Project Management

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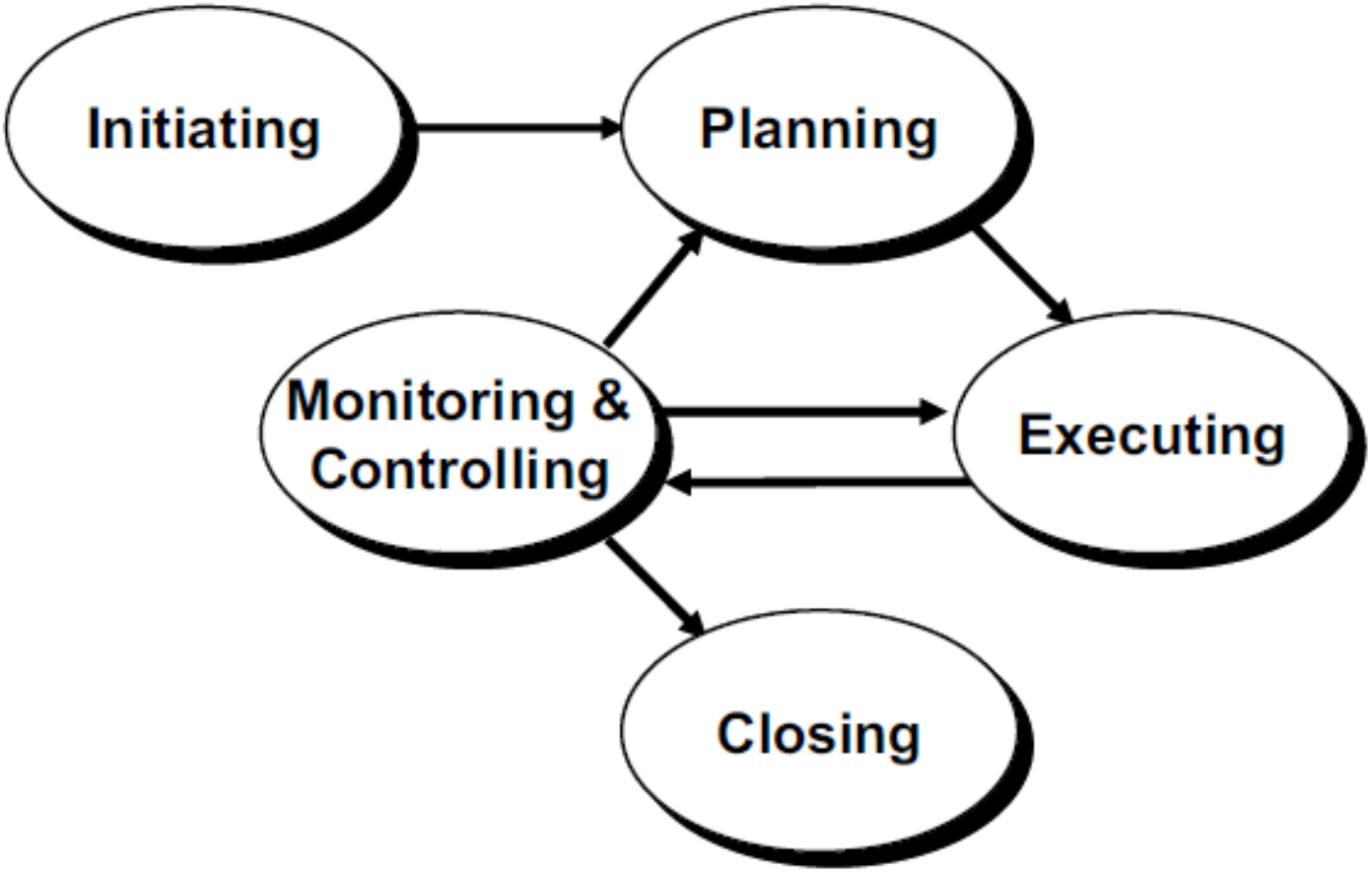
What is a Project?

- Scope
- Time
- Cost
- Quality
- Risk

Project Success

- Happy customers
- On time deliverables
- On budget
- Return investors
- Team cohesion (at end of project)

Project Management Processes



Novations Group, Inc., "Tools and Techniques of Project Management, v6.1"

Project Manager

- Primary Roles:
  - Build a team (organize existing resources)
  - Maintain/ Analyze data and schedule
  - Manage conflict (interference)
  - Review work
  - Schedule resources

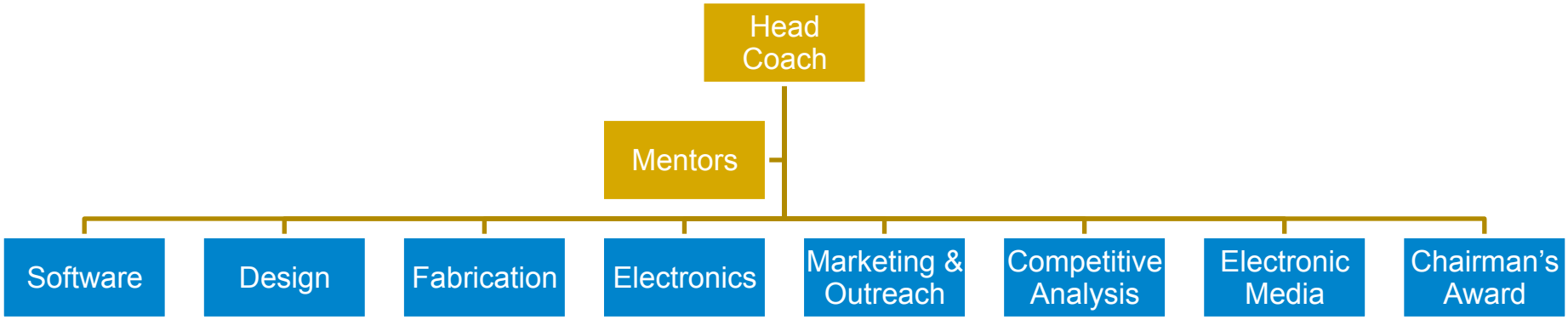
Team Structures

- Who's on first??
  - Many teams will develop an organization chart, matching system team leads to their responsibilities, and who is on each system team

- Matching people with their strengths
  - It may be helpful, particularly for rookie teams, to develop a skills matrix.
  - This will help identify training needs, or where you need to get more help (a trainer, or a hired gun?)

Team Management

Team 1540 Organization Chart



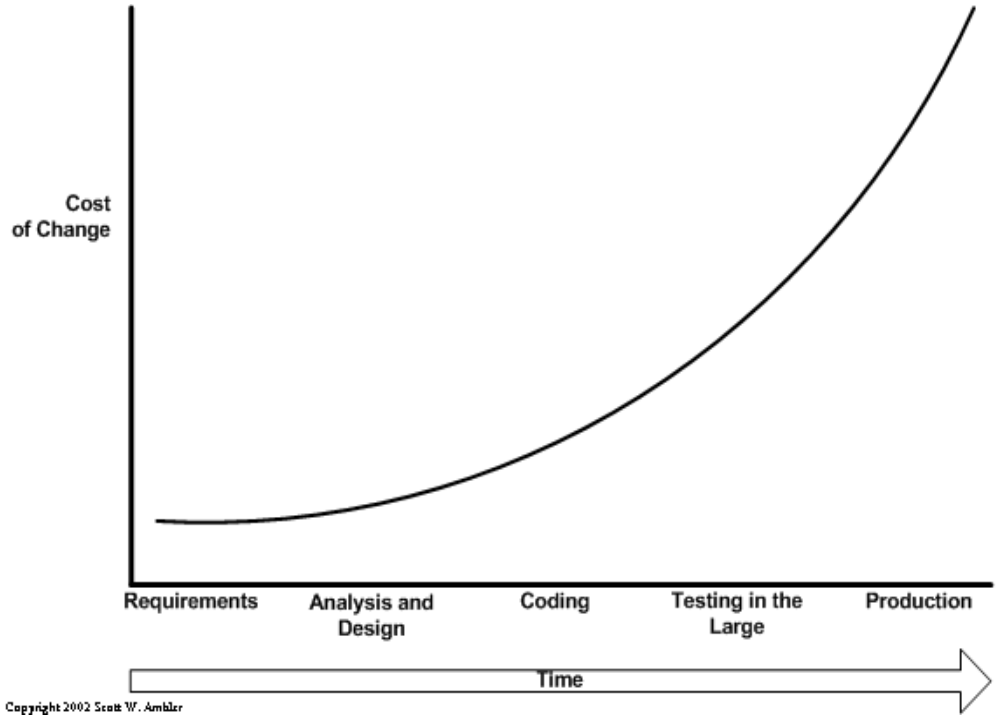
Skills Matrix

Role \ Skill	Testing Methods	Programming	Business Knowledge	Application	Hardware Connectivity	Hardware Capacity	Training	Technical Writing	Project Management
Process Engineer			H	H					M
Project Manager		M	M						H
Business Analyst		M	M	M					L
Quality Analyst	M		M	M					
Technical Writer	L		M					H	M
Trainer			M				H		M

Legend
H = High skills
M = Medium skills
L = Low skills

Project planning:
- the critical first step.

- Unexpected problems can kill your project – no time left to fix, or no money
- Time spent up front to carefully understand the requirements, analyze and correctly design a solution saves big in the end



Design Reviews

- Plan and schedule design reviews – possibly every day, until you enter production
- Document (as specifically as possible) how subsystems will work together and connect (interfaces)
- Check your interfaces in the reviews – if there is change, it must be fully investigated, understood and agreed to

Plan the work…

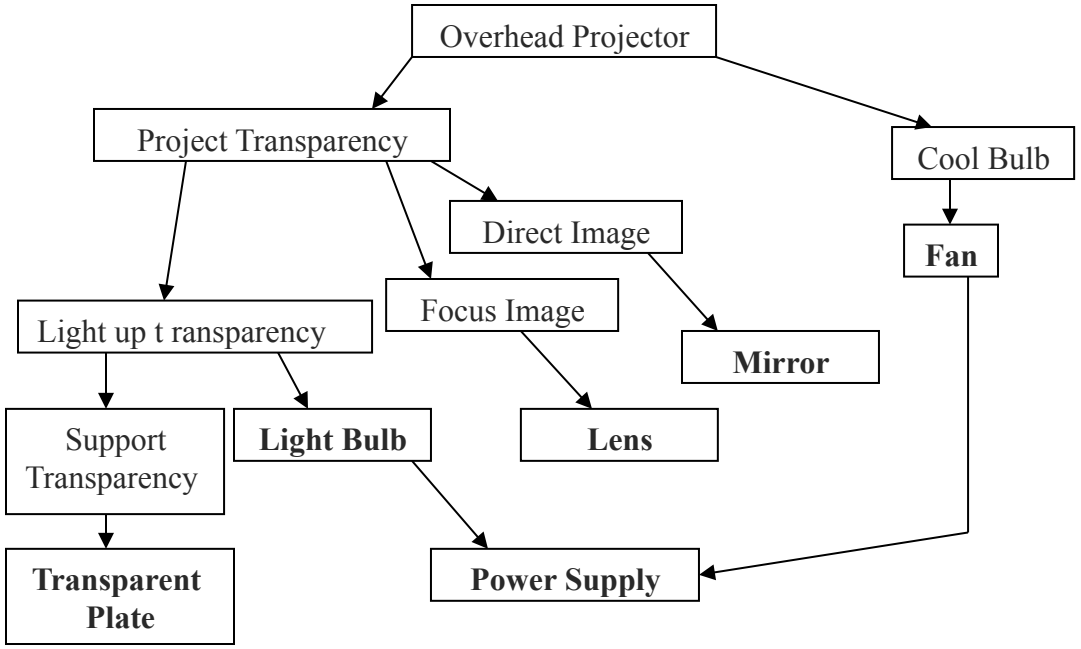
- Work Breakdown Structure (or WBS) = Everything you want to do on the project
  - The form and function of every part, and what they all do for you (Functional Efficiency Technique)
  - Also any related work – fundraising, major events, support equipment
  - This ultimately becomes your project plan, as detailed as you choose to plan and schedule it.
- Match with your team structure.

Plan the work (cont.). . .

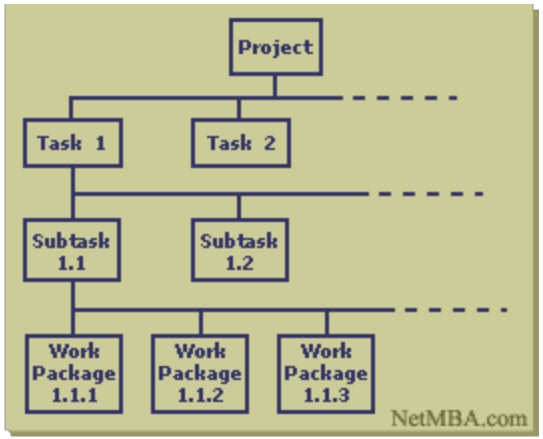
- Estimate each item or system using a Resource Loading Diagram:
  - How much time (work hours) do you think it will take?
    - Rookie team? Run your WBS and Resource Loading by an experienced team before committing yourselves.
  - How many people do you have? How much time do they have?
  - How many days/ hours will each item take?
  - Where are you short handed? Make sure you aren't double booking people.

Functional Efficiency Technique

- Break down the device by tasks it performs.
- Include what each sub-system does (a verb), and what it does it to (a noun)
- Continue until you end up with a fairly specific physical objects you need to buy or design/make, and put together. Note that interfaces between systems can be included if needed (ie the power supply has to support the light and the fan).
- Clean it up and add this entire set of objects to your WBS



WBS: Project Plan

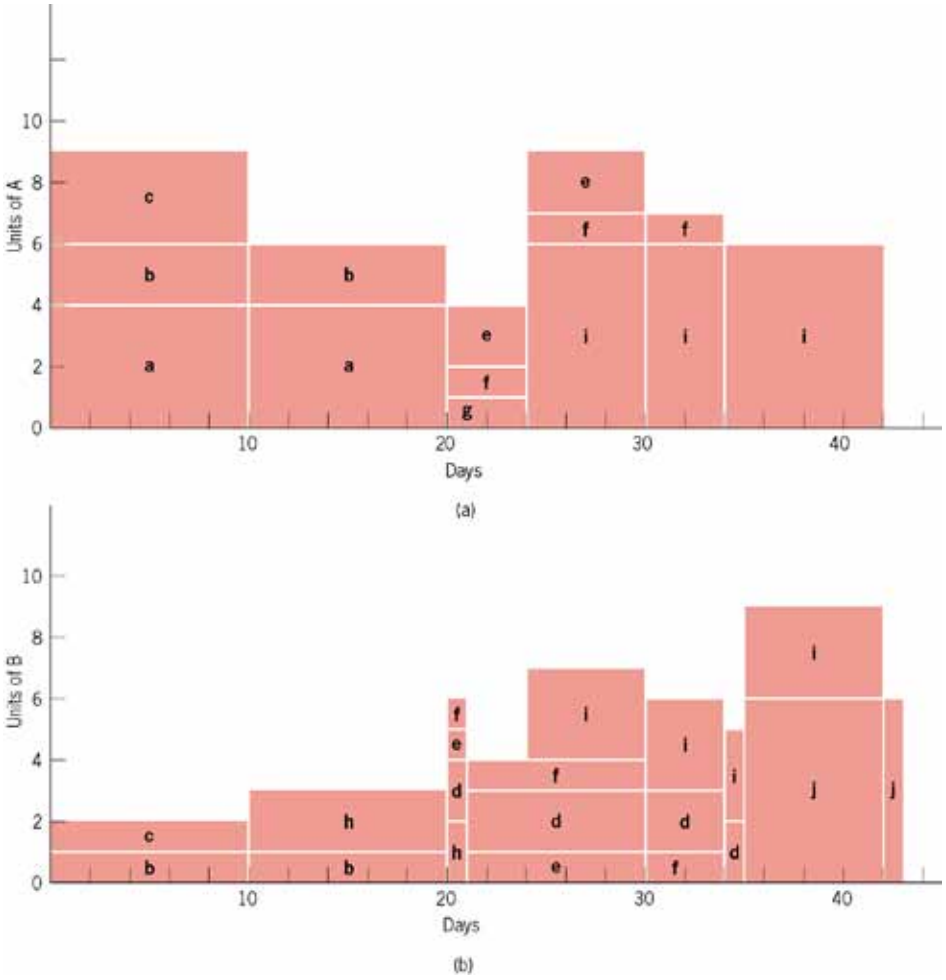


The function diagram converts to an outline style WBS

Work Breakdown Structure Outline

Level 1	Level 2	Level 3
Task 1		
	Subtask 1.1	
		Work Package 1.1.1
		Work Package 1.1.2
		Work Package 1.1.3
	Subtask 1.2	
		Work Package 1.2.1
		Work Package 1.2.2
		Work Package 1.2.3
Task 2		
	Subtask 2.1	
		Work Package 2.1.1
		Work Package 2.1.2
		Work Package 2.1.3

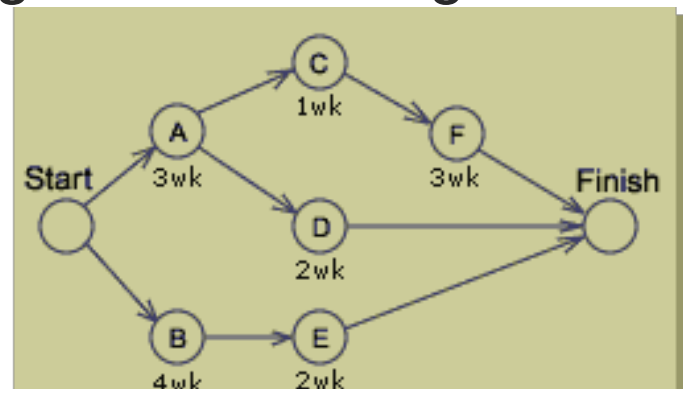
Resource Loading Diagram



Anvari.net, "Resource Allocation"

Where do you start?

- What has to be done first? How long will it all take? Try making a network diagram . . .



Hmm . . . 7 wks

- Make it fit - it all has to get done in 6 wks. The longest chain (in weeks) is how much time you need
- Make a judgment call – are you trying to do too much?

Risk Management

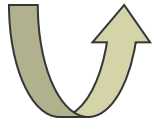
- Also known as “what if’s”
- Leave a little time for disasters and unforeseen details.
- Testing is essential.
- Set goals for features or functions that would be “nice to have”.
  - If there is insufficient time, the project will still be successful without them

Risk Management (cont.)

- FMEA (Failure Modes and Effects Analysis)
  - Consider system components
  - Identify symptoms of failure
  - Identify root cause
  - Predict consequences to other sub-systems
  - Rank failure modes by severity (1,2,3)
  - Rank failure modes by probability (1,2,3)
- Example FMEA.

FMEA - Example

FMEA					
Symptom	Root Cause	Consequence to other system?	Severity	Probability	Notes
Robot stops moving	Wheel	-	2	1	
	Drive	-	2	2	
	Controls	-	3	1	
	Pilot	-	3	1	
	Environment	-	1	1	<Don't care
	Code Error	Controls	3	2	
	Fire	All + safety	3	1	
Firing mech. Is dead	Controls	-	3	2	
	Actuators	-	2	3	<Design flaw?
	Mech. Drive	-	2	2	
	Mech. Clogged	-	1	3	<Design flaw?
	Code Error	-	3	3	<Warning!
	Structure	Drive	3	1	
Erratic behavior	Controls	All + safety	3	1	
	Code Error	All + safety	3	1	<Worth planning for?
Structural collapsse	Structures	All + safety	3	3	<Warning!

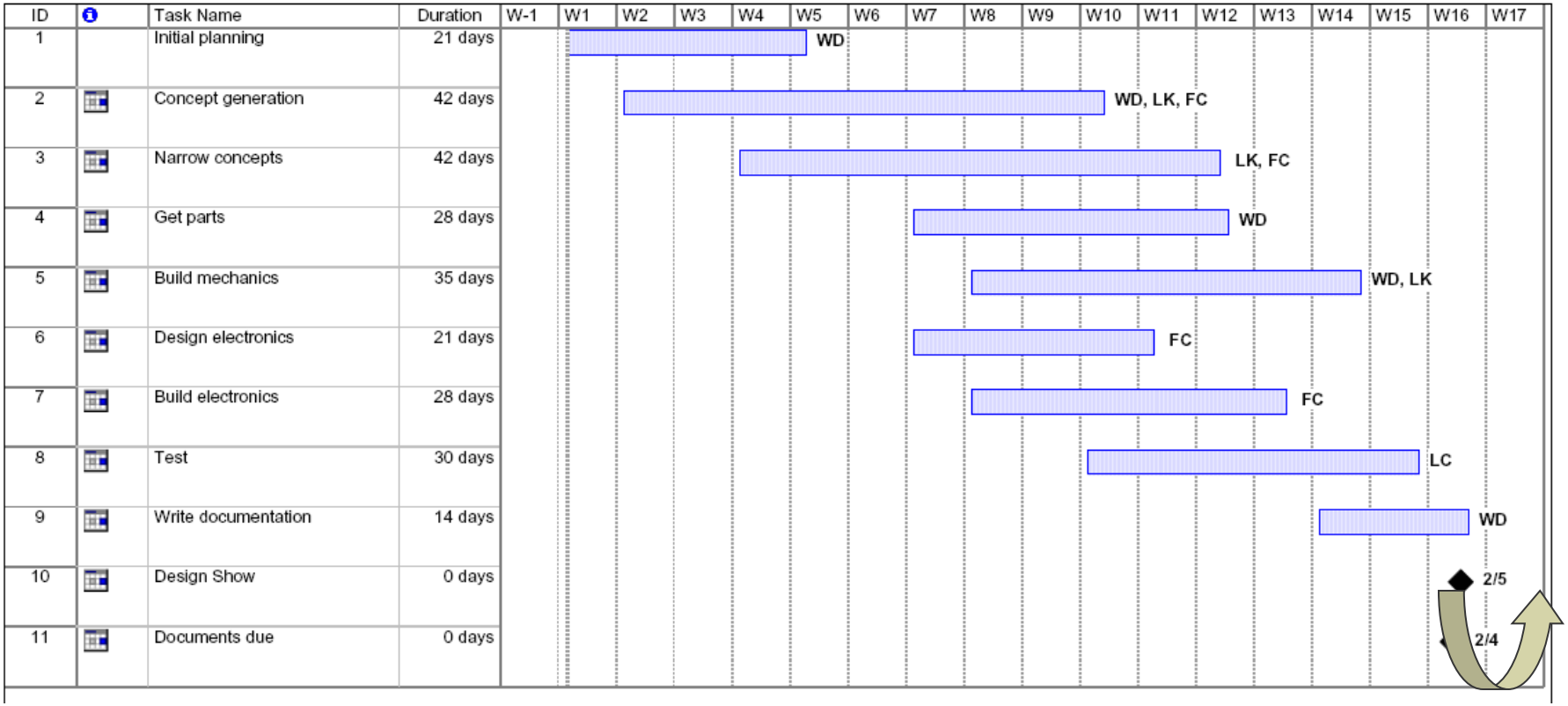


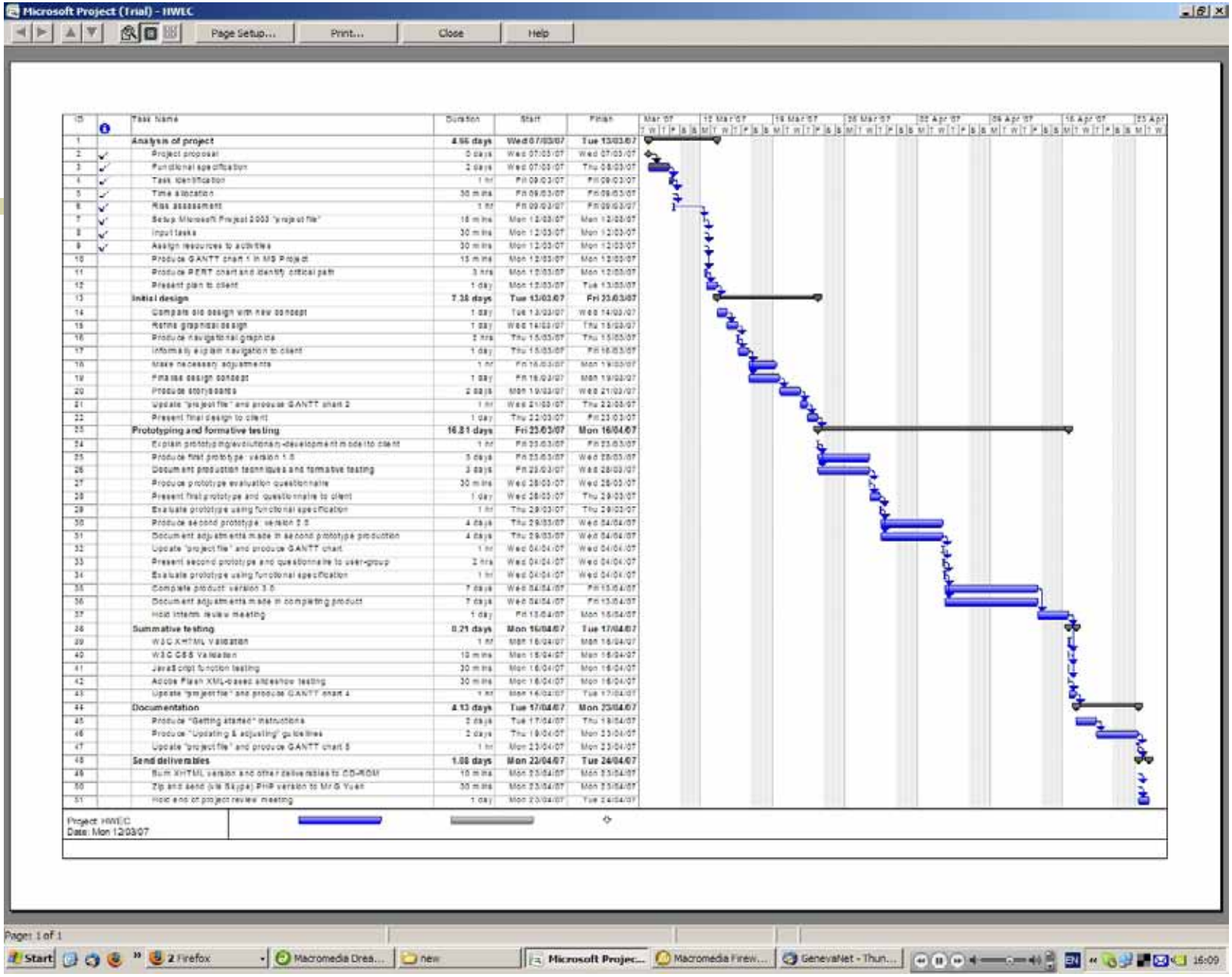
Work the Plan . . .
Make it happen

- Make a simple project schedule, easy to read and status.
- Stick to your plan
- Monitor progress – fill in the bars, but not if they are not done.
- Adjust on the fly – you may have to give up some goals, or shift more people to key tasks that are falling behind. Enlist more experts?
- Keep everyone productive, but don't forget this is all fun!
- Communicate!

Sample Gantt chart

This one is done in MS Project. Anything will work . . . Draw it out by hand on a big sheet of butcher paper!! Make it easy to read and understand (but don't take 16 weeks).





http://www.remza.co.uk

References

- MBA.com
- PMI PMBOK Guide

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Questions ????