Project Controls Expo
Thursday 10th Nov 2011

Earned Value Management and PRINCE2

John Chapman

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Speaker Profile : John Chapman

- Programme Director for Touchstone Ltd (www.touchstone.co.uk)
- Author of Project and Programme Accounting
- Member of the authoring group of The Gower Handbook of Programme Management
- Acknowledged contributor to Managing Successful Programmes 1st Edition
- International Project Implementation Experience
- Speaker at Events for
  - Association for Project Management
  - Best Practice User Group
  - PMI UK Chapter
  - British Computer Society
  - UK Earned Value Management Conference

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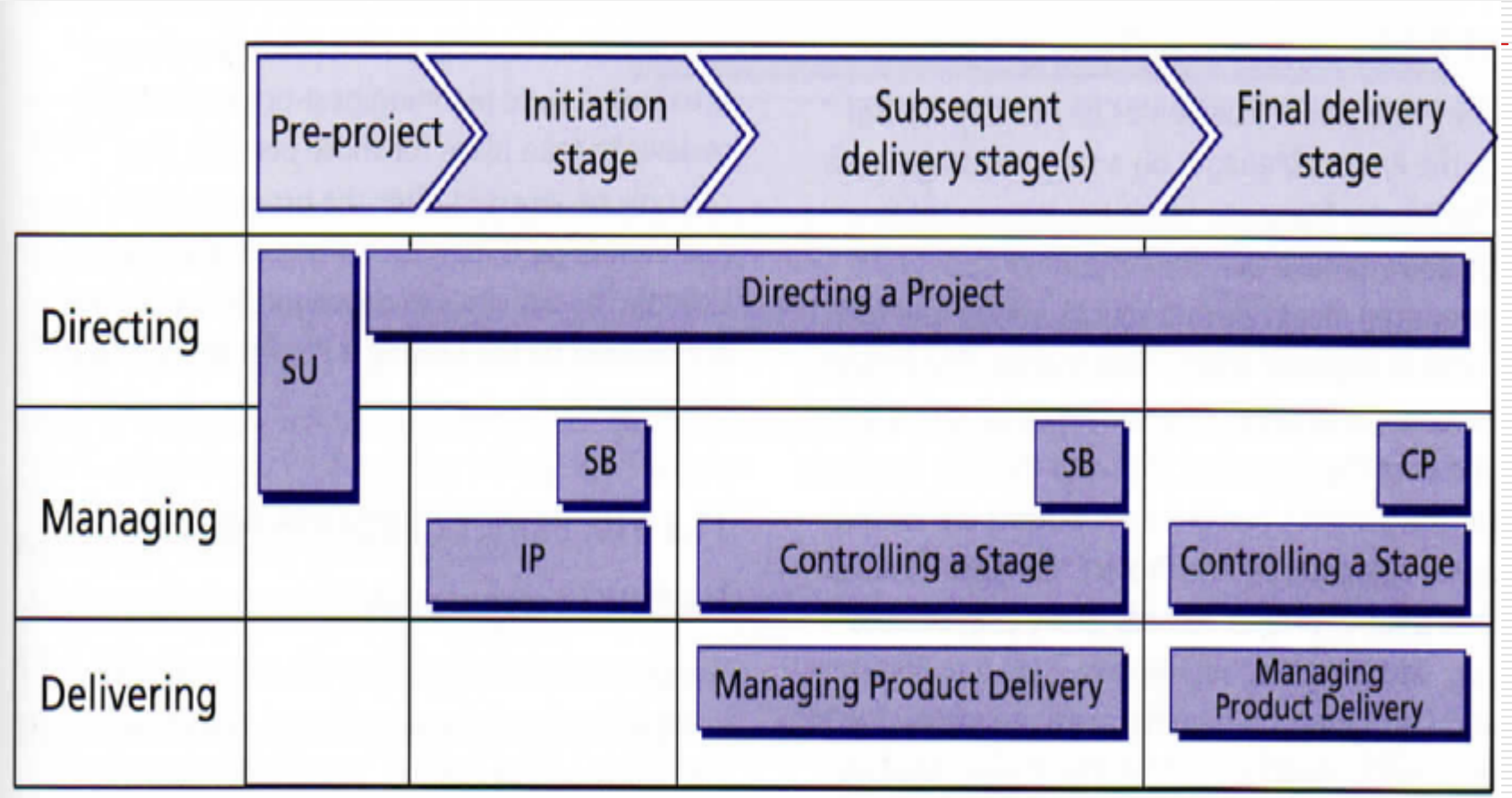
PRINCE Processes and the Project Control Lifecycle



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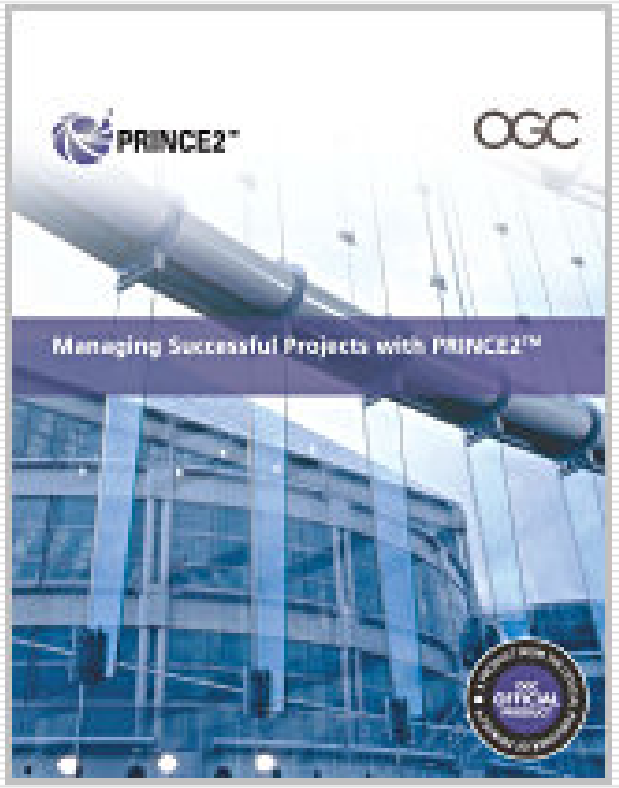
PRINCE 2 : the De facto standard

- **Earned value management** This is a technique to measure the scope, schedule and cost performance compared with plans, by comparing the completed products and the actual cost and time taken against their schedule and cost estimates. PRINCE2's product-based approach to planning provides the prerequisites needed for earned value management.



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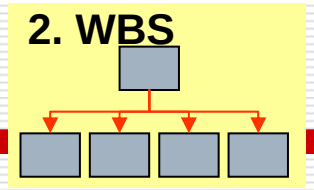
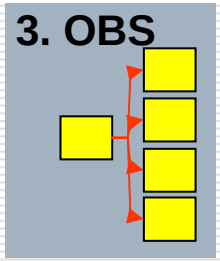
Earned Value Management in 10 Steps

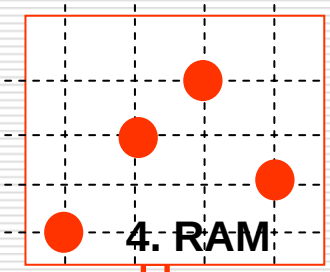
1. Requirement

2. WBS

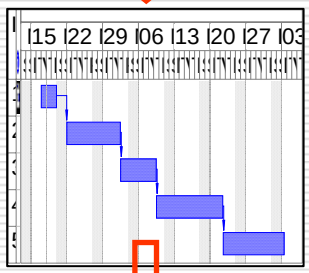


3. OBS

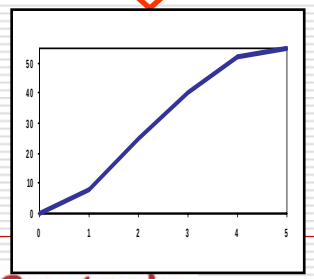




5. Plan



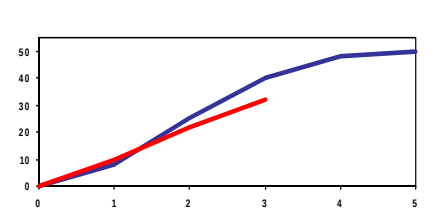
6. Budget



Set Baseline

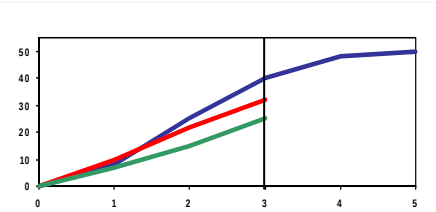
Change Control

7. Actual Cost

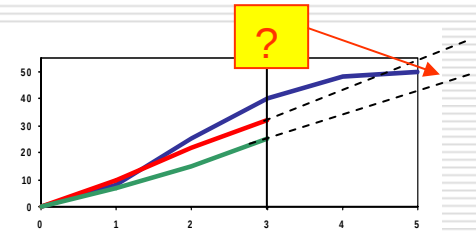


8. Work Performed

9. Earned Value



10. Analysis



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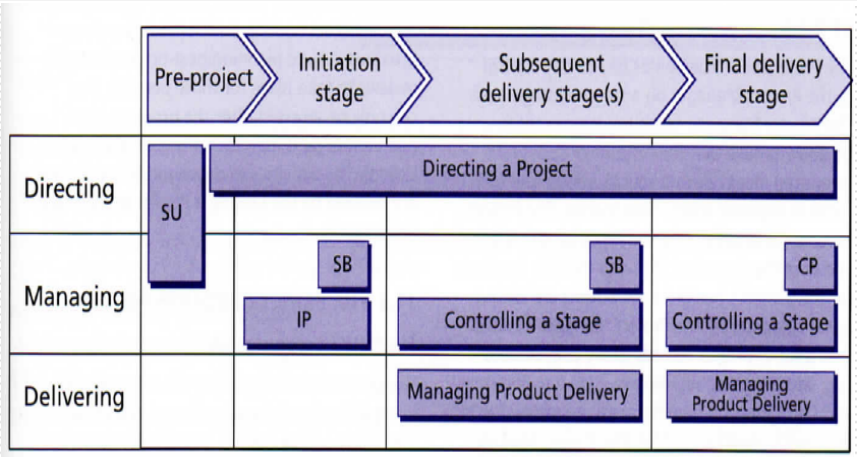
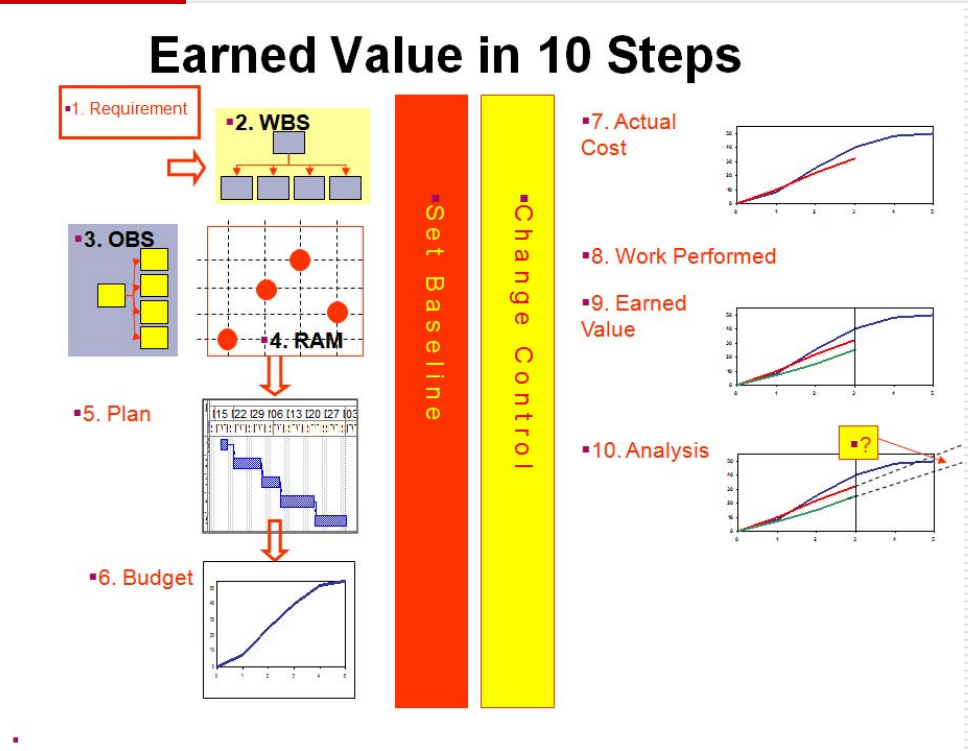
Mapping PRINCE2 to Earned Value





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Remember these 3 things

EV profiles budget over time using standard techniques.

How will we know we've delivered it?

EV monitors budget against physical progress.

Where are we?

EV calculates value for money by monitoring how efficiently we are turning budget into deliverable (aka product)

How are we doing?

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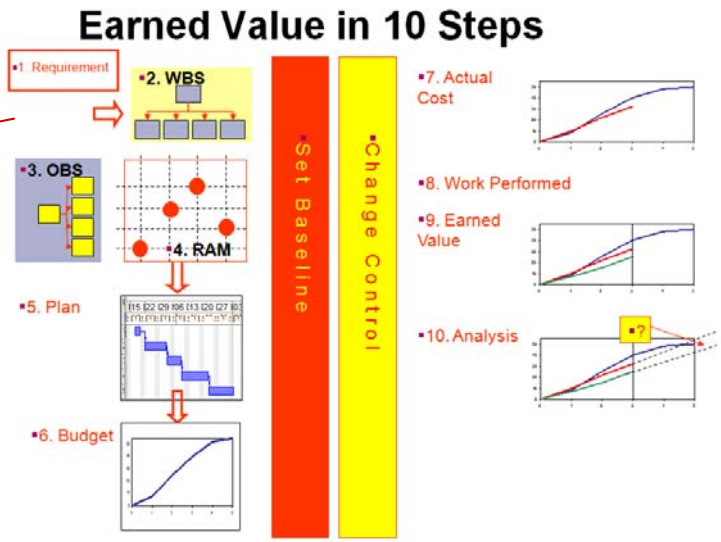
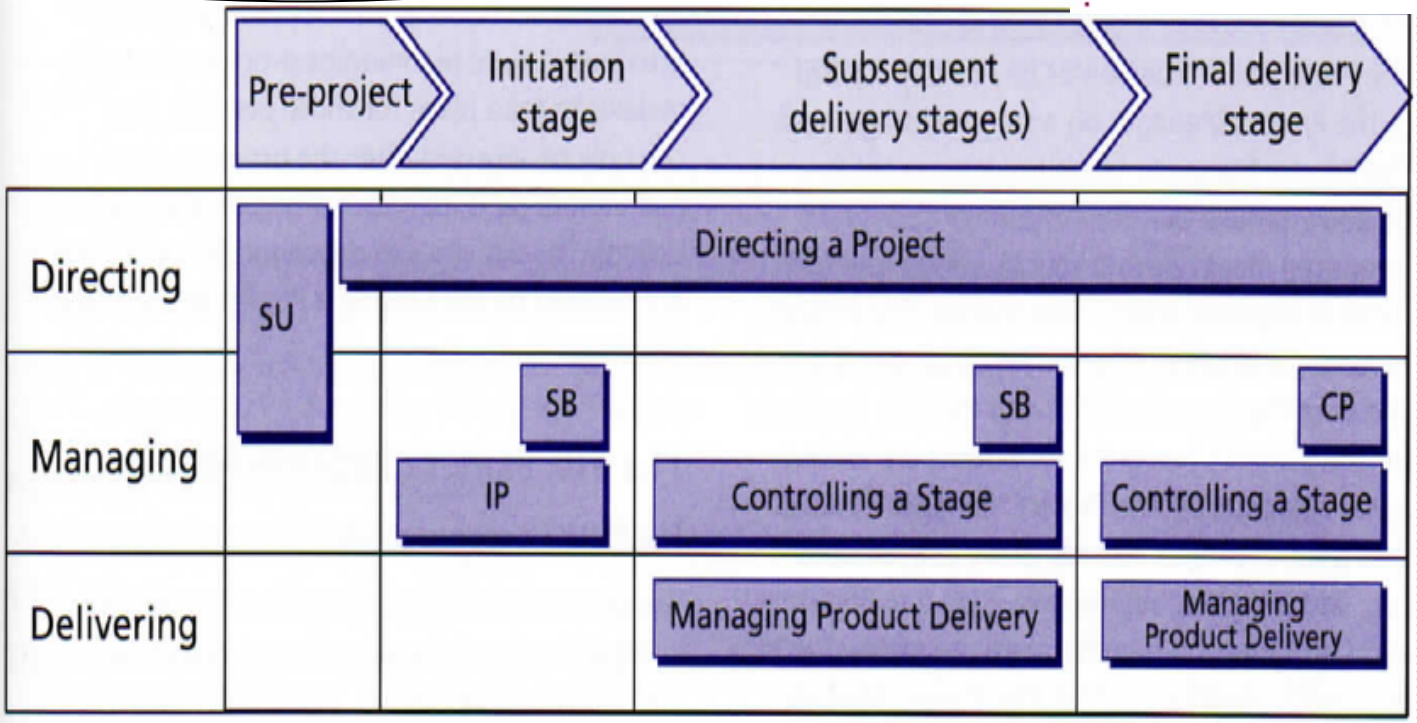
1. Requirement

Project Description : Do we have a project?





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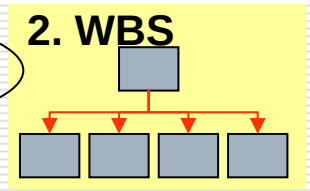
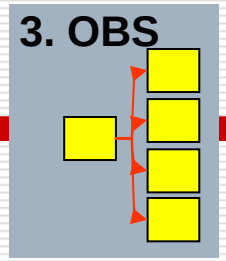
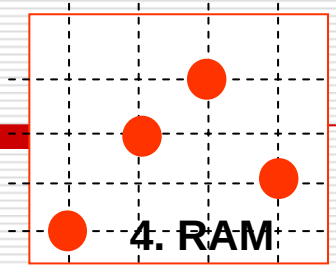
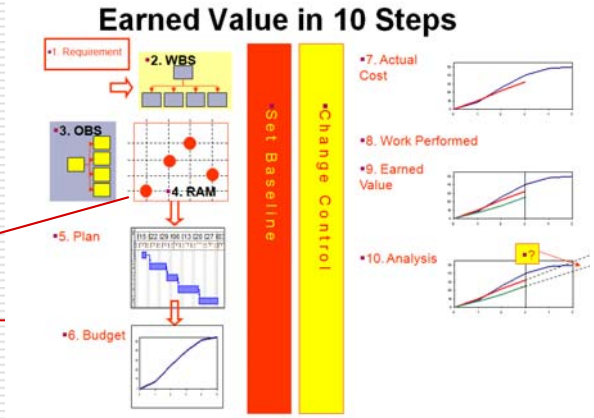
WBS includes Product Breakdown

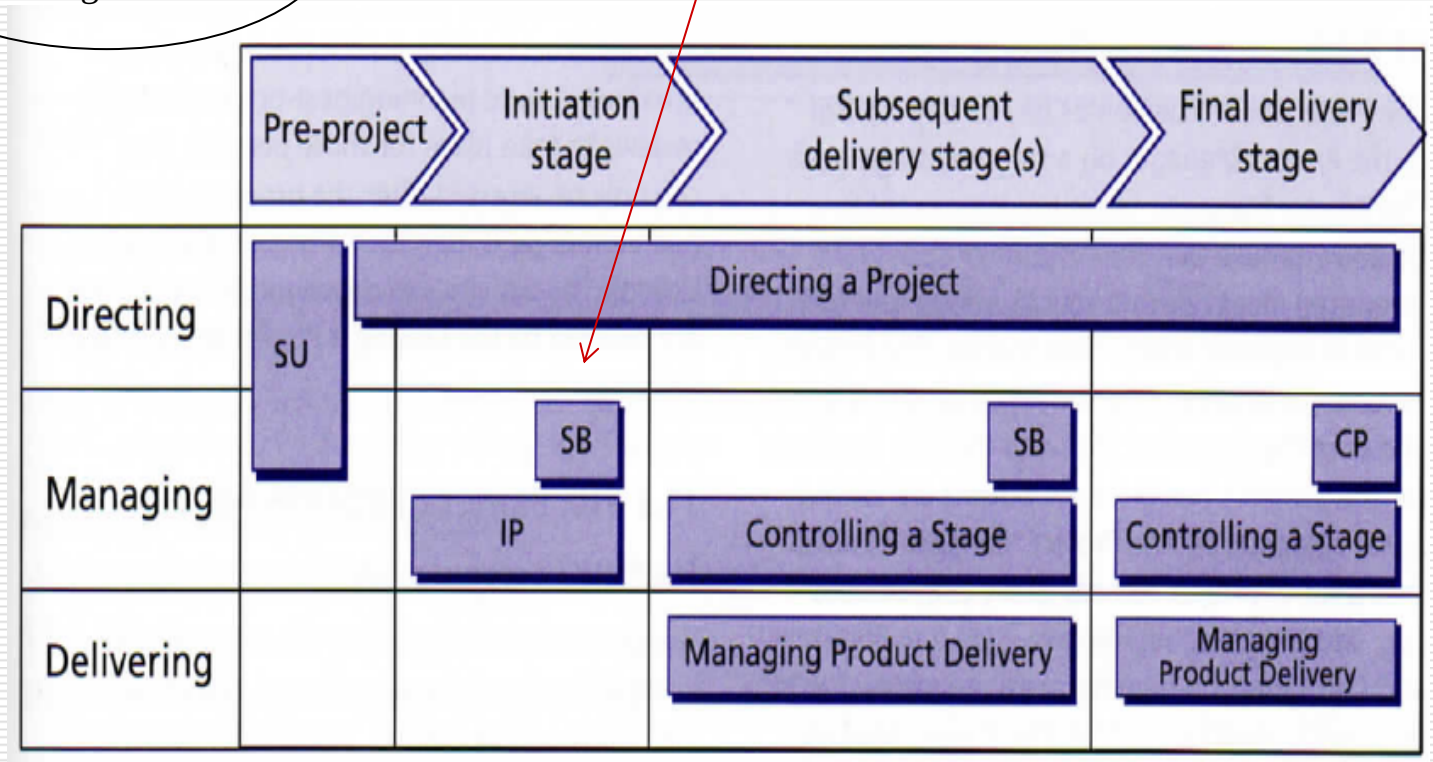






Project Planning & Stage Plan





WBS : Work Breakdown Structure
OBS : Organisation Breakdown Structure
RAM : Responsibility assignment matrix

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Case Study

- Product Breakdown
- Work Breakdown
- Organisation Breakdown
- Responsibility assignment
- Quality Management Strategy
- Bottom up estimation of effort

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Case Study

WBS Item	*Sub No*	*Sub WBS*
1.2.1 Team Training & Requirements Workshops	1	SunSystems Key Finance Requirements Workshop / Team Training
	2	Proactis Key Requirements Workshop / Team Training
	3	Recurring Invoicing Key Requirements Workshop / Team Training
	4	PM10 Key Requirements / Team Training
	5	Finance Business Requirements
	6	Spend Control Requirements
	7	Reporting Requirements

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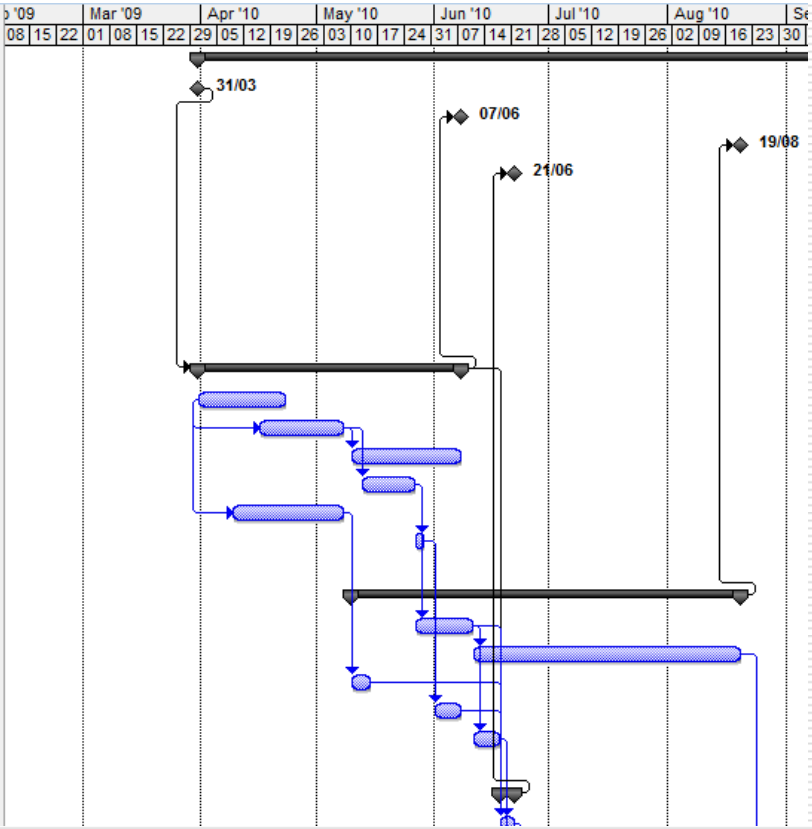
Case Study

Task Name	Total Duratio	Start	Finish
Project Control	**187 days**	**Wed 31/03/10**	**Thu 23/12/10**
Authority to start	0 days	Wed 31/03/10	Wed 31/03/10
WBS 1: Analysis Completed	0 days	Mon 07/06/10	Mon 07/06/10
WBS 2 : Design Completed	0 days	Thu 19/08/10	Thu 19/08/10
End Stage Assessment : Analysis Design to Development	0 days	Mon 21/06/10	Mon 21/06/10
WBS 3 : Development Completed	0 days	Tue 14/09/10	Tue 14/09/10
End Stage Assessment : Development to Deployment	0 days	Thu 16/09/10	Thu 16/09/10
WBS 4 : Deployment Completed	0 days	Thu 07/10/10	Thu 07/10/10
Go live week ending	0 days	Thu 07/10/10	Thu 07/10/10
WBS 5 : Operation Completed	0 days	Thu 23/12/10	Thu 23/12/10
WBS 1 : Analysis	**45 days**	**Wed 31/03/10**	**Mon 07/06/10**
WBS 1.1.1 Project Iniation	3 wks	Wed 31/03/10	Thu 22/04/10
WBS 1.2.1 Team Training & Requirements Workshops	3 wks	Fri 16/04/10	Fri 07/05/10
WBS 1.3.1 Define Business Requirements	4 wks	Mon 10/05/10	Mon 07/06/10
WBS 1.4.1 Design Workshops	2 wks	Thu 13/05/10	Wed 26/05/10
WBS 1.7.1 Define Technology Requirements	4 wks	Fri 09/04/10	Fri 07/05/10
WBS 1.8.1 Interface Design Workshop	2 days	Thu 27/05/10	Fri 28/05/10
WBS 2 : Design	**73 days**	**Mon 10/05/10**	**Thu 19/08/10**
WBS 2.4.1 Configuration Design Documentation	2 wks	Thu 27/05/10	Thu 10/06/10
WBS 2.6.1 Prepare Test Scripts for UAT	10 wks	Fri 11/06/10	Thu 19/08/10
WBS 2.7.1 Setup DEV and Production Environments	1 wk	Mon 10/05/10	Fri 14/05/10
WBS 2.8.1 Interface Design Document	1 wk	Tue 01/06/10	Mon 07/06/10
WBS 2.9.1 Design SunSystems Data Migration	1 wk	Fri 11/06/10	Thu 17/06/10
End Stage Assessment : A&D to Development	**2 days**	**Fri 18/06/10**	**Mon 21/06/10**
Run End Stage Assessment 01	2 days	Fri 18/06/10	Mon 21/06/10



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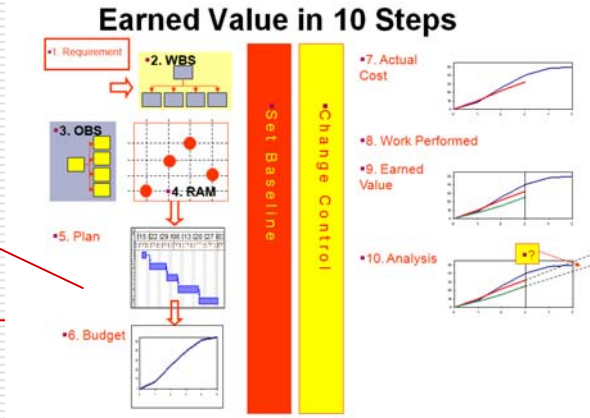
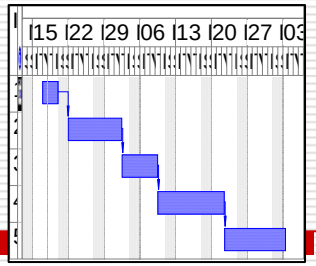
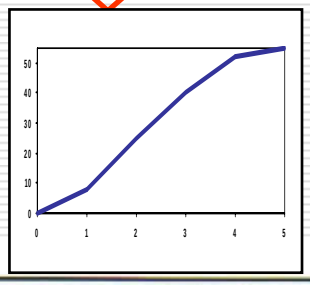


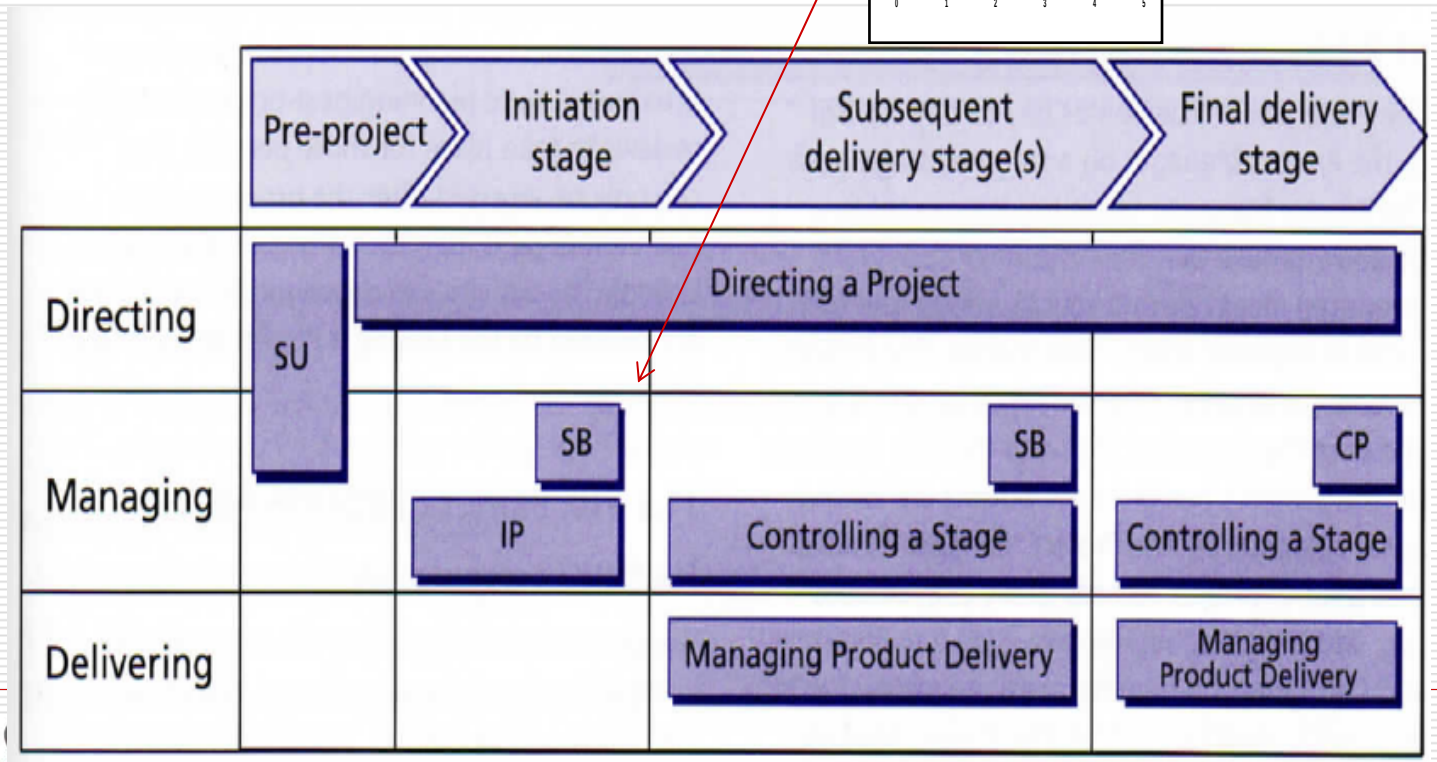


5. Plan

Project Planning & Stage Plan



6. Budget



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Case Study

- Project plan gives milestone dates with estimated dates by Stage
- Stage plans which have the allocation of resource assignment against activities
- Detailed plans for the current Stage
- Bottom up estimate of time by level 4 WBS
- Totalled by Project Stage

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	Touchstone						
	Team Mgr	Sun & Proactis	Rec. Invoicing	Reporting	Technical	Integration	Total
Stage 01							
Analysis WBS 1	25.00	12.50	3.50	2.50	1.00	1.00	45.50
Design WBS 2	6.25	5.00	3.00	1.00	4.00	1.00	20.25
Stage 02							
Development WBS 3	27.00	47.00	11.00	14.50	0.00	8.00	107.50
Stage 03							
Deployment WBS 4	14.00	14.00	4.00	3.00	1.00	2.00	38.00
Operation WBS 5	1.50	1.50	0.50	0.00	0.00	0.00	3.50
	73.75	80.00	22.00	21.00	6.00	12.00	214.75

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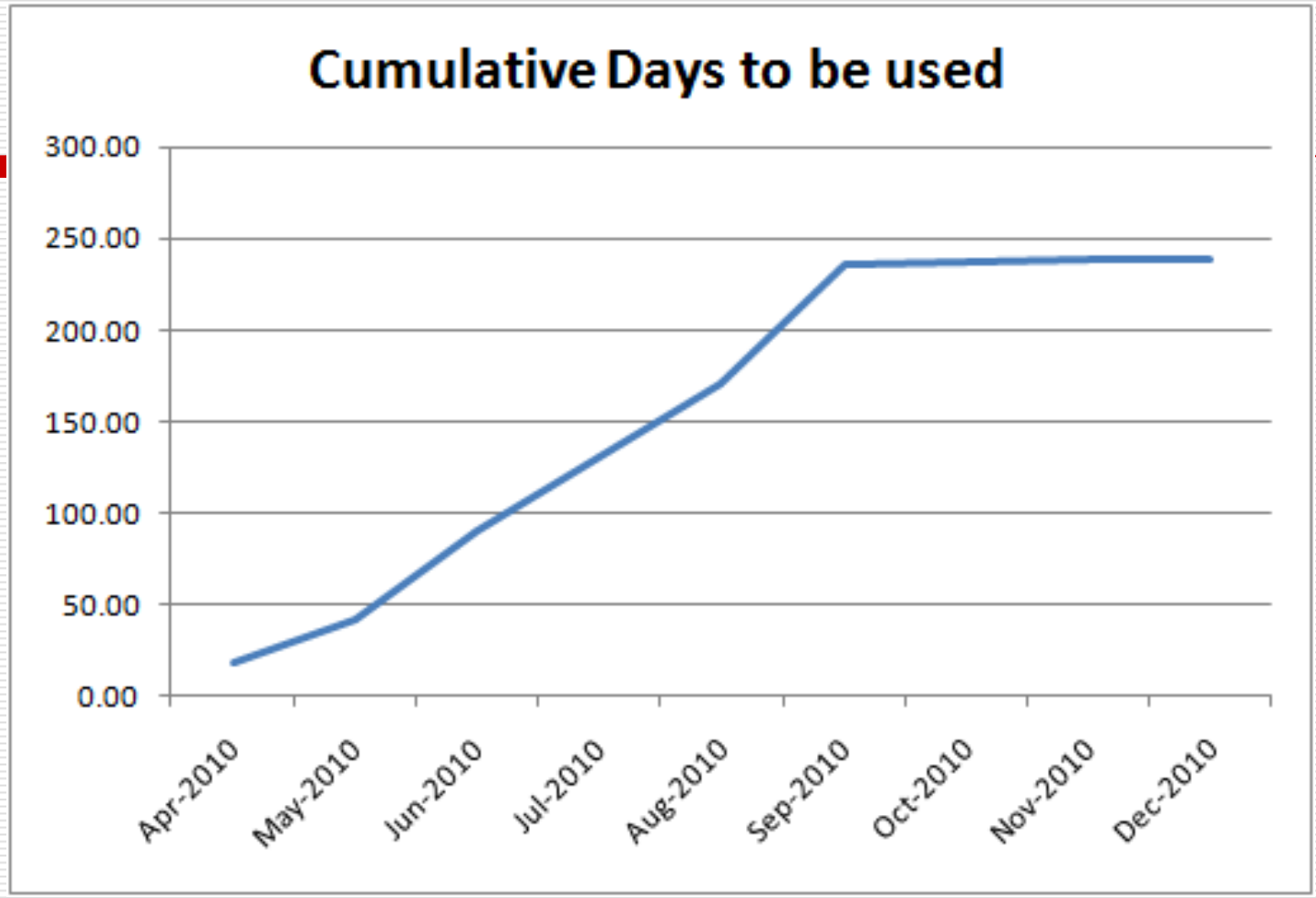

- These are days not financial values

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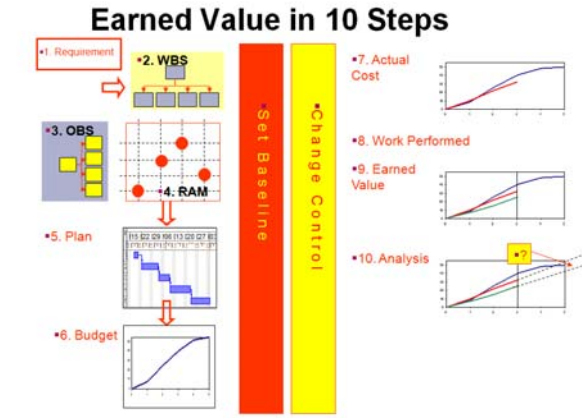
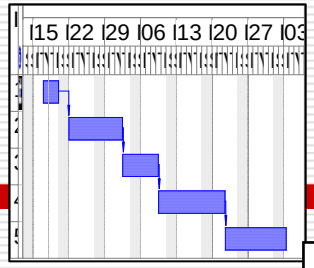
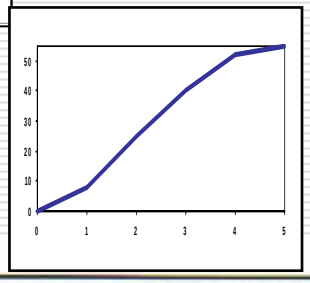


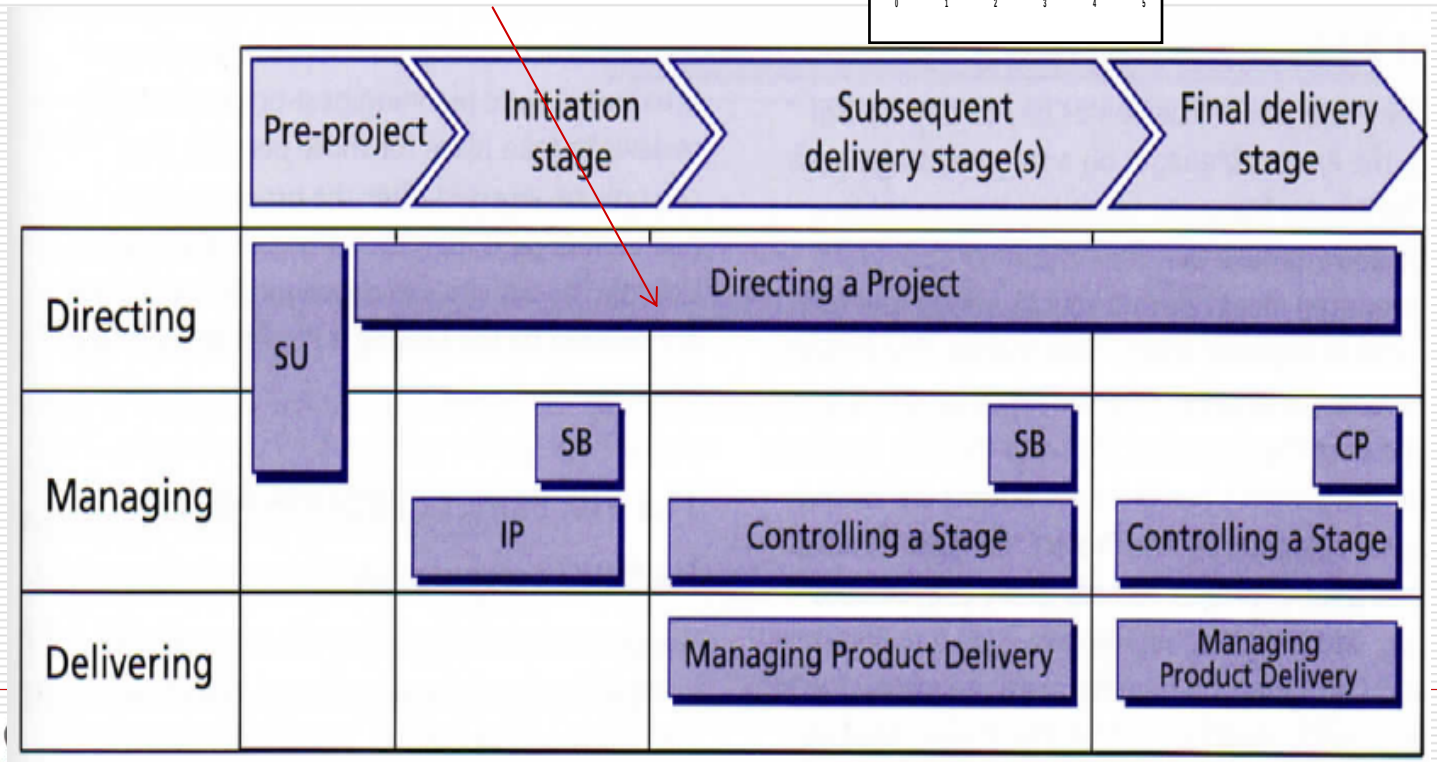
5. Plan



Set Baseline



6. Budget



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Case Study

- In the Stage Plan set the baseline
- Includes resource allocation by name
- Assign costs by name
- The Cost calculation based on resource cost

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Using Microsoft Project

% Complete	WBS	Task Name	Start	Baseline Start	Baseline Finish	Baseline Duration	Duration	Actual Duration	Remaining Duration	Duration Variance	BCWS	BCWP	CPI
0%	1	WBS 1 Analysis	Wed 31/03/10	Wed 31/03/10	Wed 19/05/10	33 days	33 days	0 days	33 days	0 days	£18,525.00	£0.00	0
0%	1.2.1	WBS 1.2.1 Team Training & Requirements Workshops	Wed 31/03/10	Wed 31/03/10	Tue 18/05/10	31.5 days	31.5 days	0 days	31.5 days	0 days	£11,400.00	£0.00	0
0%	1.2.1.1	SunSystems Key Finance Requirements Workshop / Team	Wed 05/05/10	Wed 05/05/10	Fri 07/05/10	3 days	3 days	0 days	3 days	0 days	£2,850.00	£0.00	0
0%	1.2.1.2	Proactis Key Requirements Workshop / Team Training	Tue 20/04/10	Tue 20/04/10	Wed 21/04/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	1.2.1.3	Recurring Invoicing Key Requirements Workshop / Team T	Thu 13/05/10	Thu 13/05/10	Fri 14/05/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	1.2.1.4	PM10 Key Requirements / Team Training	Mon 17/05/10	Mon 17/05/10	Mon 17/05/10	0.5 days	0.5 days	0 days	0.5 days	0 days	£475.00	£0.00	0
0%	1.2.1.5	Prepare Finance Business Requirements Document	Mon 17/05/10	Mon 17/05/10	Mon 17/05/10	0.5 days	0.5 days	0 days	0.5 days	0 days	£475.00	£0.00	0
0%	1.2.1.6	Prepare Spend Control Requirements Document	Fri 30/04/10	Fri 30/04/10	Fri 30/04/10	1 day	1 day	0 days	1 day	0 days	£950.00	£0.00	0
0%	1.2.1.7	Prepare Reporting Requirements Document	Mon 17/05/10	Mon 17/05/10	Tue 18/05/10	1 day	1 day	0 days	1 day	0 days	£950.00	£0.00	0
0%	1.2.1.8	Run Sun session for Savita	Wed 31/03/10	Wed 31/03/10	Thu 01/04/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	1.2.1	WBS 1.2.1 Team Training Completed	Tue 18/05/10	Tue 18/05/10	Tue 18/05/10	0 days	0 days	0 days	0 days	0 days	£0.00	£0.00	0

- In MS Project setting the baseline creates the BCWS (the Planned Value)

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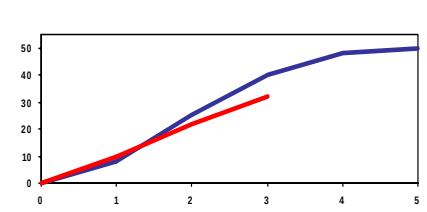
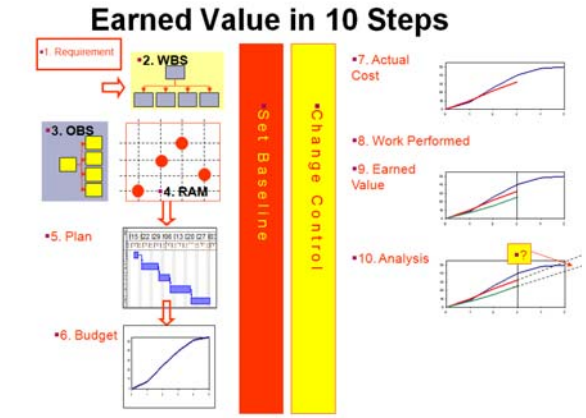
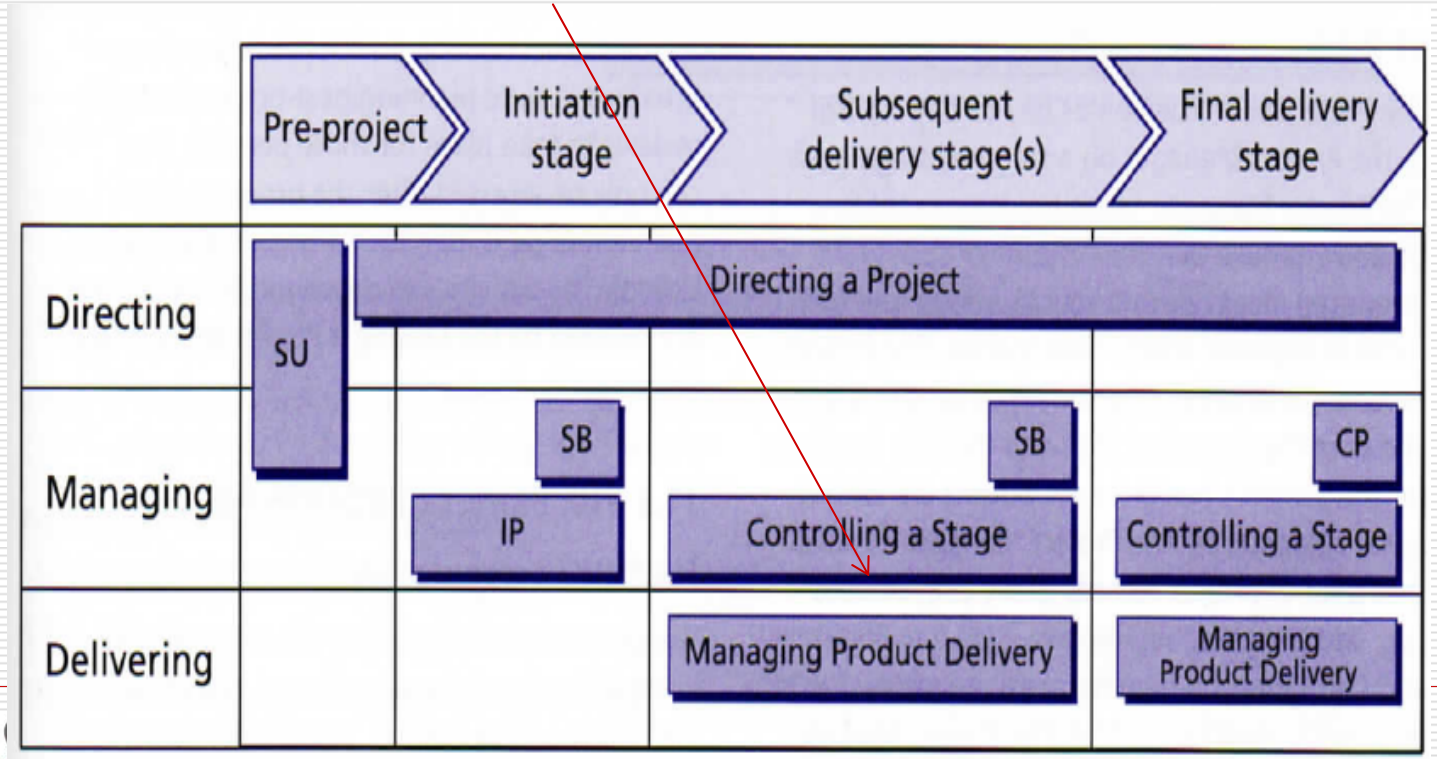
7. Actual Cost





Checkpoint Reporting against Work Packages

8. Work Performed



EXPO

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Case Study

- The project is underway
- We collect Actual Cost information by WBS element through timesheet analysis which needs to be at Level 4 Deliverable (in this example)
- We have weekly reviews to collect % complete and remaining duration
- If your team have not considered remaining duration before then this will require some forethought!
- This is reported through a checkpoint report

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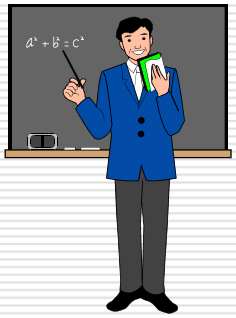
Earning the value

For example on an IT Project

- Training is 0-100 : either you are trained or not trained!



- Design could be by weighted milestone
  - 25% on completion of a design workshop
  - 50% on issuing a design document
  - 25% on design signoff

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Using Microsoft Project

% Complete	WBS	Task Name	Start	Baseline Start	Baseline Finish	Baseline Duration	Duration	Actual Duration	Remaining Duration	Duration Variance	BCWS	BCWP	CPI
10%	**1**	**WBS 1 Analysis**	**Wed 31/03/10**	**Wed 31/03/10**	**Wed 19/05/10**	**33 days**	**33 days**	**3.22 days**	**29.78 days**	**0 days**	**£18,525.00**	**£1,900.00**	**1**
17%	**1.2.1**	**WBS 1.2.1 Team Training & Requirements Workshops**	**Wed 31/03/10**	**Wed 31/03/10**	**Tue 18/05/10**	**31.5 days**	**31.5 days**	**5.25 days**	**26.25 days**	**0 days**	**£11,400.00**	**£1,900.00**	**1**
67%	1.2.1.1	SunSystems Key Finance Requirements Workshop / Team	Wed 05/05/10	Wed 05/05/10	Fri 07/05/10	3 days	3 days	2 days	1 day	0 days	£2,850.00	£1,900.00	1
0%	1.2.1.2	Proactis Key Requirements Workshop / Team Training	Tue 20/04/10	Tue 20/04/10	Wed 21/04/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	1.2.1.3	Recurring Invoicing Key Requirements Workshop / Team T	Thu 13/05/10	Thu 13/05/10	Fri 14/05/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	1.2.1.4	PM10 Key Requirements / Team Training	Mon 17/05/10	Mon 17/05/10	Mon 17/05/10	0.5 days	0.5 days	0 days	0.5 days	0 days	£475.00	£0.00	0
0%	1.2.1.5	Prepare Finance Business Requirements Document	Mon 17/05/10	Mon 17/05/10	Mon 17/05/10	0.5 days	0.5 days	0 days	0.5 days	0 days	£475.00	£0.00	0
0%	1.2.1.6	Prepare Spend Control Requirements Document	Fri 30/04/10	Fri 30/04/10	Fri 30/04/10	1 day	1 day	0 days	1 day	0 days	£950.00	£0.00	0
0%	1.2.1.7	Prepare Reporting Requirements Document	Mon 17/05/10	Mon 17/05/10	Tue 18/05/10	1 day	1 day	0 days	1 day	0 days	£950.00	£0.00	0
0%	1.2.1.8	Run Sun session for Savita	Wed 31/03/10	Wed 31/03/10	Thu 01/04/10	2 days	2 days	0 days	2 days	0 days	£1,900.00	£0.00	0
0%	**1.2.1**	**WBS 1.2.1 Team Training Completed**	**Tue 18/05/10**	**Tue 18/05/10**	**Tue 18/05/10**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**£0.00**	**£0.00**	**0**

- In MS Project setting the baseline creates the BCWS (the planned value)
- As we update the Actual duration and remaining duration the CPI is calculated

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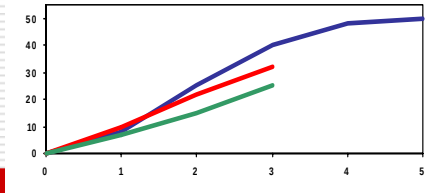
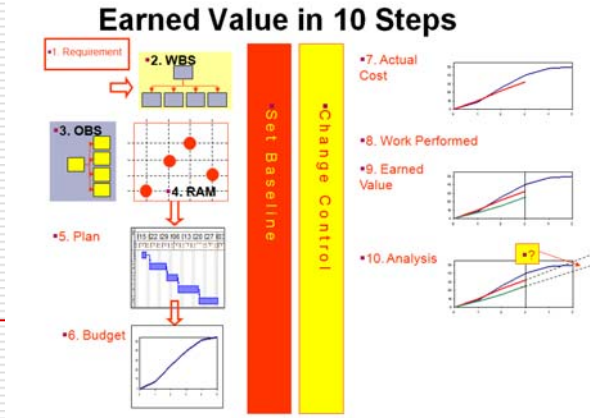
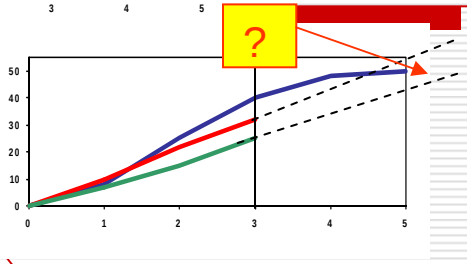
9. Earned Value

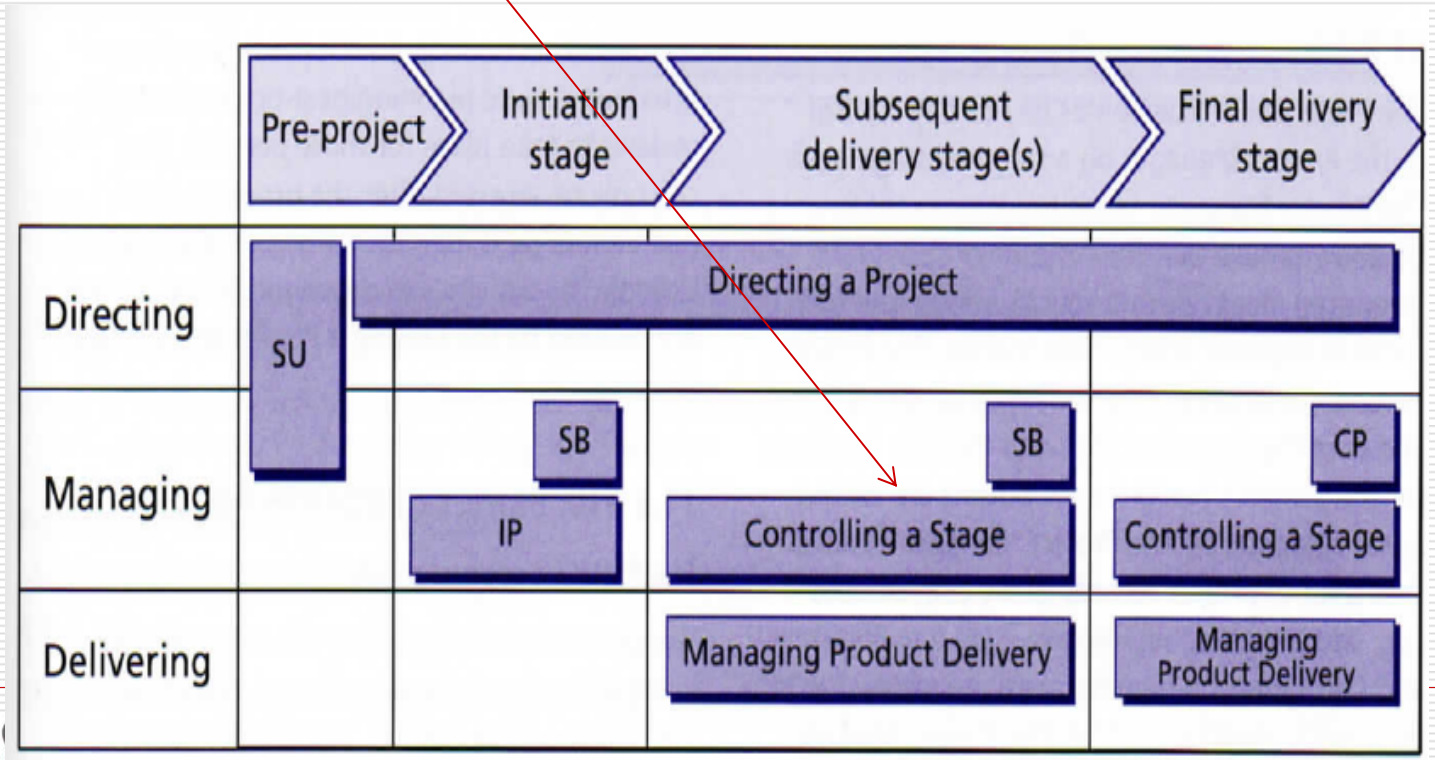




10. Analysis

Time tolerance
Cost tolerance
Exception report





EXPO

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Case Study: End Stage Assessment

- The End Stage Report is used to give a summary of progress to date, the overall project situation, and sufficient information to ask for a Project Board Decision on what to do next with the project [1]
- Composition … Forecast. The Project Manager's forecast for the project and next Stage against planned targets and tolerances for time, cost, quality, scope, benefits and Risk with the project [2]

1. Managing Successful Projects with PRINCE2, OGC, ISBN 978-0-11-331059-3 page 244
2. Ibid page 244

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US Survey says…..

over 800 military programs show that ……

no program has ever improved performance better than the following EAC calculation

$$EAC = \frac{BAC}{CPI}$$

at 15% complete point in program

No-one pays enough attention in the early stages

Courtesy of Steve Wake

Project Controls EXPO

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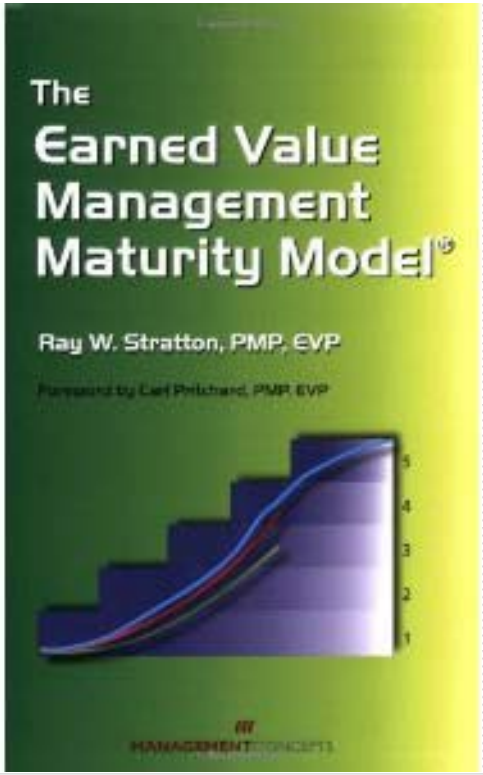
US Survey says…..

Estimate at Complete

- Thanks to CPI and SPI_t, and a budget that represents all the work to be done (BAC), .. it is possible to predict when the project will be done and how much will be spent getting there… There is common knowledge and statistical evidence showing this assumption to be valid. The project work is as difficult as it is. Page 34



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Case Study : Key Performance Indicator

A mathematical projection

- EAC = BAC / CPI
- Estimate at Complete = Budget at Complete / Cost Performance Index
- Assume
  - BAC is £150,000
  - CPI is 0.95
  - EAC = £150,000 / 0.95
  - EAC = £157,895

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Case Study: Why is CPI Important?

- This is a quick method of identifying of the estimate at complete(EAC).
- It does not involve bottom up analysis but does provide a metric and financial value
- 'However when there is a significant technical issue, only detailed planning of the remaining work can result in a valid EAC'.[1]

1. Performance Based Earned Value . Paul J Solomon and Ralph R Young, ISBN 9780471721888, page 100

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Case Study

A bottom up calculation

- EAC = AC + ETC
- Estimate at Complete = Actual Costs plus Estimate to Complete
- Alternatively we do a bottom up analysis of all the remain activities based on what we have learnt to get the Estimate to Complete.

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Case Study: End Stage Assessment

- At End Stage Assessment we now have
  - Budget At Complete (BAC)
  - Estimate To Complete (ETC)
  - Estimate At Complete (EAC)
- Is the project still financially viable based on the Estimate at Complete?
  - Used at End Stage Assessment

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Case Study: End Stage Assessment

Activity/Resource Budget	(Touchstone) Forecasted Days	Raised CCN/PO	Revised Total	Utilised to 4 June	Balance	Estimate To Complete	Variance	RAG
Stage 01: Analysis and Design	66.25	2.25	68.50	52.77	15.73	6.50	9.23	
Stage 02: Development	115.00	0.00	115.00	0.00	115.00	111.75	3.25	
Stage 03: Deployment & Operation	39.00	0.00	39.00	0.00	39.00	39.00	0.00	

Estimate At Complete (EAC) = 210.02

Actual Cost: 52.77 + Estimate to Complete of 157.27

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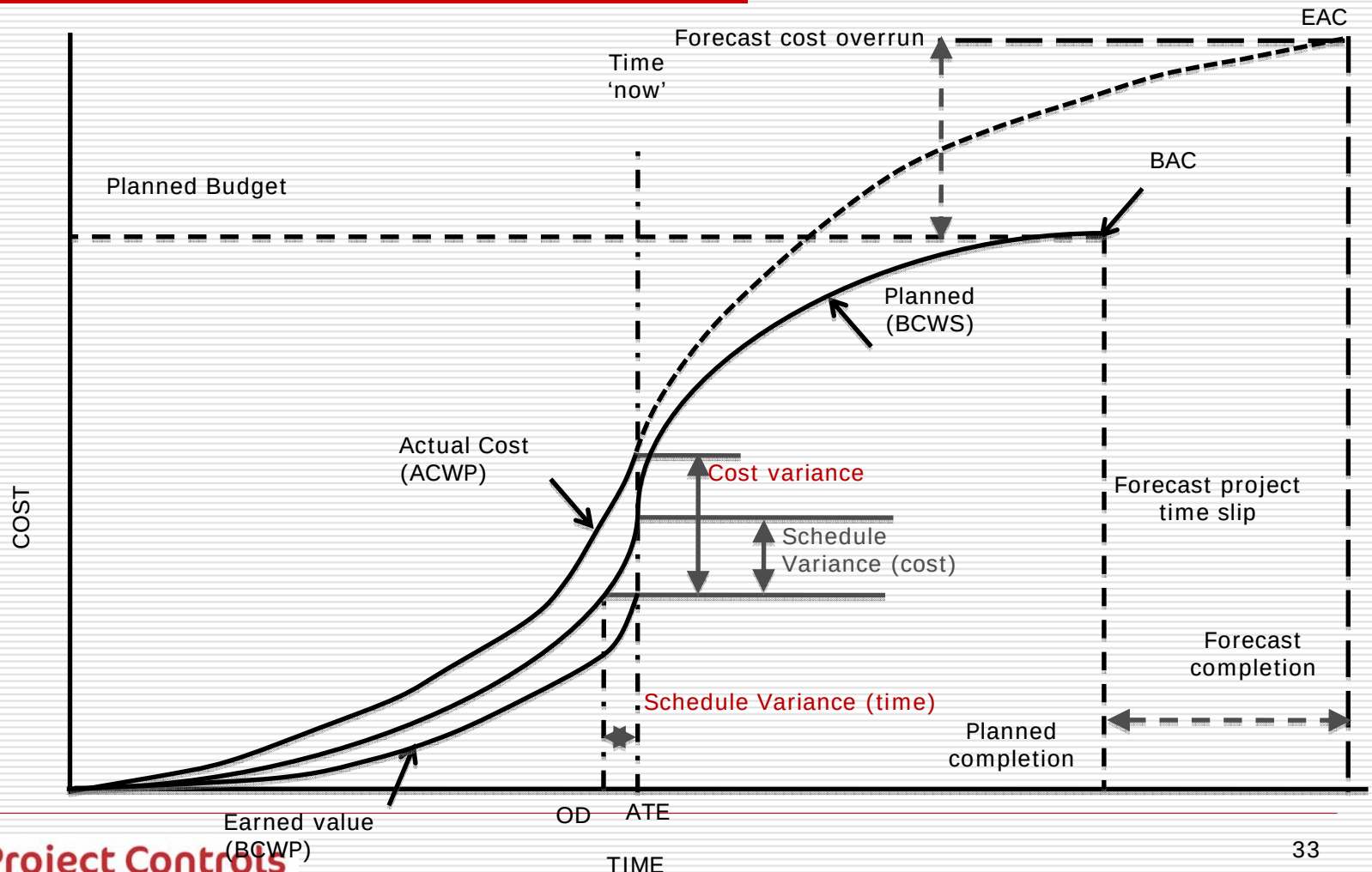
BAC	Budget at completion
BCWS	Budgeted Cost of Work Scheduled
OD	Original Duration planned
ATE	Actual Time Expended
ACWP	Actual Cost of Work Performed
BCWP	Budget Cost of Work Performed
EAC	Estimate Cost at Completion

Reporting Graphs



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Thank you to…

Steve Wake
swprojects@blueyonder.co.uk

Graham Williams
grahamgsw@me.com

John Chapman, Touchstone Ltd
john.chapman@touchstone.co.uk, Tel: +44 (0) 7973 108 426

John Flaherty, OTC Optima
john.flaherty@otcoptima.com

Alex Davis, MOD
alex.davis507@mod.uk

… and members of the EVM SIG

Project Controls EXPO

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