
- **An effective forum for recognizing and resolving:**
  - Differences of interpretation
  - Work problems
  - Difficulties in understanding instructions
- **Meetings should have:**
  - Regular schedules, with frequency determined by
    - » Project size and complexity
    - » Degree of risk associated with the project
    - » Completion requirements
    - » Task definitions
    - » Degree of control required
  - Fixed times and places
  - Mandatory attendance
  - Written agendas
  - Published minutes with specific actions that will be followed up

Reporting Progress to Senior Management

- **What is the purpose of Management Progress Reports?**
  - To report to the upper management and/or the client on the general health and progress of the project.

- **The following aspects are typically covered:**
  - Costs/Effort expended
  - Estimated extra costs/effort required
  - Milestones achieved
  - Predicted end dates
  - Technical status
  - Task accomplishments
  - Client/user responsibilities status
  - Problems and planned/recommended actions
  - Required management actions

Sample Progress Report Form

Progress Report Form		
Project Name:		
Prepared by:	**Date:**	**Ref:**
Report Period:	**Start Date:** **End Date:**	
Progress Report for Period:		
Plans for Next Period:		
Reviewed by:	**Comments:**	
Kindly attach Gantt Chart to aid visualization of progress.		

Management Progress Review Meetings

- **Purpose of management progress meetings**
  - To inform senior management of the progress of the project
    - » Task status
    - » Costs/effort expended
    - » Technical progress
    - » Quality status
    - » Subcontractor progress
    - » Risks and problems occurring
    - » Changes status
  - To initiate actions/ obtain approvals from senior management

Progress Tracking

- **PROGRESS TRACKING is the process of**
  - Analysing progress reports and associated data, and
  - Comparing the results with the PROJECT PLAN

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Analysis of Progress Metrics

- **Effort to date**
  - Calculate the effort spent to date for each task in the project plan
- **Costs to date**
  - Identify the costs expended on the project to date (e.g. chargeable effort, costs of Hardware, Software tools,…)
- **Changes in Functionality or Systems Size**
  - Identify additions or deletions of system functionality or size
- **Effort-to-complete**
  - Determine the Effort required to complete the existing tasks
    - » *Identify what extra resources are then required to complete the project*
- **Cost-to-complete**
  - Use the Effort- to-complete and identified extra resources to determine the cost to complete
- **Project achievements**
  - Determine the deliverables that have been produced to date by using the Technical Progress Reports
  - Determine what important project milestones have been achieved (acceptance of deliverables by clients, ending of development phases etc…)
- **Stage Payments**
  - Determine which cost milestones have been achieved
  - Which cost payments should be claimed (for external projects)

Estimating Cost-to-Complete

- **During a project it is essential to update <u>effort-to-complete</u> to determine <u>cost-to-complete</u>**
  - To end of current phase
  - To end of project

- **For <u>tasks in progress</u> estimate effort-to-complete**
  - For some tasks this <u>may not be</u> remaining original task budget
  - Look at progress-to-date, what delays/overruns are caused by
    - » Transient problems ie. they come and go away
    - » Systemic problems ie. they come and don't go away

- **For <u>tasks yet to be initiated</u> update estimates based on**
  - A more accurate assessment of the work to be performed
    - » Incorporating the systemic effects that you expect to continue throughout the project
  - A more reliable estimate of current project productivity
  - A consideration of the other factors that will decrease, or increase effort
- **Convert to Costs by applying appropriate man-day rate**

Measuring and Projecting Cost Trends: A simple example

Task	Estimate Effort	Actual effort	Status	Remarks
1:Code Module A	10 days	14 days	Complete	Programmers needed time to learn C#
2: Code Module B	10 days	10 days	Complete	We are now familiarized with C# !
3: Code Module C	15 days	-	Not yet started	
4: Code Module D	10 days	-	Not yet started	
5: Code Module E	15 days	-	Not yet started	

Measuring and Projecting Cost Trends: Another simple example

Task	Estimated Effort	Actual effort	Status	Remarks
1. Requirements Analysis	10 days	15 days	Complete	Requirements seem bigger than originally anticipated
2: Systems Design	10 days	15 days	Complete	System seems bigger than originally anticipated
3: Software Design	20 days	Spent to date: 10 days To complete : ?	In Progress	
4: Code and Unit Test Modules	20 days	-	Not yet started	
5: Integration and Systems Test	20 days	-	Not yet started	
5: Acceptance Tests	10 days	-	Not yet started	

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Measuring and Projecting Cost Trends: A more Complex Example

Task	Initial Budget	Actual Spend		Task status	Comments
Create Project Plan	5 days	5 days		Complete	
Interview Users	6 days	9 days		Complete	More information from users than we anticipated
Create Req.Spec.	4 days	6 days		Complete	More requirements than we anticipated
High Level Design	8 days	12 days		Complete	System is bigger than we thought
Design Component A	6 days	6 days		Complete	This component seems OK
Design Component B	6 days	12 days		Complete	Much more work on this component than we projected
Devlp Component A	8 days	To date: 3 days	To complete:?	In-progress	OK so far!
Devlp Component B	8 days	To date: 3 days	To complete:?	In-progress	Tough going!
Integrate A and B	10 days	?		Not yet started	
Systems Test	6 days	?		Not yet started	
Acceptance Test	6 days	?		Not yet started	

Factors impacting on cost-to-complete of remaining Tasks

What factors that may bring the cost of remaining tasks down?	**What factors that may push the cost of remaining tasks up?**

Sample Situation Report Form

Situation Report Form			ISS/Forms/SR		
Project Name FCS Accounts Payable Project					
Staff Name		**Date**	**Ref** ISS/FCS2/ME.1/		
Report Period		**Start date** **End date**			
Task Description		**Budget Effort**	**Effort to Date**	**Effort to Complete**	**Total Effort**

Comparison of Progress Reports with Plan

- **Compare total ESTIMATES to complete with the effort BUDGETS in the PROJECT PLAN**
  - Use cost accomplishment charts
- **Assess implications of any budget OVER-RUNS in terms of**
  - Internal COST
  - Expected PROFIT
  - Staff AVAILABILITY
- **Assess TECHNICAL PROGRESS in terms of production of deliverables**
- **Compare the planned project MILESTONES with the deliverables achieved to date**
  - Use tracking Gantt charts
- **Assess effects on the project of any MILESTONES which have NOT been achieved, in terms of:**
  - Project SCHEDULE
  - Client SATISFACTION
  - Financial PENALTY

How would you measure the value of the work done?

- **Example 1:**
  - Task 2.1 *"Write Use case descriptions"* has a budget of 10 days
    - » Your man day rate is $100 a day, so the cost budget assigned = $1000
  - You completed it in 13 days
  - What is the value of the work you have completed?

- **Example 2:**
  - Task 2.2 "*Define GUI interfaces*" has a budget of 10 days
    - » Your man day rate is $100 a day,
    - » Currently you have spent 7 days
    - » You estimate 5 days to complete
  - What is the value of the work you have completed?

Important Cost Measures (taken from PMI)

Abbreviation	Actual Name	What it is
PV	Planned value	What the estimated value of the work that was planned to have been done by now
EV	Earned Value	What the actual value of the work that has been done by now
AC	Actual Cost	What the actual cost of the work that has been done by now
BAC	Budget At completion	What was budgeted for the TOTAL project
EAC	Estimate At Completion	What we currently expect the TOTAL project to cost
ETC	Estimate To Complete	Given our current position, how much more do we expect to spend to complete the project
VAC	Variance At Completion	How much over or under budget do we expect to be at the end of the project

Derived values		
CV	Cost Variance	= EV-AC • Negative is over budget. • Positive is under budget
SV	Schedule Variance	= EV-PV • Negative is behind schedule • Positive is ahead of schedule

How to calculate EAC, ETC and VAC

Abbreviation	Actual Name	What it is

EAC	Estimate at completion	What is our current prediction of total project cost
		This will depend on which assumptions you use to calculate your remaining expenditure
		
		1. = BAC/CPI
		
		    Assume the same rate of overspend/underspend that has been exhibited up to now will be maintained until the end of the project
		
		2. = AC + ETC
		
		    Assume the original estimate was seriously wrong, and that the estimate-to-complete (ETC) is substantially correct
		
		3. = AC + BAC - EV
		
		    Assume we shall spend the actual to date and then the remaining budget. This assumes that any variances to date will <u>not</u> be repeated in the remainder of the project
		
		4. = AC + (BAC − EV)/CPI
		
		    Assume we shall spend the actual to date and then the remaining budget modified by current performance. i.e. current under/over performance will be repeated throughout the rest of the project

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Microsoft Project and Cost Measures
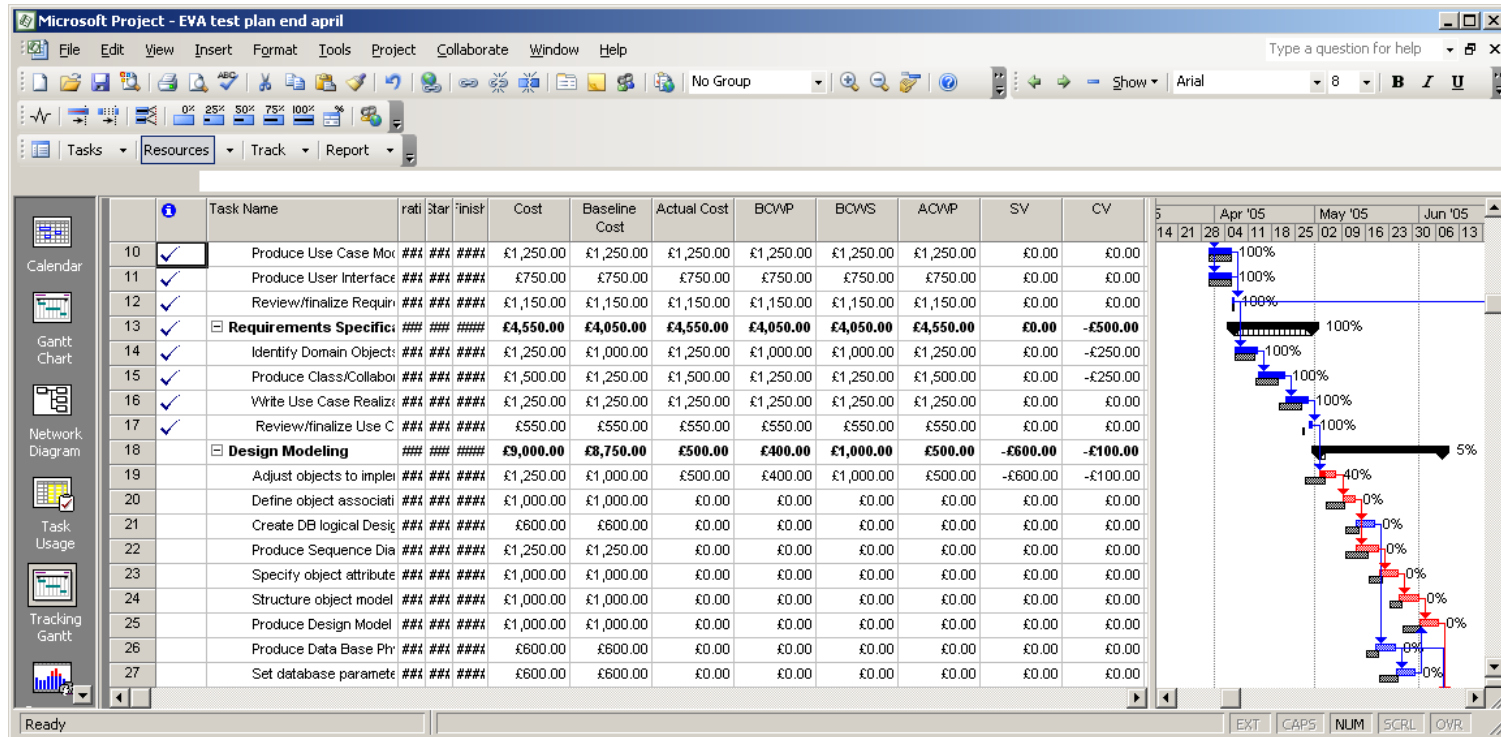
PV (BCWS)*
EV (BCWP)*
AC (ACWP)*

Example of Use of Cost Measures

- **Example of CV**
  - You have a task where the required effort is 5 days, and you have assigned an engineer who costs $100 a day
    - » Then the PV for a task is $500
  - If the task takes 6 days and the engineer works all 6 days to complete the task
    - » Then the EV is $500
    - » Then the AC is $600
    - » Also the CV is - $100, meaning you're $100 over- budget.
  - If the cost variance is negative, then the cost for the task is currently over the budgeted, or baseline amount

- **Example of SV**
  - You have a task where the required effort is 5 days, and you have assigned an engineer who costs $100 a day. The task was meant to start on March 6th and end on March 10th.
  - However by 5.00 pm march 10th, only 4 days of effort have been consumed on this task ($400 cost) and 1 day of effort is left to be expended ($100 cost)
    - » Then the EV is $400
    - » But the PV is $500
    - » So the SV is -$100, meaning the progress on this task is behind schedule
    - » If the SV is negative, the task is currently behind schedule in cost terms

More complex example of Use of Cost Measures (I)

- Suppose we have a simple project with 5 major activities and the below schedule

	Costs	Duration (month)
Requirements Analysis labour cost	$20,000	2
Design labour cost	$26,000	2
Code and Unit test labour cost	$35,000	2
Integration and test labour cost	$30,000	2
Acceptance labour cost	$20,000	2
TOTAL	$131,000	10

MONTH	1	2	3	4	5	6	7	8	9	10
Requirements Analysis	▓	▓								
Design			▓	▓						
Code and Unit test					▓	▓				
Integration and test							▓	▓		
Acceptance									▓	▓

Example of Use of Cost Measures (II)

- Suppose after seven months we have recorded the following data about a particular project

	Costs	Duration (month)	Actual costs to date	Status	Actual Duration (months)
Requirements Analysis labour cost	$20,000	2	$30,000	complete	3
Design labour cost	$26,000	2	$39,000	complete	3
Code and Unit test labour cost	$35,000	2	$17,500	33% complete	1
Integration and test labour cost	$30,000	2	0	not started	
Acceptance labour cost	$20,000	2	0	not started	

The values of the following are :

PV	$96,000
EV	$57,550
AC	$86,500
BAC	$131,000
CV	-$28,950
CPI	0.6653
SV	-$38,450
SPI	0.5995
EAC	$196,898
ETC	$110,398
VAC	-$65,898

Assuming current performance is maintained to the end of the project

Example:
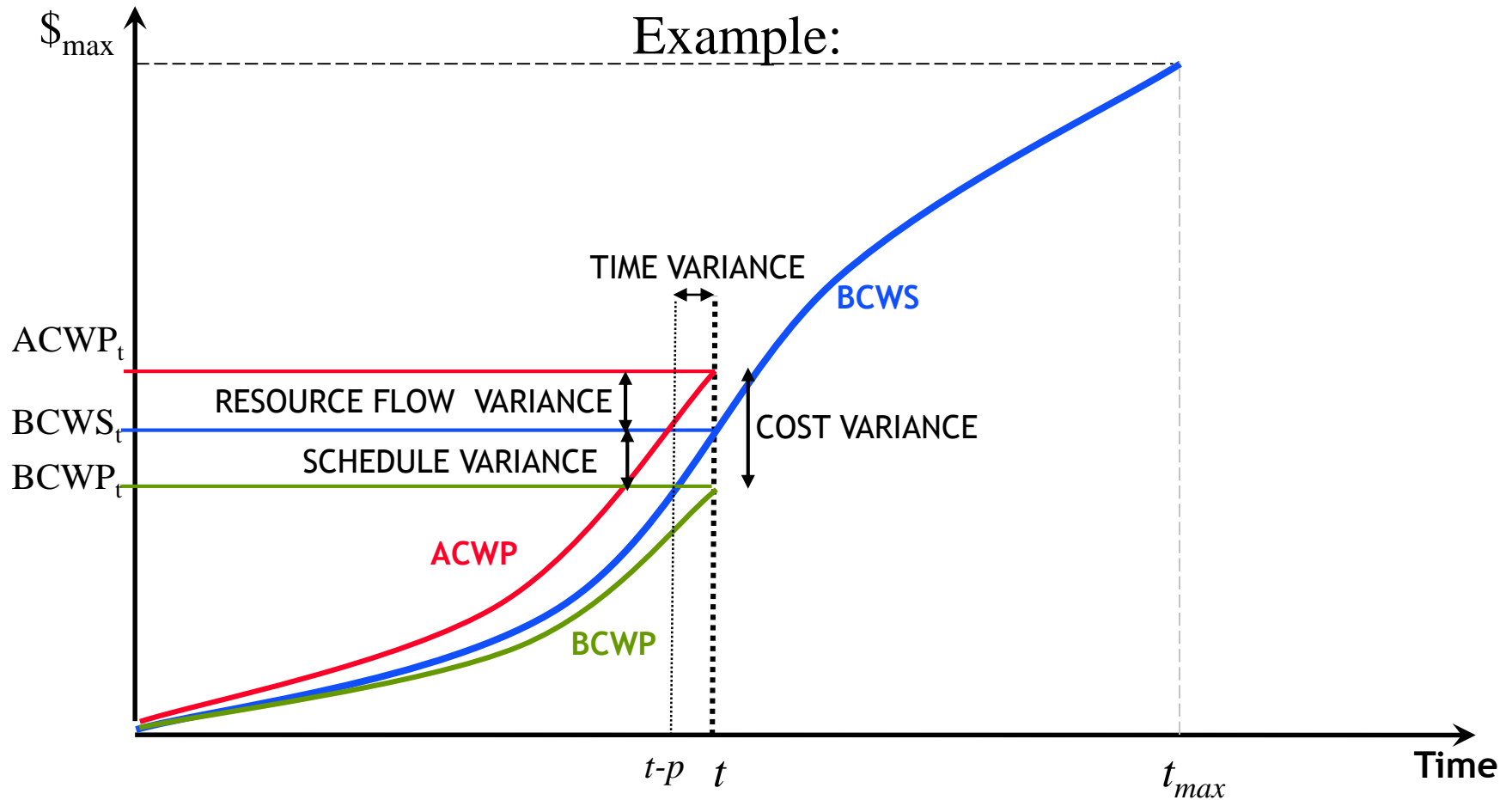
Using Earned Value: Constructing a Cost Accomplishment Chart

Cost

Actual spend

Planned spend

Earned Value (total)

Earned Value (completed tasks)

Time

- **Predicted spend**
  - **Derived from project plan**
- **Actual spend**
  - **Derived from progress reports**
- **Earned value (completed tasks)** $= \Sigma$ **budgets of all tasks completed to date**
  - **Derived from project plan & progress reports**
- **Earned value (total)** $= \Sigma$ **budgets of all tasks completed to date**

  $+$

  Σ **budgets of tasks currently engaged in**

  $-$

  Σ **cost to complete of tasks currently engaged in**
  - *Also called accomplishment*
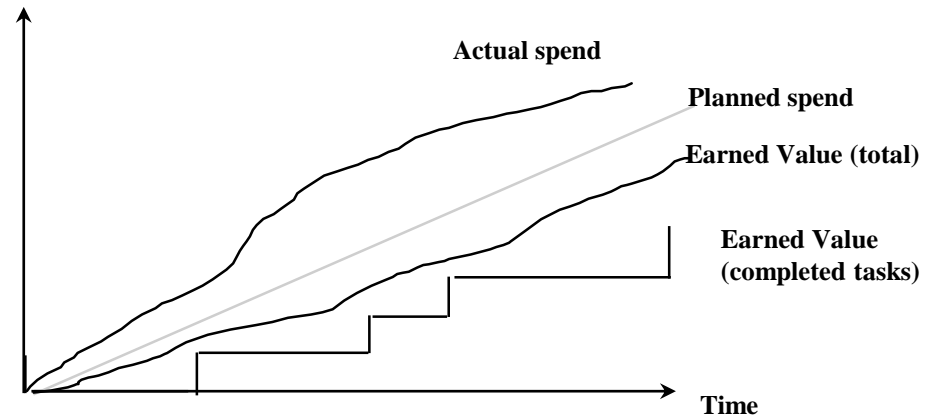
Derived from project plan & progress reports and updated estimates

Interpretation of a Cost Accomplishment Chart - 1

- **Predicted spend**
  - What was your original spend by this date in the plan?

- **Actual spend**
  - What did you actually spend by this date?

- **Earned value (completed tasks)**
  - The value (either effort or monetary) of the tasks completed to date
  - Effectively equivalent to the monetary value of the deliverables produced at the end of tasks
  - Does not allow for "value" of tasks currently in-progress

- **Earned value (total)**
  - An estimate of the value (monetary or effort) of the work you have completed to date
  - It includes the value of the tasks completed to date
  - It also includes the value of tasks currently in-progress

Interpretation of a Cost Accomplishment Chart -2
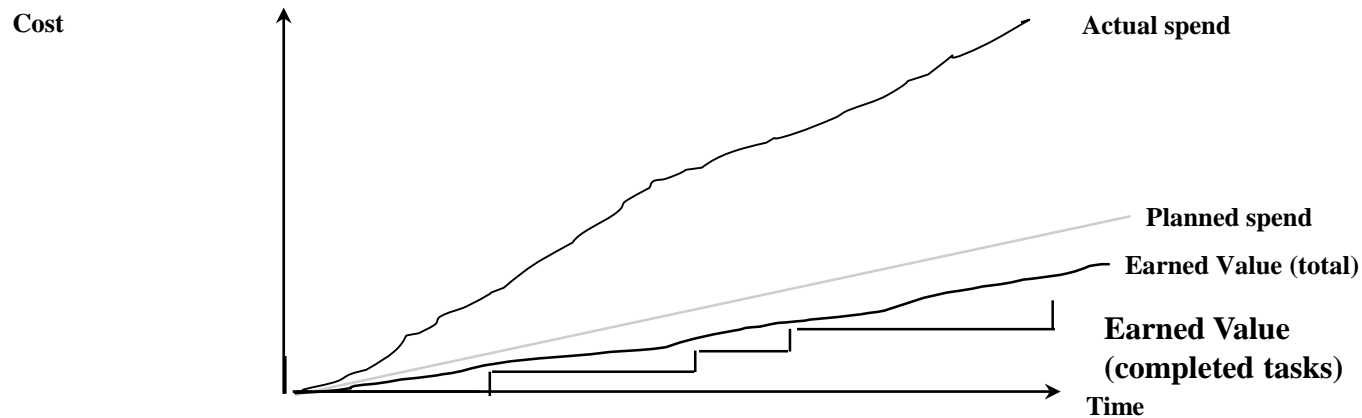
- **Observation**
  - Actual spend greatly exceeds planned spend, Earned value (total), and Earned value (completed tasks)

- **Interpretation**
  - Extra staff were assigned to the project, but
    - » Effort to complete tasks was greatly underestimated
    - » Or staff working on project are <u>not</u> working on project tasks but are simply booking to project
    - » Or staff working on project are spending more time than expected on individual tasks due to inexperience in either development technology or application domain

Interpretation of a Cost-Accomplishment Chart- 3

Cost — Planned spend, Actual spend, Earned Value (total), Earned Value (completed tasks), **Time**
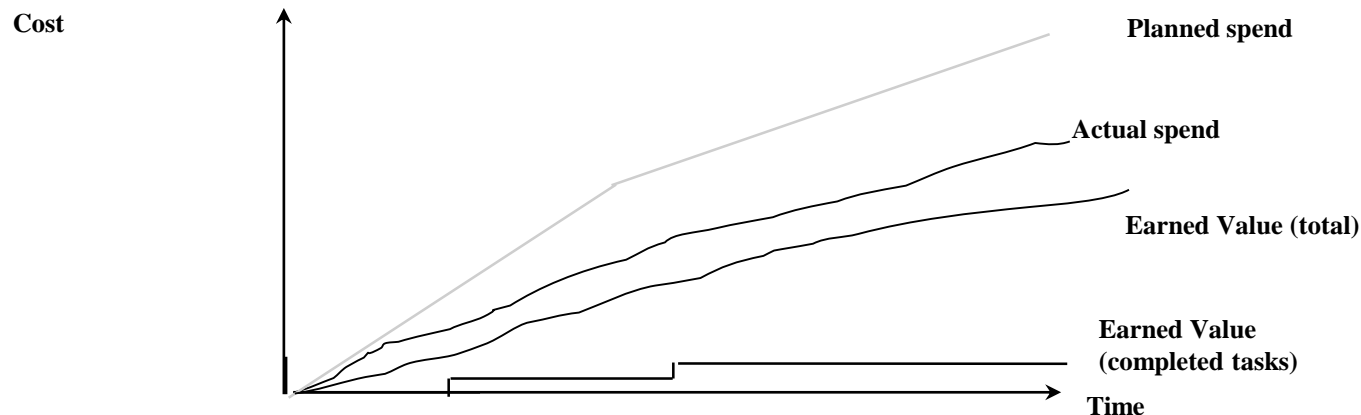
- ■ **Observation**
  - – Actual spend lags behind planned spend
  - – Earned value (total) significantly exceeds Earned value (completed tasks)
- ■ **Interpretation**
  - – Too few staff may be assigned to the project
  - – Tasks are being started in accordance with the project plan, <u>but</u>
  - – They are not being successfully completed, this could be due to
    - » Too few staff being "stretched" over too many tasks; tasks are being started (but not completed) to give the illusion of progress
    - » Deliverables are not being approved at the end of tasks , possibly due to poor quality

Interpretation of a Cost Accomplishment Chart - 4

- Cost
- Actual spend
- Planned spend
- Earned Value (total)
- Earned Value (completed tasks)
- Time
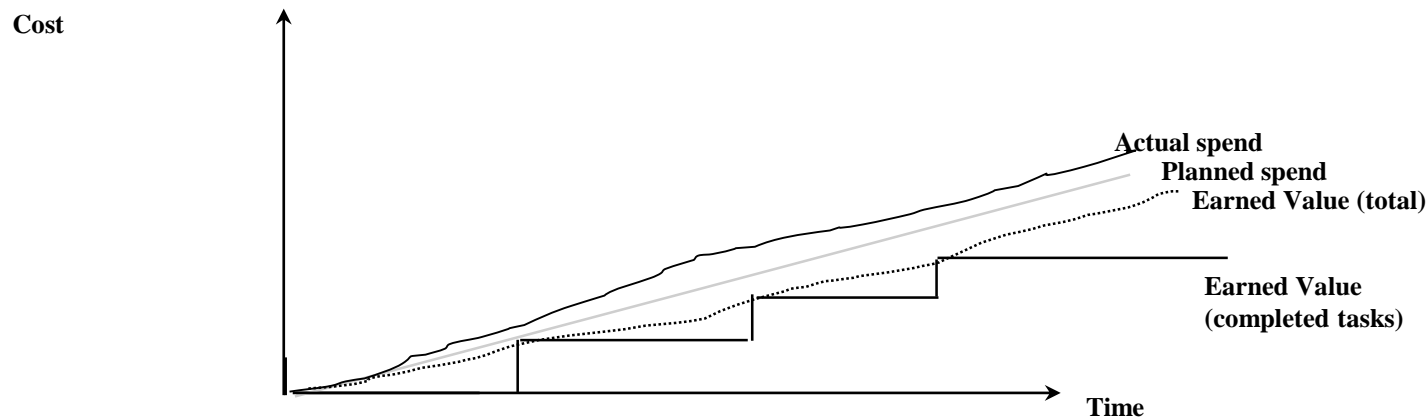
■ Observation

- – Actual spend, is slightly greater than planned spend, and Earned value (total)/Earned value (completed tasks) is marginally lower than planned/actual spend

■ Interpretation

- – Project is achieving its objectives marginally slower than expected, but at a slightly higher cost
- – Project will probably achieve it's objectives albeit slightly later and at slightly higher cost than originally anticipated.

Interpretation of a Cost Accomplishment Chart - 5
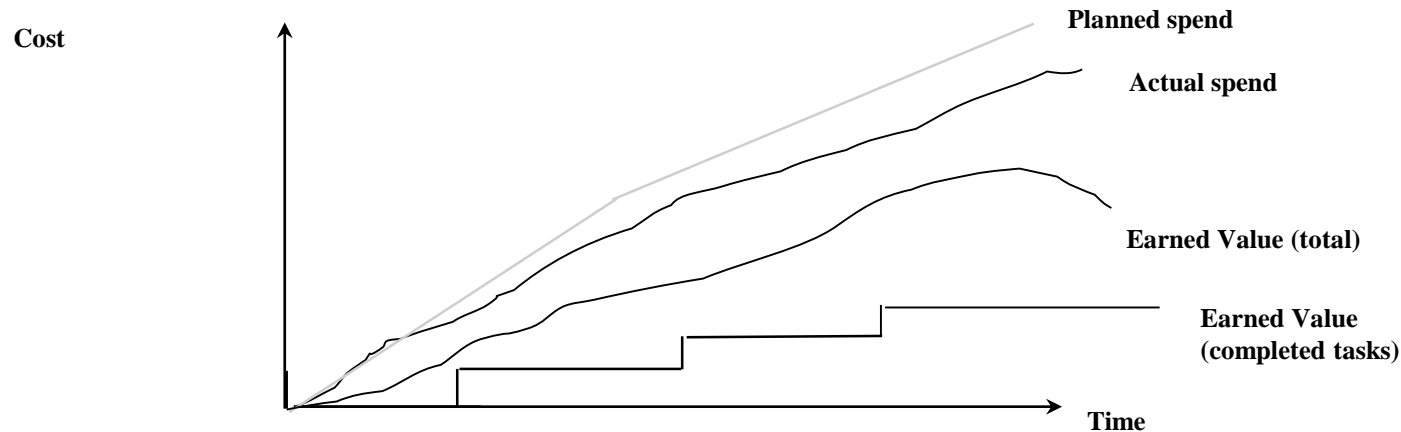
- **Observation**
  - Earned value (total) appears to decrease
- **Interpretation**
  - The effort to complete of certain tasks-in-progress is rapidly increasing
  - These tasks were probably never properly defined and are certainly greatly underestimated

# Interpretation of a Cost Accomplishment Chart – 6

Cost

Actual spend

Earned Value (total)

Earned Value (completed tasks)

Planned spend

Time
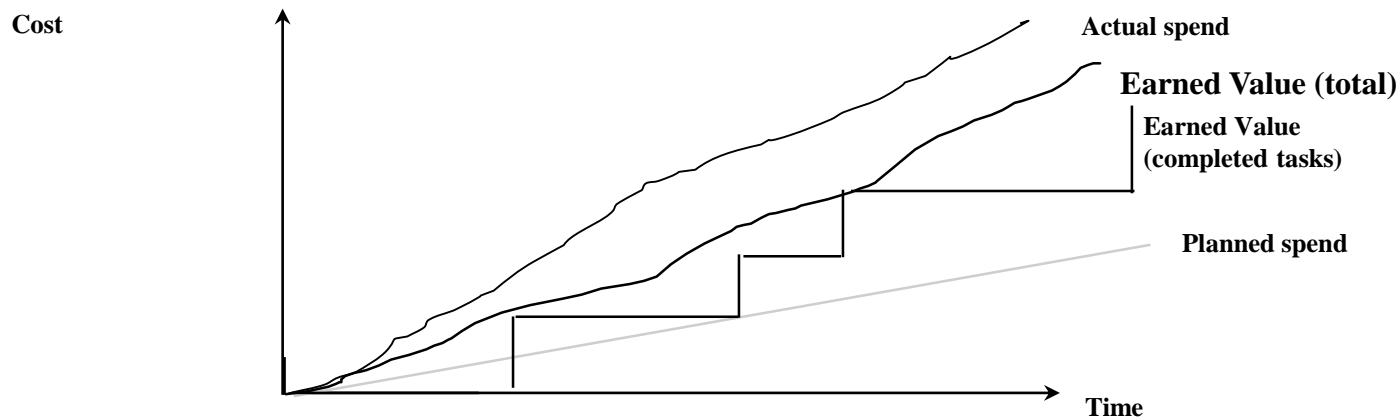
- **Observation**
  - Actual spend, Earned value (total), and Earned value (completed tasks) greatly exceeds planned spend
- **Interpretation**
  - Extra staff were assigned to the project, and they are effectively "speeding up" the project

Tracking Gantt
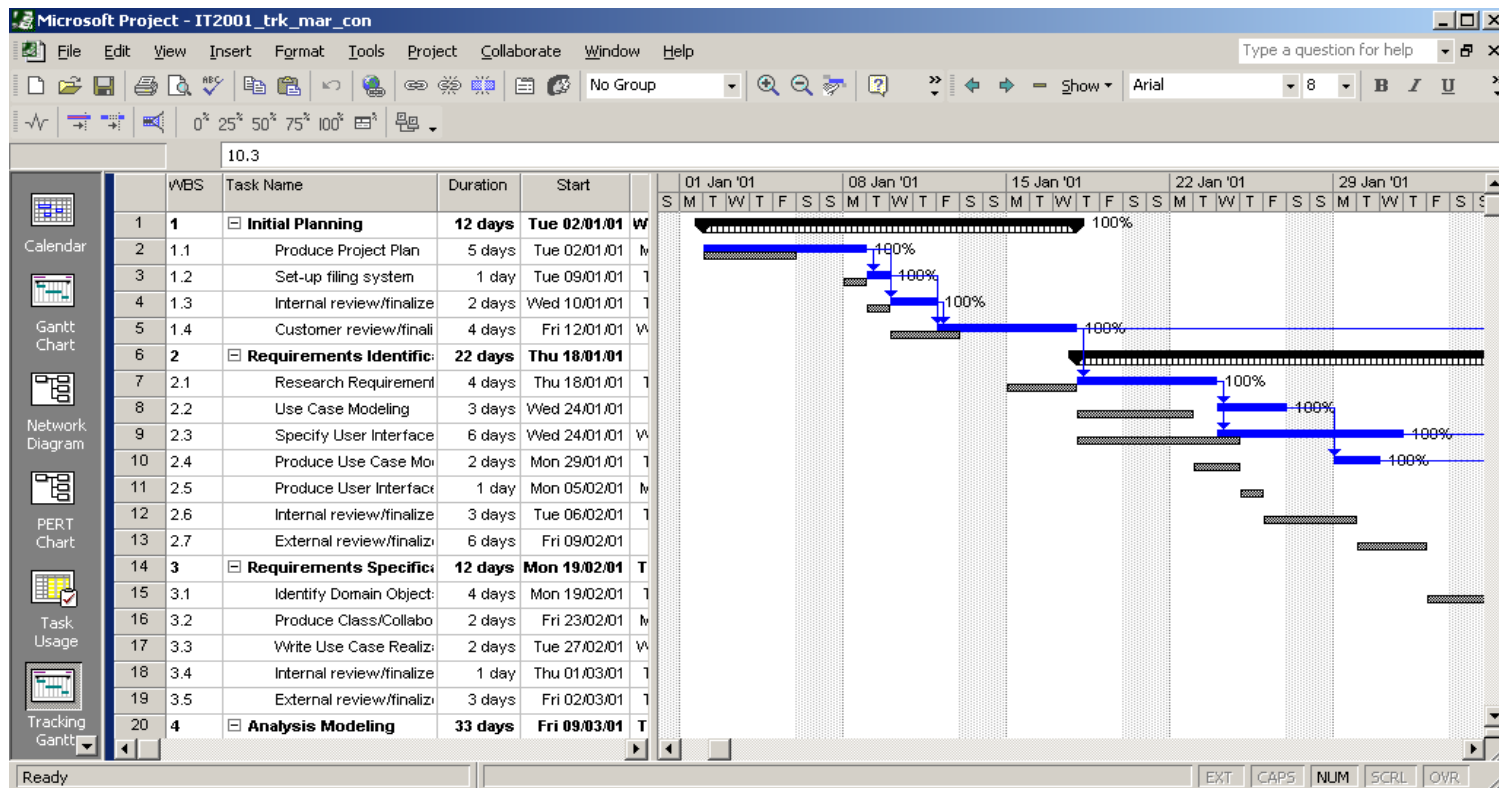
Tracking Gantt shows

– **Bars representing tasks in original plan**
– **Bars representing the actual completed tasks**
– **Bars representing tasks currently in progress (including % complete)**
– **Bars representing the currently forecast beginnings /durations/ends of tasks yet to be started**

Project Tracking Workshop

- **The SMS replacement project has been initiated and has been running for some time**

- **Attached are some documents that describe the current situation on the project**

- **Summarise the Project progress, by**
  - Producing a tracking Gantt Chart
  - Estimating the current financial position
  - Summarise current progress
  - Summarise current Problems and risks
  - Do not attempt to solve these problems yet!

Project Control Activities

- **If the project is off-track, what are the actions to take to put the project back on track?**
  - Identify and record problems
  - Find the REAL cause of the problem!
  - Devise and apply an appropriate solution!
- **Project control activities:**
  - Technical Leadership
  - Cost Control
  - Quality Control
 - Change Control
  - People Management & Soft Skills

Technical Leadership Tasks and Roles

- **What are the major technical leadership roles associated with a technically complex or technically innovative project (e.g. OO)?**
  - Understanding the technical issues that the project will face
  - Defining the project technical strategy that will address these issues
  - Demonstrating the technical strategy
    - » Developing lead components
    - » Demonstrating the technical approach
  - Ensuring the technical strategy is adhered to
    - » Technical monitoring
    - » Reviews
    - » Walkthroughs

Monitoring Technical Progress
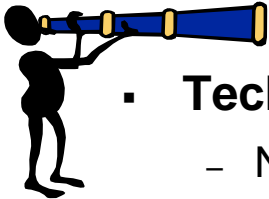
- **Technical progress must be carefully monitored**
  - New Technology may create benefits, but may also create risk
- **Use the detailed stages in your methodology and the associated deliverables as your milestones**
- **Capture and analyse OO metrics as a measure of progress**
  - Number of Use Cases completed
  - Number of Objects
  - Number of classes…….
- **Progress meetings should focus on achievement of technical objectives**
  - Utilising metrics collected above
  - *Need to maintain a balance between detailed technical progress assessment and technical problem solving*
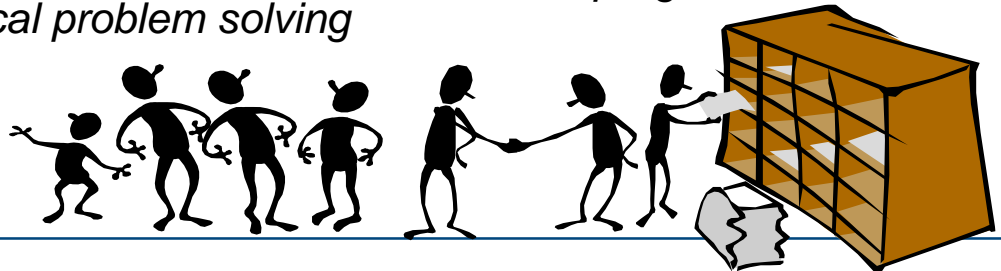
How do you ensure Technical Success?

- **Will the project complete successfully?**
  - Monitor technical progress
- **Are the technical products correct and meet requirements**
  - Review Products
  - Ensure communications
- **Is the development team learning to use new technology/methodology?**
  - Plan to Learn
- **Does the development team have a common view of the project?**
  - Team building

How do you Handle Technical Problems?

"There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know."

- Donald Rumsfeld

US Secretary of Defense from 2001 to 2006

For the Known Unknowns

- **Possible Technical Management and Control Approaches include:**
  - Avoidance
  - Mitigation
  - Acceptance

Avoiding Known Unknowns

- **You are paid to build systems that provide business value NOT play with sexy new state-of-the-art technology**
  - Go with the tried and tested
  - Go with what YOU know works
  - The leading edge is the bleeding edge
  - It is not the complicated individual component technology that kills you, but its complex interoperability with others

Mitigating Known Unknowns

- Prototype, prototype, prototype
- Conduct research
  - Technical evaluation (in-house and purchased)
  - Proof of concept
  - Look up pathfinders
- <u>Buy, beg, borrow or steal expertise</u>
  - Hire an expert
  - Train your staff
  - Assign your best technical chap
  - Bring in a consultant

Accepting Known Unknowns

- Minimize impact on critical path
  - Start early
  - Minimize dependencies
  - Have a contingency reserve of time and resources
  - Have a Plan B
  - Push the feature into phase 2
- Get vendor insurance (does not always work)

Recovering from Unknowns
The Project Management Perspective

- **Manage the user**

- **Get them involved**

- **Tell the truth but not necessarily the whole truth**
  - E.g. if hard to estimate recovery time say so
  - Activate your plans
  - Consider
    - » De-scoping
    - » Alternative solutioning

- **Prepare Three Envelopes**

Recovering from Unknowns The Technical Strategy Perspective

- **First step**
  - Decide if you need to stop digging

- **Second step**
  - Decide (to the best of your knowledge) which of two possibilities are you facing
    - » There is a solution
    - » There is no solution

- **Third step**
  - Solve the problem
- **How?**

Solving Unknowns

- **Get more information**
- **Ask the right question**
- **Come to the right answer**

Easier said than done

Cost Control

- **Project manager must monitor financial status of project:**
  - Expenditure by activity
  - Stage payments to Supplier upon receipt of major deliverables at project milestones

- **Project Manager must recommend to senior management and client/user re-assignment of budget and/or request for increase in funding to meet**
  - Extra, unplanned effort on Tasks
  - External Consultancy/Subcontract
 - Bought in Hardware/Software Tools

Quality Management (I)

- **Elements of quality management**
  - Quality assurance
    - » Ensuring the quality of processes
  - Quality Control
    - » Ensuring the quality of products
- **Why is quality management important?**
  - To avoid rework and long-term business damage
- **Project Managers must ensure**
  - Quality control is applied early in the life cycle
    - » Reviews
    - » Walkthroughs
  - Sufficient testing is applied to the product
    - » Ensure adequate resources are assigned to testing
    - » Adhere to test plan procedures

Quality Management (II)

- **What should project leaders look for in Reviews?**
  - Is there an appropriate checklist for this review?
  - Is the appropriate review checklist being properly applied (Quality assurance)
  - Is the product under review correct (Quality control)?

- **What should project leaders <u>not</u> look for in Design reviews?**
  - Are the staff performing correctly?
  - Are there ways of avoiding reviews?
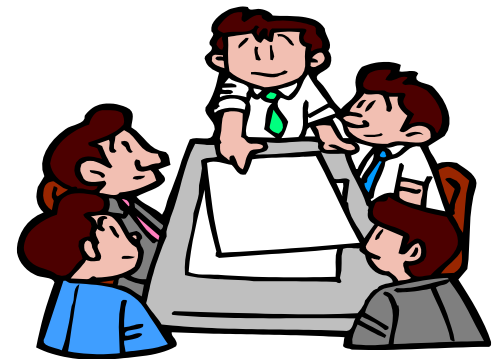
Responsibilities of Project Manager in Change Control

▪ **Project Manager must ensure**

- Change control Procedures are well defined, understood and used by all

- All requested changes to any baseline deliverable (requirements, specifications, plans, etc.) are handled by these procedures

Summary: Tips for Effective Project Control

- Beware of optimism

- Develop clear roles and responsibilities

- Keep your project tracking & control techniques simple yet effective

- Don't just collect data - analyse it and record it for future use

- Re-estimate at appropriate intervals

- Ensure that technical strategies are correctly understood and adhered to

- Communicate well with all stakeholders

- Be prepared to negotiate and conciliate

- Be aware of corporate politics

- Don't oversimplify status report

- Anticipate and avoid risks, Watch out for trends

Quantifying Impact of Factors

Effect	Impact
Your staff have already performed technical work on similar tasks *within the project*	10-20% reduction in effort and duration of relevant ongoing and future tasks
Your staff have already performed work on similar tasks concerning the same business environment and similar processes *within the project*	5-15% reduction in effort and duration of relevant ongoing and future tasks
You have established an effective rapport with the client or user management that will enable flexibility in implementing the remainder of the project	10-20% reduction in effort and duration of <u>all</u> remaining ongoing and future tasks
You have established a well-enforced change control policy and procedure that manages and costs all changes	No reduction
Your client insists on "small" modifications to the software during development that he claims are not "changes", but "clarifications"	10-25% increase in effort and duration of <u>all</u> remaining ongoing and future tasks
You are about to begin tasks with technical or other work of a nature you have not attempted before	15-25% increase in effort and duration of relevant ongoing and future tasks
You are about to begin tasks involved with business processes or business environments you have not encountered before	10-30% increase in effort and duration of relevant ongoing and future tasks
Existing staff are being replaced with new staff to work on ongoing and yet to be started tasks ; however you broadly are aware of the skills and capabilities and you have assigned them appropriately, and managed the induction and learning curve	5% increase in effort and duration of relevant ongoing and future tasks
Existing staff are being replaced with new staff to work on ongoing and yet to be started tasks ; however you are unaware of the skills and capabilities they have but you must assign them **now**	10-30% increase in effort and duration of relevant ongoing and future tasks
The Client or user management has changed , and you are dealing with an unfamiliar manager with whom you have yet to establish a relationship	10-20% increase in effort and duration of <u>all</u> remaining ongoing and future tasks

A cost-to-complete checklist (I)

- **Preparation**
  - Is all the work needed to be done to complete the original project been included in the cost-to- complete?
  - Has any agreed additional work been included in the cost-to-complete?
  - Is there any re-work of completed products or repeat of completed tasks required?
  - Are there tasks that were not performed earlier that need to be performed now?
  - Have cost and effort figures from previous tasks been collected and analyzed?
  - What are the major uncertainties left in the project?
  - Are there any exploration tasks (e.g. prototyping) that could be carried out to reduce these uncertainties
  - What further risks may occur, and how are they to be dealt with?

A cost-to-complete checklist (II)

- **Construction of estimates and planning**
  - Are the estimates based on current project performance on completed or ongoing tasks?
  - If not, what are they based upon?
  - Has allowance been made for
    » Improvements in Productivity due to staff increased capability and knowledge?
    » Effect of unfamiliar technology?
    » Effect of new unfamiliar business processes?
  - Have all external dependencies been considered?
  - Have additional resourcing requirements been identified, and can these be provided?
  - Have the costs of changes been separated from the costs of additional work?
  - Have the costs in combating risks been included; in particular is there a residual contingency budget allocated for this?

A cost-to-complete checklist (III)

- **Consequences of the Cost-to-complete exercise**
  - Have the dates of project milestones and final project completion been identified?
  - Are these compatible with the original agreed dates in the initial project plan or contract?
  - If not, are the changes allowed for in the contract?
  - Are they acceptable to the client business?
  - What are the additional costs of the project; can they be covered by the original contingency budget?
  - Can any of the additional tasks be classified as changes and can additional funding be sought for them ?
  - What are the major uncertainties in the cost to complete?
  - What senior management or client actions could be taken to resolve these uncertainties?