



MANAGEMENT ENGINEERING  
PROCESS IMPROVEMENT COMMUNITY  
Networking. Process. Tools. Collaboration.



# Project Planning Tools: Project Estimating Worksheet & Project Planning Template

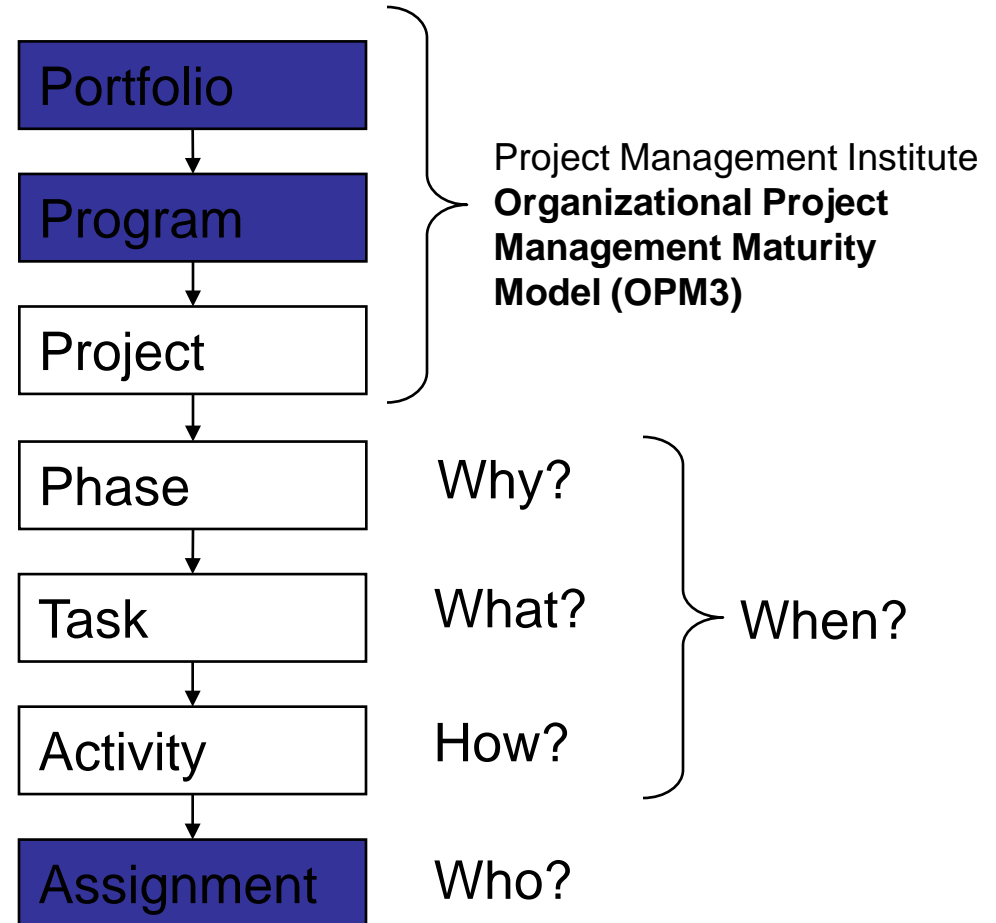
**Richard Biehl**

**HIMSS Management Engineering-  
Process Improvement Tools &  
Topic Workgroup**

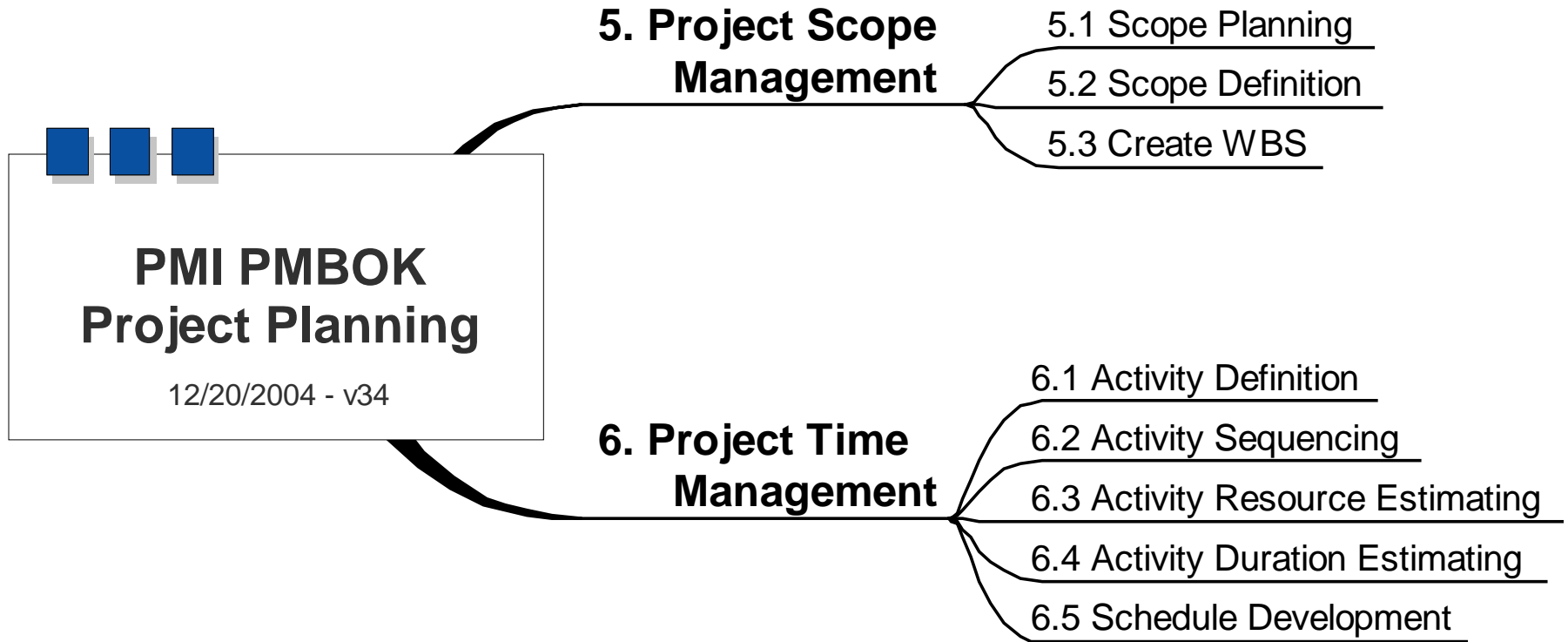
# Project Scheduling TMAP

## Guiding Questions

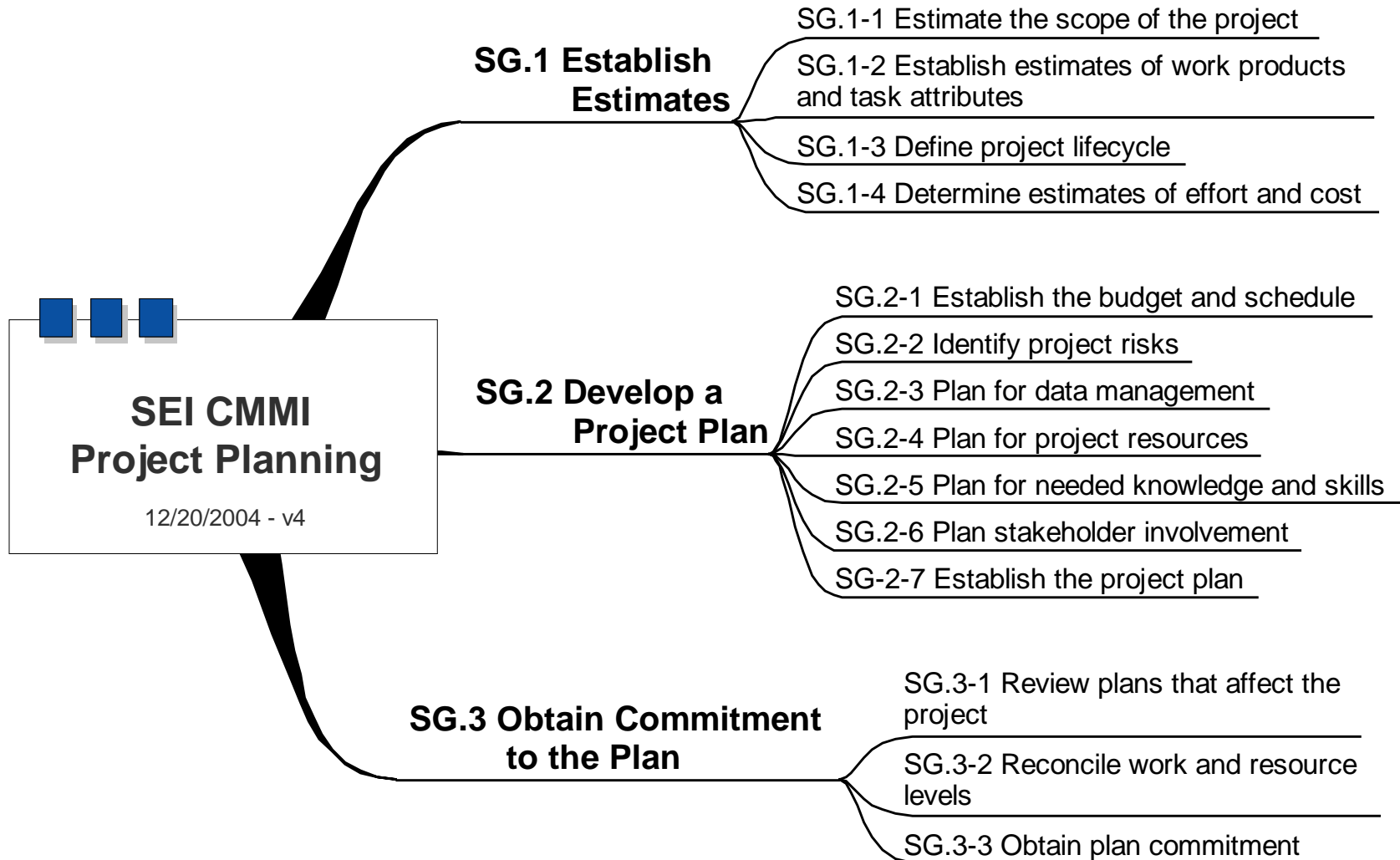
- How do we define a work breakdown structure from our selected project lifecycle?
- What level of detail is needed for managing activities and assignments?
- How do we include appropriate milestones for reporting?
- How do we “build in” CMMI compliance?
- Which key variables should be managed and optimized?



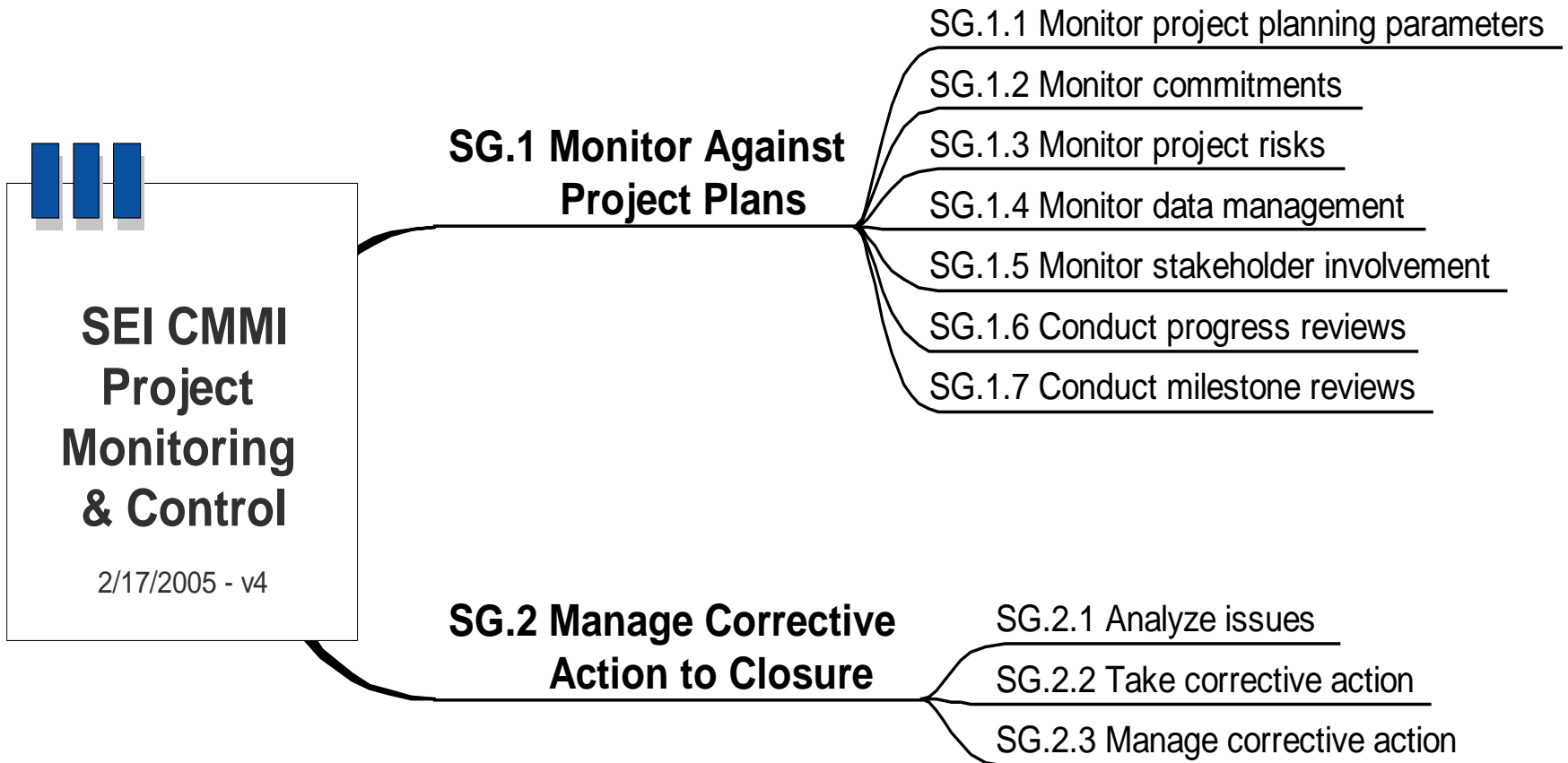
# PMI PMBOK®



# SEI CMMI®

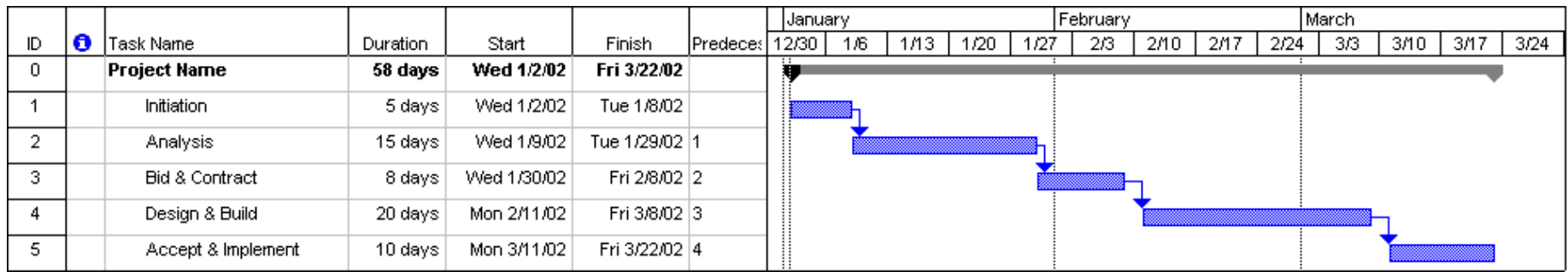


# SEI CMMI®



# Phase Scheduling

- Take a top-down decomposing approach.
- At each level, test for reasonableness.
- Start with the lifecycle phases...

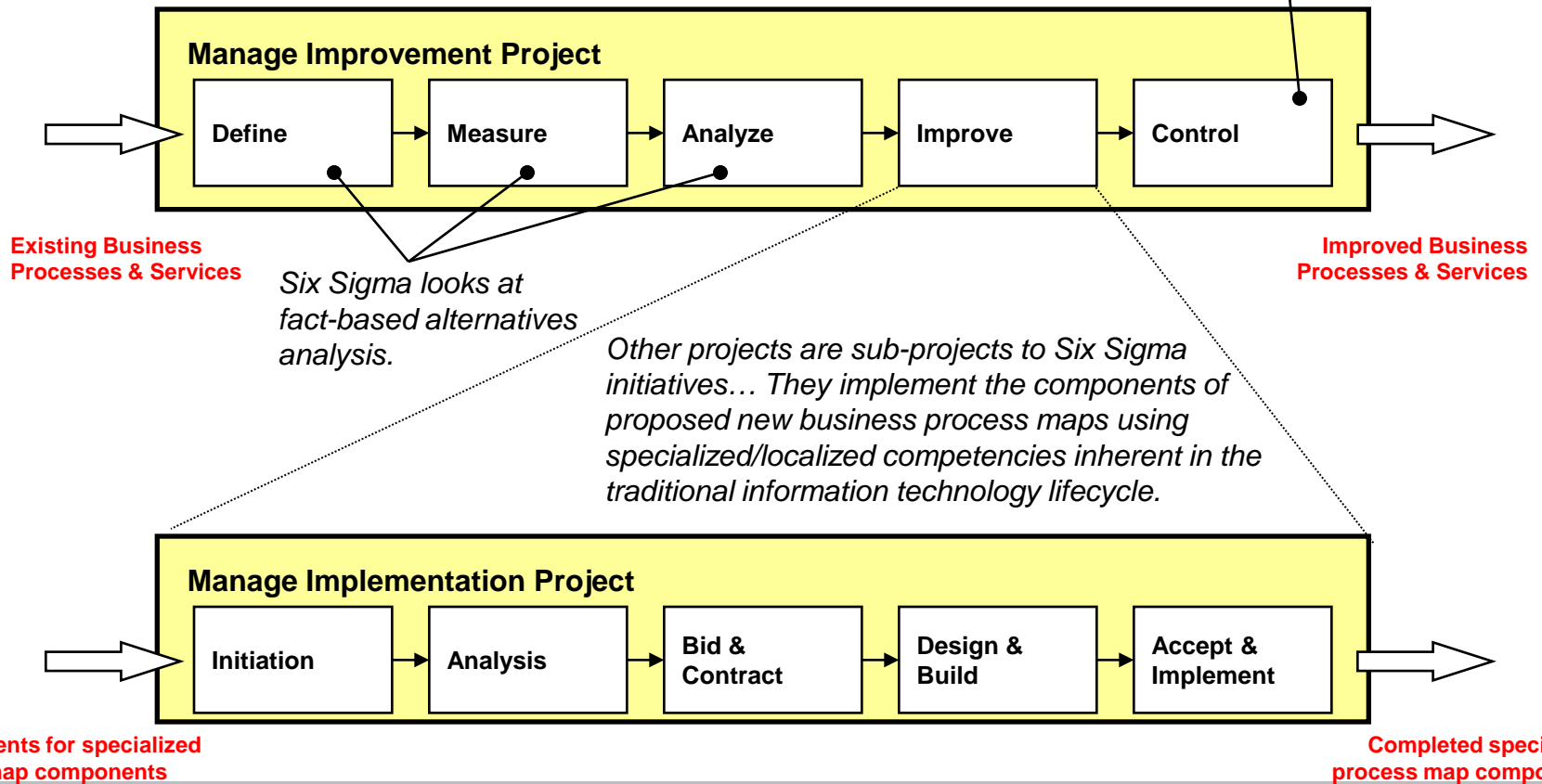


- Always emphasize Durations and Dependencies.
- Specify Start Dates or Finish Dates only if *absolutely* constrained.

# Lifecycle Selection & Integration

## Six Sigma Drives Lifecycle-based Project Success

*Six Sigma puts controls in place to assure that implemented process components are successful.*



# Project Estimating Worksheet

Project Estimating Worksheet						
Project Name:	<b>Demonstration Project</b>					
Project Manager:	<b>Rick Biehl</b>					
Lifecycle:	<b>Implementation</b>					
Expected Start Date:	<b>1/3/2005</b>					
Desired Target End Date:	<b>7/11/2005</b>					
Expected Phase Overlap:	<b>33%</b>					
Project Elapsed Duration:	189 days					
Project Mgt. Resource:	<b>0.10</b> persons					
Total Human Resource:	203.6 person-days					
Project Phases	Proportion	Start	End	Days	Resources	ResDays
Initiation	<b>5%</b>	1/3/2005	1/12/2005	7	<b>0.50</b>	3.4
Analysis	<b>25%</b>	1/10/2005	2/28/2005	35	<b>1.00</b>	35.3
Bid & Contract	<b>10%</b>	2/17/2005	3/19/2005	22	<b>0.75</b>	16.4
Design & Build	<b>40%</b>	3/12/2005	6/3/2005	59	<b>1.50</b>	88.7
Accept & Implement	<b>20%</b>	5/14/2005	7/11/2005	41	<b>1.00</b>	40.9

# Project Estimating Worksheet

Name the Project.

Name a Project Leader.

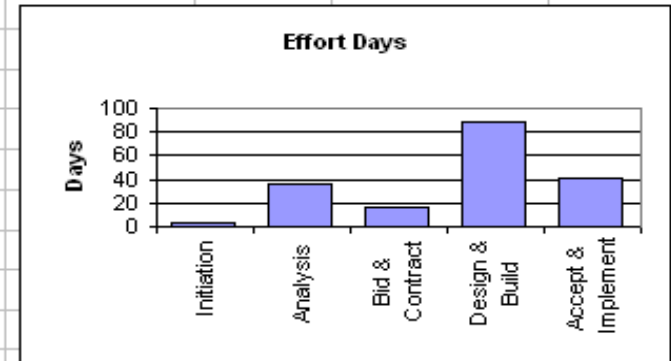
Project Estimating Worksheet						
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Design & Build	40%	3/12/2005	6/3/2005	59	1.50	88.7
Accept & Implement	20%	5/14/2005	7/11/2005	41	1.00	40.9

Indicate which of the available lifecycles best describes the project. The Six Sigma lifecycle is more appropriate for projects that must begin by identifying a problem and selecting from among multiple alternatives; the Implementation lifecycle is more appropriate for projects that already know their target solution. [Note: This selection modifies the labels on project phases but does not affect the calculations.]

# Project Estimating Worksheet

Provide the dates on which the project is expected to start and end.

Project Estimating Worksheet						
Project Name:	Demonstration Project					
Project Manager:	Rick Biehl					
Lifecycle:	Implementation					
Expected Start Date:	1/3/2005					
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Design & Build	40%	3/12/2005	6/3/2005	59	1.50	88.7
Accept & Implement	20%	5/14/2005	7/11/2005	41	1.00	40.9

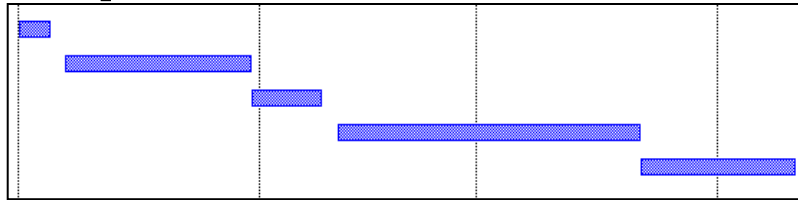


Provide a ratio to indicate the extent to which each phase should be planned to begin before the end of the previous phase. This value will increase the resources needed to complete the project because phases will overlap, but it will not extend the target date of the project.

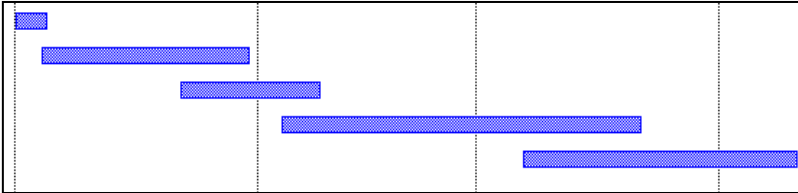
Provide the ratio/proportion of the entire project effort that is expected to fall within each project phase.

# Expected Phase Overlap

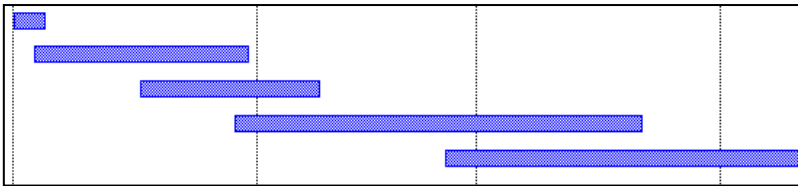
0%



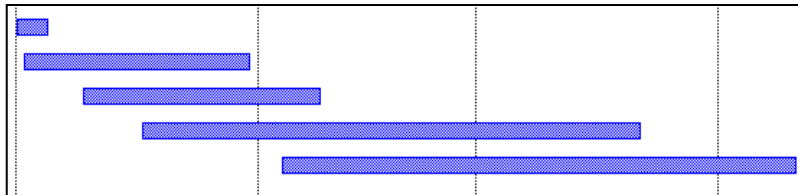
33%



50%



75%



100%



Most projects conduct their phases in basic order, but allow for considerable overlap in order to keep activity progressing smoothly.

### Basic Usage Tip:

The default of 33% is a common traditional value.

If you're not sure what this value should be, then leave the default value as an approximation.

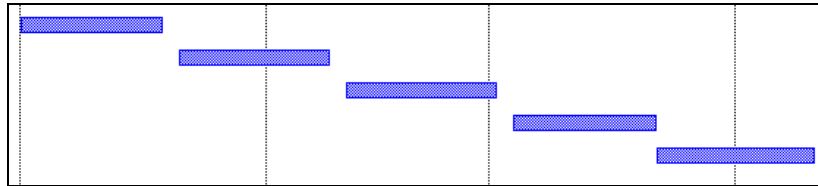
### Intermediate Usage Tip:

Projects that need to pack a lot of effort into limited time will tend to increase this value, sometimes to as high as an aggressive 75%.

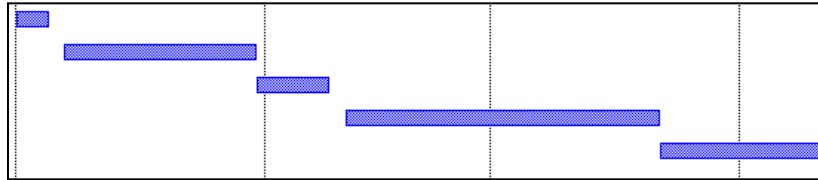
High risk projects that want to proceed cautiously will tend to decrease this value, sometimes to as low as 10%, very rarely down to 0%.

# Phase Proportions

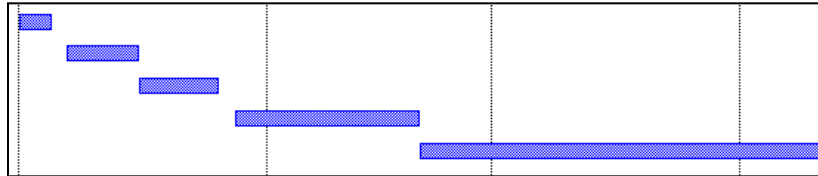
20-20-20-20-20



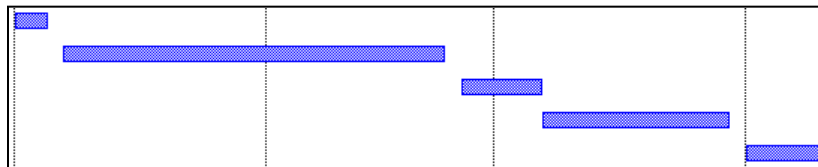
5-25-10-40-20



5-10-10-25-50



5-50-10-25-10



Varying these values affects the relative length of each phase, and so more effort should be allocated to phases in which your project will be expected to devote more effort.

## Basic Usage Tip:

The 5-25-10-40-20 default proportions are typical of traditional Implementation projects.

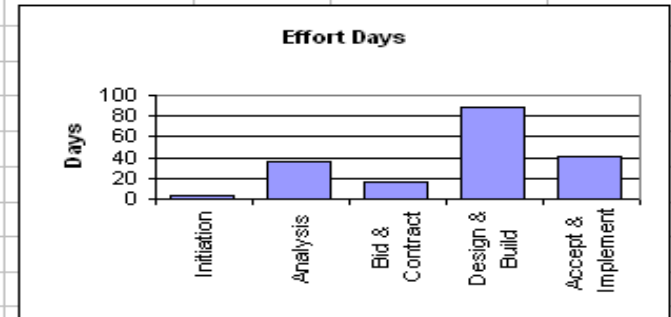
If you expect your project to execute fairly typically, then just leave these values unchanged.

Only make changes to these values if you have a specific rationale.

# Project Estimating Worksheet

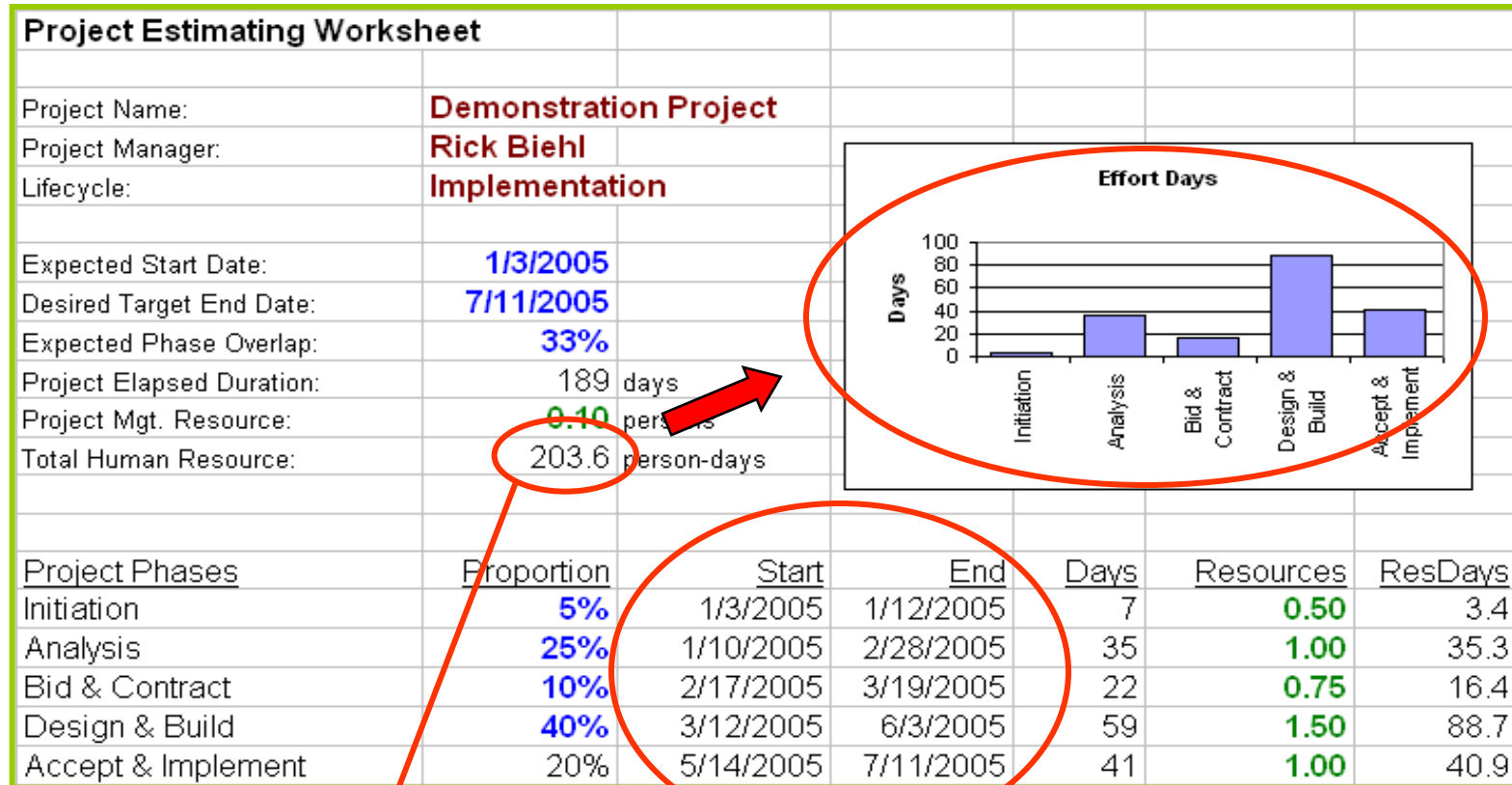
Provide the level of human resource to be allocated to the project as project management. (This resource will be allocated evenly across the entire elapsed period of the project.)

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Accept & Implement	<b>20%</b>	5/14/2005	7/11/2005	41	<b>1.00</b>	40.9



For each lifecycle phase, provide the number of human resources that are required to be allocated to the phase. This value is considered smoothed over the life of the phase, so for longer phases it helps to think in terms of average involvement for allocated resources even though some resources will actually have more intense involvement at specific points in the phase. [Do NOT include the project management resource estimated above in these resource estimates.]

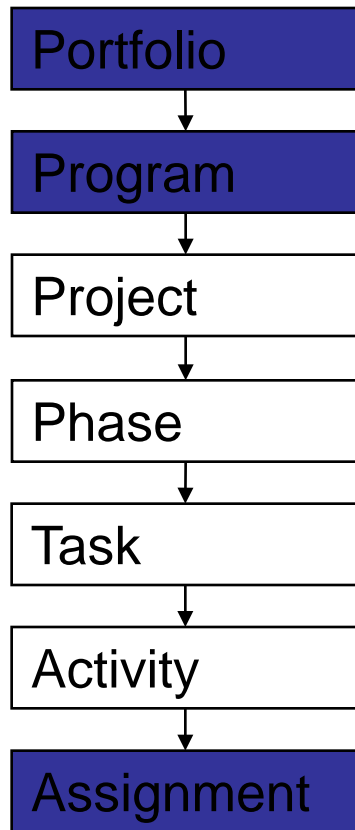
# Project Estimating Worksheet



Determines rough staffing estimate.

Determines rough phase start and end dates.

# Work Breakdown Structure



*Establish, Define, Develop,  
Consolidate, Implement, Finalize ...  
[Lifecycle Component or Deliverable]*

What are we  
going to do?

How are we  
going to do it?

DURATION

How much elapsed  
time will it take?

DEPENDENCY

What needs to have  
already happened?

*Define, Model, Review, Draft, Conduct,  
Clarify, Narrow, Build, Revise, Approve ...  
[Work Package or Tool]*

# Deliverable Drafting: 0 Iterations

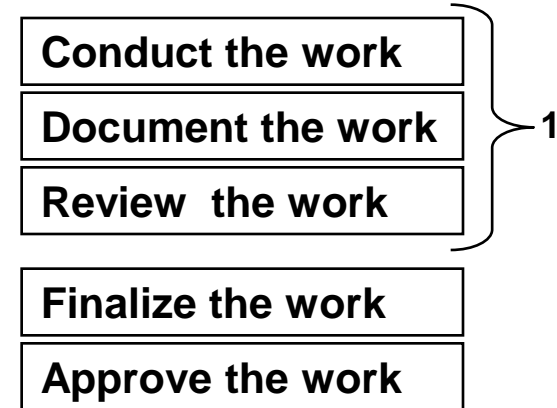
ID	%	Task Name	Duration	January			February		
				B	M	E	B	M	E
2	50%	<b>ANALYSIS (0 iterations)</b>	20 days						
3	50%	Analyze requirements	20 days						
4	0%	Obtain requirements approval	0 days						
5	0%	<b>DESIGN</b>	15 days						

Finalize the work

Approve the work

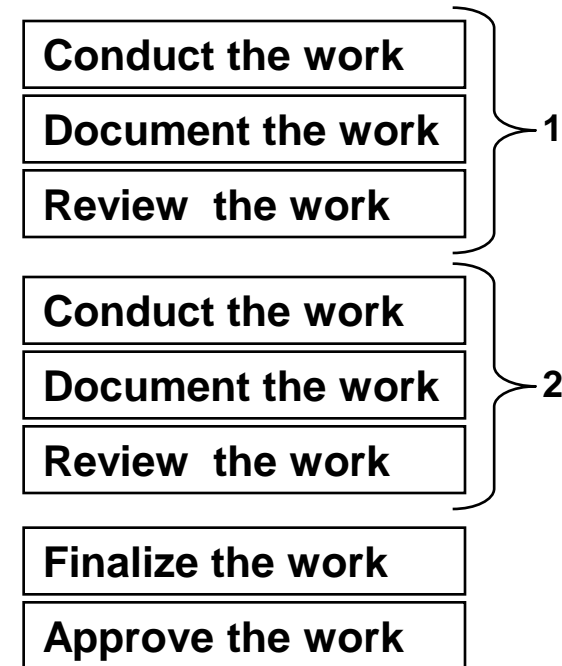
# Deliverable Drafting: 1 Iteration

ID	%	Compl	Task Name	Duration	January			February		
					B	M	E	B	M	E
7	50%		<b>ANALYSIS (1 iteration)</b>	20 days						
8	90%		Conduct analysis	7 days						
9	75%		Draft requirements	5 days						
10	0%		Conduct customer review	3 days						
11	0%		Finalize requirements	5 days						
12	0%		Obtain requirements approval	0 days						
13	0%		<b>DESIGN</b>	15 days						



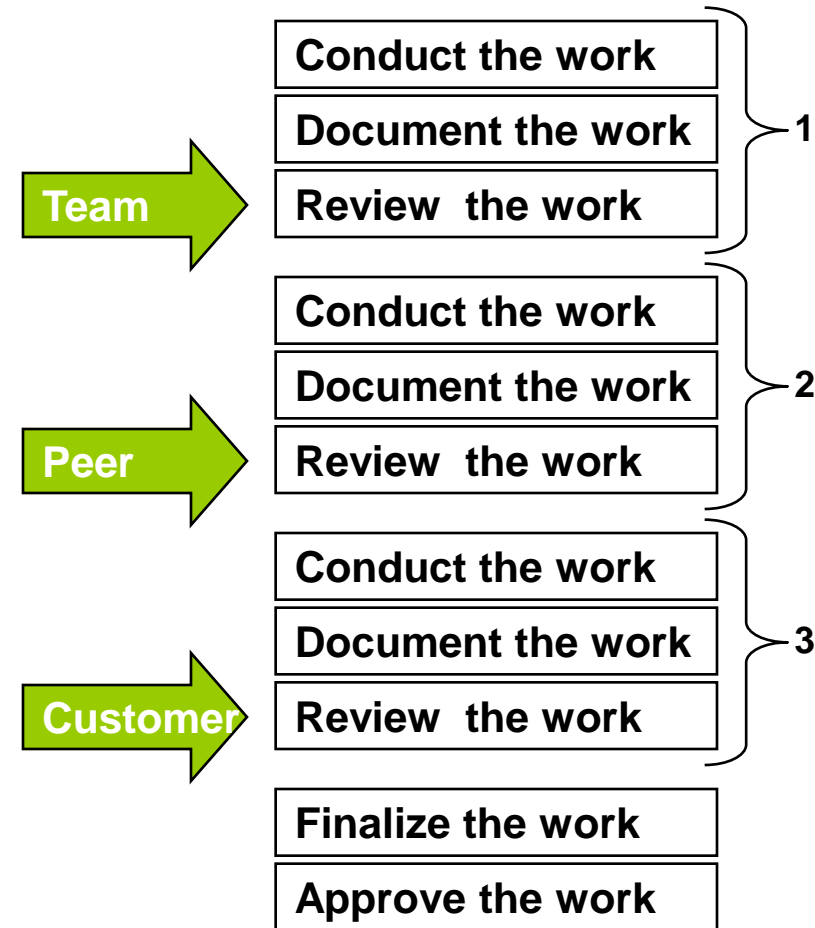
# Deliverable Drafting: 2 Iterations

ID	%	Compl	Task Name	Duration	January			February		
					B	M	E	B	M	E
15		50%	<b>ANALYSIS (2 iterations)</b>	20 days						
16	✓	100%	Conduct initial analysis	5 days						
17	✓	100%	Draft initial requirements	3 days						
18	✓	100%	Conduct team review	1 day						
19		25%	Conduct further analysis	4 days						
20		0%	Draft requirements document	3 days						
21		0%	Conduct customer review	2 days						
22		0%	Finalize requirements	2 days						
23		0%	Obtain requirements approval	0 days						
24		0%	<b>DESIGN</b>	15 days						

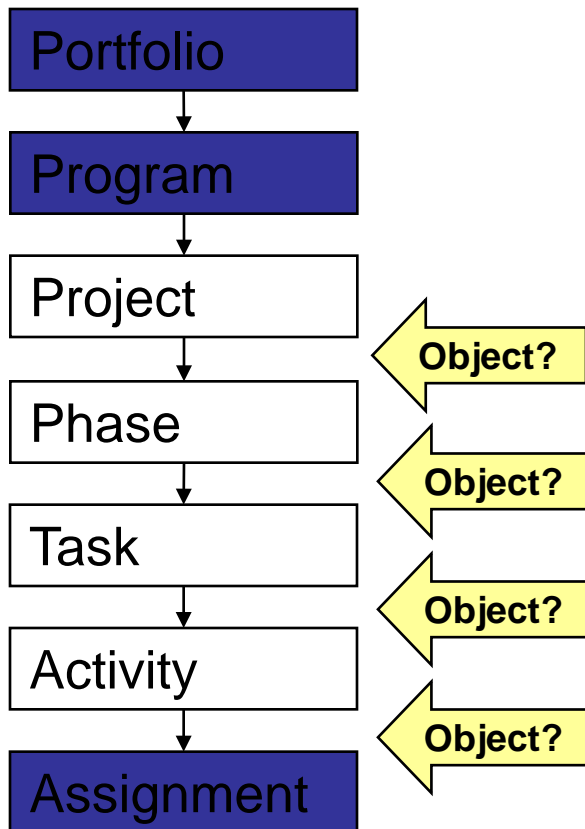


# Deliverable Drafting: 3 Iterations

ID	%	Task Name	Duration	January			February		
				B	M	E	B	M	E
26	50%	<b>ANALYSIS (3 iterations)</b>	<b>20 days</b>						
27	100%	Conduct initial analysis	3 days						
28	100%	Draft initial requirements	2.5 days						
29	100%	Conduct team review	0.5 days						
30	100%	Conduct further analysis	3 days						
31	45%	Draft requirements document	2 days						
32	0%	Conduct peer review	1 day						
33	0%	Conduct remaining analysis	2 days						
34	0%	Produce final requirements	2 days						
35	0%	Conduct customer review	2 days						
36	0%	Finalize requirements	2 days						
37	0%	Obtain requirements approval	0 days						
38	0%	<b>DESIGN</b>	15 days						



# Inserting Objects



- Introducing the objects being managed by the plan results in an expanding Work Breakdown Structure.
  - Objects serve as a multiplier on the size of the WBS.
- Small projects that manage their scope as a whole typically don't introduce objects at all.
- Decisions about object introduction will depend upon the planning and operational strategy for the project.

# Phase-OBJECT-Task Example

ID	%	Task Name	Duration	Start	Predecessor	December			January			February		
						B	M	E	B	M	E	B	M	E
1	0%	<b>ANALYSIS</b>	29 days	Mon 1/3/05										
2	0%	<b>Marketing</b>	29 days	Mon 1/3/05										
3	0%	Conduct initial marketing analysis	15 days	Mon 1/3/05										
4	0%	Draft initial marketing requirements	5 days	Mon 1/24/05	3									
5	0%	Conduct marketing review	1 day	Mon 1/31/05	4									
6	0%	Conduct follow-up marketing analysis	5 days	Tue 2/1/05	5									
7	0%	Finalize marketing requirements	2 days	Tue 2/8/05	6									
8	0%	Obtain marketing approval	1 day	Thu 2/10/05	7									
9	0%	<b>Sales</b>	29 days	Mon 1/3/05										
10	0%	Conduct initial sales analysis	15 days	Mon 1/3/05										
11	0%	Draft initial sales requirements	5 days	Mon 1/24/05	10									
12	0%	Conduct sales review	1 day	Mon 1/31/05	11									
13	0%	Conduct follow-up sales analysis	5 days	Tue 2/1/05	12									
14	0%	Finalize sales requirements	2 days	Tue 2/8/05	13									
15	0%	Obtain sales approval	1 day	Thu 2/10/05	14									
16	0%	<b>Accounting</b>	29 days	Mon 1/3/05										
17	0%	Conduct initial accounting analysis	15 days	Mon 1/3/05										
18	0%	Draft initial accounting requirements	5 days	Mon 1/24/05	17									
19	0%	Conduct accounting review	1 day	Mon 1/31/05	18									
20	0%	Conduct follow-up accounting analysis	5 days	Tue 2/1/05	19									
21	0%	Finalize accounting requirements	2 days	Tue 2/8/05	20									
22	0%	Obtain accounting approval	1 day	Thu 2/10/05	21									

3 functional areas with tasks for a 1-iteration draft cycle.

# Phase-Task-OBJECT Example

ID	%	Task Name	Duration	Start	Precede:	December			January			February				
						B	M	E	B	M	E	B	M	E		
24	0%	<b>ANALYSIS</b>	<b>29 days</b>	<b>Mon 1/3/05</b>												
25	0%	<b>Conduct initial analysis</b>	<b>15 days</b>	<b>Mon 1/3/05</b>												
26	0%	Conduct marketing analysis	15 days	Mon 1/3/05												
27	0%	Conduct sales analysis	15 days	Mon 1/3/05												
28	0%	Conduct accounting analysis	15 days	Mon 1/3/05												
29	0%	<b>Draft initial requirements</b>	<b>5 days</b>	<b>Mon 1/24/05</b>	25											
30	0%	Draft marketing requirements	5 days	Mon 1/24/05												
31	0%	Draft sales requirements	5 days	Mon 1/24/05												
32	0%	Draft accounting requirements	5 days	Mon 1/24/05												
33	0%	<b>Conduct review</b>	<b>1 day</b>	<b>Mon 1/31/05</b>	29											
34	0%	Conduct marketing review	1 day	Mon 1/31/05												
35	0%	Conduct sales review	1 day	Mon 1/31/05												
36	0%	Conduct accounting review	1 day	Mon 1/31/05												
37	0%	<b>Conduct follow-up analysis</b>	<b>5 days</b>	<b>Tue 2/1/05</b>	33											
38	0%	Conduct follow-up marketing analysis	5 days	Tue 2/1/05												
39	0%	Conduct follow-up sales analysis	5 days	Tue 2/1/05												
40	0%	Conduct follow-up accounting analysis	5 days	Tue 2/1/05												
41	0%	<b>Finalize requirements</b>	<b>2 days</b>	<b>Tue 2/8/05</b>	37											
42	0%	Finalize marketing requirements	2 days	Tue 2/8/05												
43	0%	Finalize sales requirements	2 days	Tue 2/8/05												
44	0%	Finalize accounting requirements	2 days	Tue 2/8/05												
45	0%	<b>Obtain approval</b>	<b>1 day</b>	<b>Thu 2/10/05</b>	41											
46	0%	Obtain marketing approval	1 day	Thu 2/10/05												
47	0%	Obtain sales approval	1 day	Thu 2/10/05												
48	0%	Obtain accounting approval	1 day	Thu 2/10/05												

1-iteration draft cycle with 3 functional areas per task.

# Phase-OBJECT-Task Example

ID	%	Task Name	Duration	Start	Precede:	December			January			February		
						B	M	E	B	M	E	B	M	E
50	0%	<b>DESIGN</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
51	0%	<b>Data structures</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
52	0%	Conduct initial data structure design	15 days	Mon 1/3/05										
53	0%	Draft initial data structure design	5 days	Mon 1/24/05	52									
54	0%	Conduct data structure review	1 day	Mon 1/31/05	53									
55	0%	Conduct follow-up data structure design	5 days	Tue 2/1/05	54									
56	0%	Finalize data structure design	2 days	Tue 2/8/05	55									
57	0%	Obtain data structure design approval	1 day	Thu 2/10/05	56									
58	0%	<b>Inputs/Outputs</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
59	0%	Conduct initial I/O design	15 days	Mon 1/3/05										
60	0%	Draft initial I/O design	5 days	Mon 1/24/05	59									
61	0%	Conduct I/O review	1 day	Mon 1/31/05	60									
62	0%	Conduct follow-up I/O design	5 days	Tue 2/1/05	61									
63	0%	Finalize I/O design	2 days	Tue 2/8/05	62									
64	0%	Obtain I/O design approval	1 day	Thu 2/10/05	63									
65	0%	<b>Interfaces</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
66	0%	Conduct initial interface design	15 days	Mon 1/3/05										
67	0%	Draft initial interface design	5 days	Mon 1/24/05	66									
68	0%	Conduct interface review	1 day	Mon 1/31/05	67									
69	0%	Conduct follow-up interface design	5 days	Tue 2/1/05	68									
70	0%	Finalize interface design	2 days	Tue 2/8/05	69									
71	0%	Obtain interface design approval	1 day	Thu 2/10/05	70									

3 component types with tasks for a 1-iteration draft cycle.

# Phase-Task-OBJECT Example

ID	%	Task Name	Duration	Start	Precede:	December			January			February			
						B	M	E	B	M	E	B	M	E	
73	0%	<b>DESIGN</b>	<b>29 days</b>	<b>Mon 1/3/05</b>											
74	0%	<b>Conduct initial design</b>	<b>15 days</b>	<b>Mon 1/3/05</b>											
75	0%	Data structures	15 days	Mon 1/3/05											
76	0%	I/Os	15 days	Mon 1/3/05											
77	0%	Interfaces	15 days	Mon 1/3/05											
78	0%	<b>Draft initial design</b>	<b>5 days</b>	<b>Mon 1/24/05</b>	74										
79	0%	Data structures	5 days	Mon 1/24/05											
80	0%	I/Os	5 days	Mon 1/24/05											
81	0%	Interfaces	5 days	Mon 1/24/05											
82	0%	<b>Conduct review</b>	<b>1 day</b>	<b>Mon 1/31/05</b>	78										
83	0%	Data structures	1 day	Mon 1/31/05											
84	0%	I/Os	1 day	Mon 1/31/05											
85	0%	Interfaces	1 day	Mon 1/31/05											
86	0%	<b>Conduct follow-on design</b>	<b>5 days</b>	<b>Tue 2/1/05</b>	82										
87	0%	Data structures	5 days	Tue 2/1/05											
88	0%	I/Os	5 days	Tue 2/1/05											
89	0%	Interfaces	5 days	Tue 2/1/05											
90	0%	<b>Finalize design</b>	<b>2 days</b>	<b>Tue 2/8/05</b>	86										
91	0%	Data structures	2 days	Tue 2/8/05											
92	0%	I/Os	2 days	Tue 2/8/05											
93	0%	Interfaces	2 days	Tue 2/8/05											
94	0%	<b>Obtain design approval</b>	<b>1 day</b>	<b>Thu 2/10/05</b>	90										
95	0%	Data structures	1 day	Thu 2/10/05											
96	0%	I/Os	1 day	Thu 2/10/05											
97	0%	Interfaces	1 day	Thu 2/10/05											

1-iteration draft cycle with 3 component types per task.

# Complexity Pitfalls of Objects

ID	%	Task Name	Duration	Start	Precede:	December			January			February		
						B	M	E	B	M	E	B	M	E
99	0%	<b>DESIGN</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
100	0%	<b>Data structures</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
101	0%	Conduct initial data structure design	15 days	Mon 1/3/05										
102	0%	Draft initial data structure design	5 days	Mon 1/24/05	101,108,									
103	0%	Conduct data structure review	1 day	Mon 1/31/05	102,109,									
104	0%	Conduct follow-up data structure design	5 days	Tue 2/1/05	103,110,									
105	0%	Finalize data structure design	2 days	Tue 2/8/05	104,111,									
106	0%	Obtain data structure design approval	1 day	Thu 2/10/05	105,112,									
107	0%	<b>Inputs/Outputs</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
108	0%	Conduct initial I/O design	15 days	Mon 1/3/05										
109	0%	Draft initial I/O design	5 days	Mon 1/24/05	108,101,									
110	0%	Conduct I/O review	1 day	Mon 1/31/05	109,102,									
111	0%	Conduct follow-up I/O design	5 days	Tue 2/1/05	110,103,									
112	0%	Finalize I/O design	2 days	Tue 2/8/05	111,104,									
113	0%	Obtain I/O design approval	1 day	Thu 2/10/05	112,105,									
114	0%	<b>Interfaces</b>	<b>29 days</b>	<b>Mon 1/3/05</b>										
115	0%	Conduct initial interface design	15 days	Mon 1/3/05										
116	0%	Draft initial interface design	5 days	Mon 1/24/05	115,101,									
117	0%	Conduct interface review	1 day	Mon 1/31/05	102,116,									
118	0%	Conduct follow-up interface design	5 days	Tue 2/1/05	117,103,									
119	0%	Finalize interface design	2 days	Tue 2/8/05	118,104,									
120	0%	Obtain interface design approval	1 day	Thu 2/10/05	119,105,									

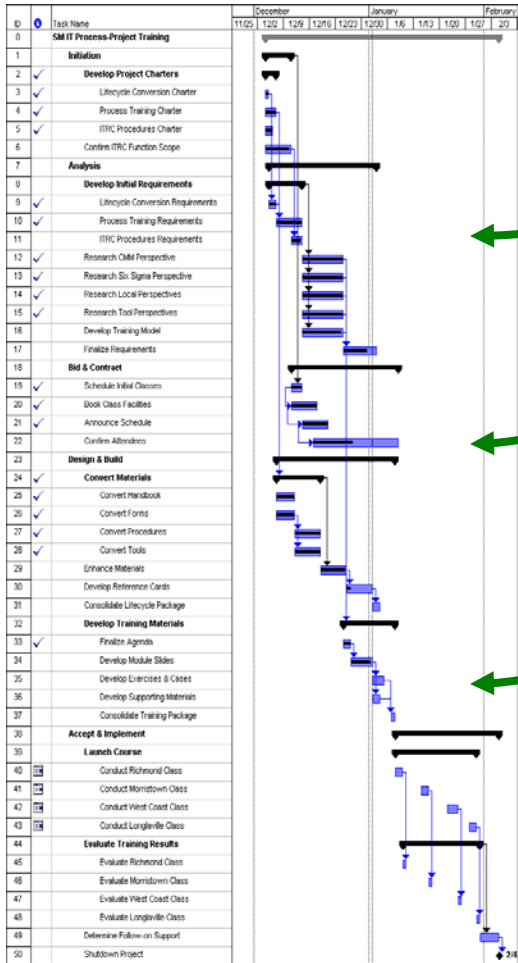
Real-world interdependencies tend to push objects down in the WBS.

# Project Context Components

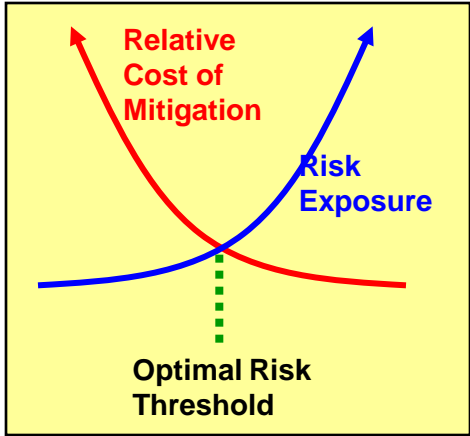
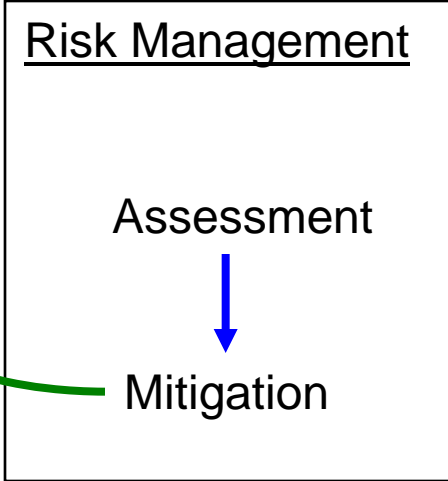
- The execution of a project plan results in

ID	%	Cc	Task Name	Duration	Start	Predi	1st Quarter			2nd Quarter			3rd Quarter		
							Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
590		0%	<b>Project Execution</b>	<b>148 days</b>	<b>Thu 1/6/05</b>	<b>584</b>									
591	🔄	0%	Maintain risk management logs	148 days	Thu 1/6/05										
623	🔄	0%	Maintain issue management logs	148 days	Thu 1/6/05										
655	🔄	0%	Maintain change logs	148 days	Thu 1/6/05										
687	🔄	0%	Maintain defect logs	148 days	Thu 1/6/05										
719	🔄	0%	Maintain project plan updates	148 days	Thu 1/6/05										
751	🔄	0%	Review status of related projects	148 days	Thu 1/6/05										
783	🔄	0%	Produce project status reports	148 days	Thu 1/6/05										
815	🔄	0%	Build management reports	148 days	Thu 1/6/05										
824	🔄	0%	Participate in operations reviews	148 days	Thu 1/6/05										

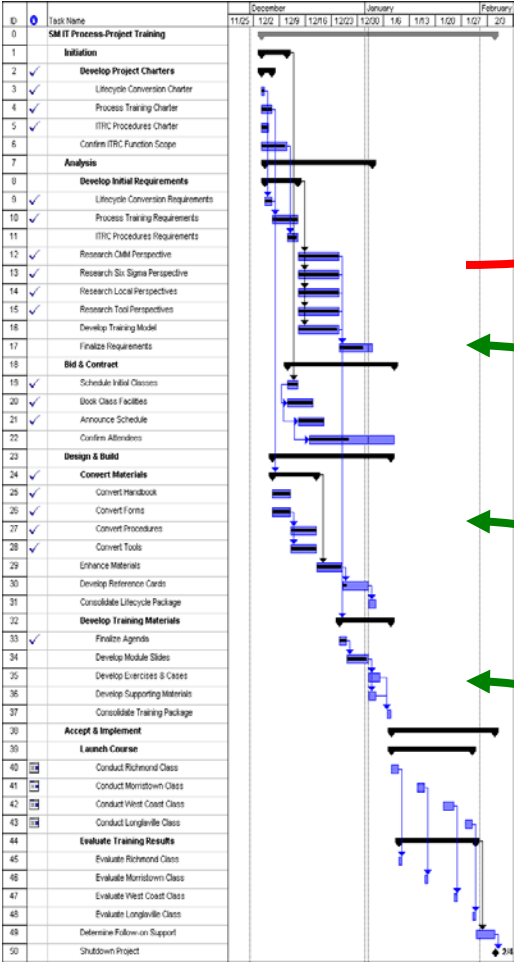
# Risk Mitigation



Mitigation Activities

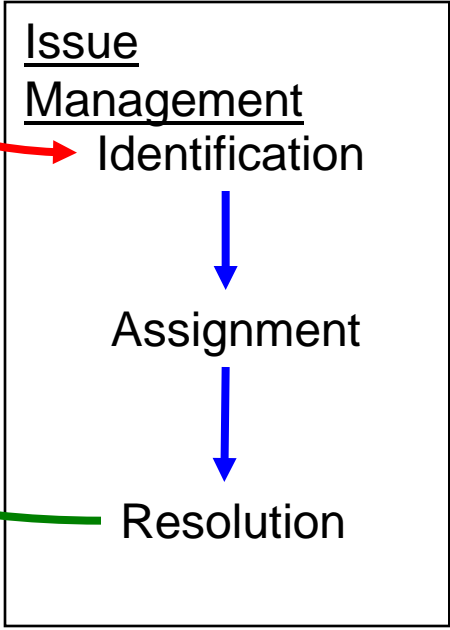


# Issue Closure

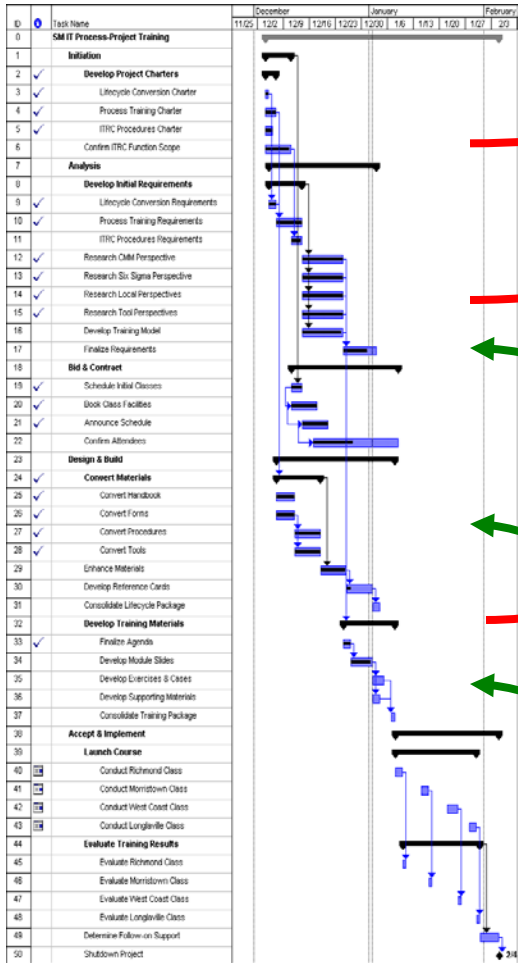


Issue Crystallizes

Resolution Activities



# Defect Tracking

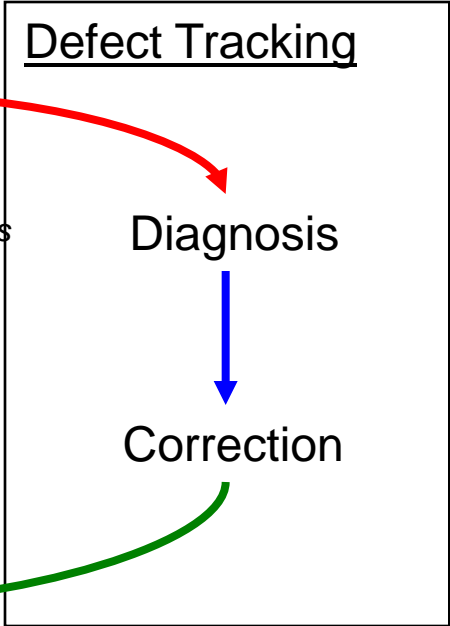


**Verification & Validation Results**

*Opens & Closes Defects*

**Rework Activities**

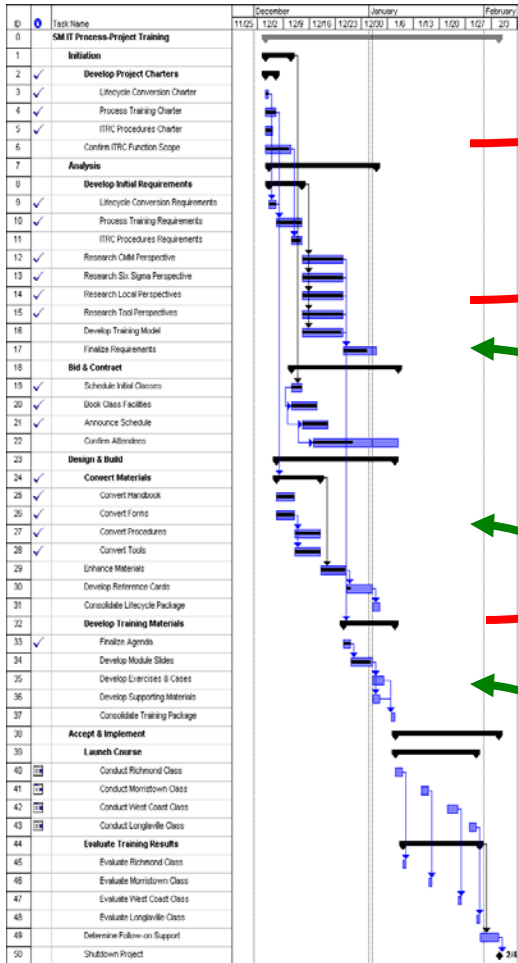
*Records Root & Proximate Causes*



# WBS “Squeezing”

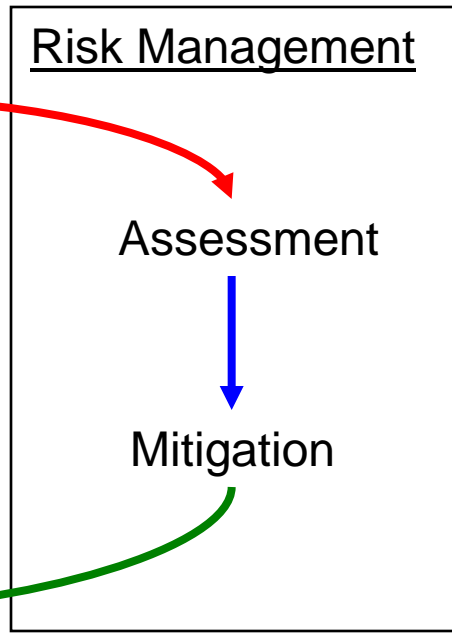
- The template on which an initial schedule is built will contain a series of default values for **Duration** and **Dependency**.
- The template plan will typically be longer than desired, based on the rough dates calculated in the estimating worksheet.
- The initial schedule will typically be “squeezed” by the project planner during scheduling of the work breakdown structure.
- The challenge is to do the squeezing in a rational way that doesn’t sacrifice project plan quality, typically by:
  - **Eliminating Activities**
  - **Increasing Overlap**
- Because **Effort** and **Assignment** are beyond the scope of this workshop, reducing task and activity estimates is not covered here. Arbitrary estimate reduction in order to build the plan is very dangerous and must be approached carefully and with full team involvement.

# Eliminating Activities



Eliminated Activities

Mitigation Activities





# Conclusion: What now?

**2** Back up and gain increased familiarity with the professional models.

**1** Immediately start applying the techniques learned in this workshop.

**3** Begin looking toward learning and using the resource assignment and effort skills that come next.

**4** Begin a long-term effort to continuously learn and improve your professional skills.

