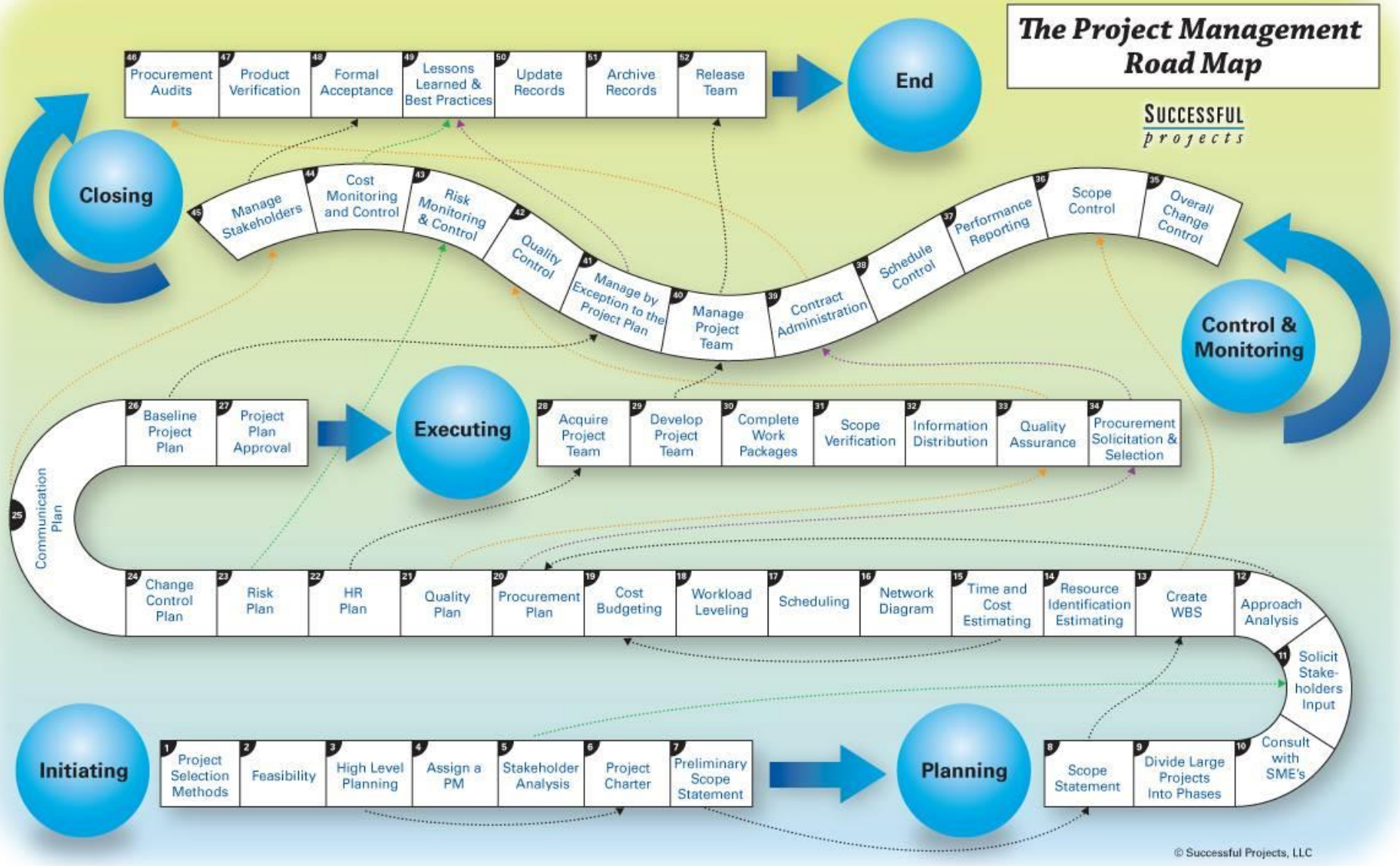
The Project Management Road Map
SUCCESSFUL projects
Initiating
1 Project Selection Methods
2 Feasibility
3 High Level Planning
4 Assign a PM
5 Stakeholder Analysis
6 Project Charter
7 Preliminary Scope Statement
Planning
8 Scope Statement
9 Divide Large Projects Into Phases
10 Consult with SME's
11 Solicit Stake-holders Input
12 Approach Analysis
13 Create WBS
14 Resource Identification Estimating
15 Time and Cost Estimating
16 Network Diagram
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18 Workload Leveling
19 Cost Budgeting
20 Procurement Plan
21 Quality Plan
22 HR Plan
23 Risk Plan
24 Change Control Plan
25 Communication Plan
26 Baseline Project Plan
27 Project Plan Approval
Executing
28 Acquire Project Team
29 Develop Project Team
30 Complete Work Packages
31 Scope Verification
32 Information Distribution
33 Quality Assurance
34 Procurement Solicitation & Selection
Control & Monitoring
35 Overall Change Control
36 Scope Control
37 Performance Reporting
38 Schedule Control
39 Contract Administration
40 Manage Project Team
41 Manage by Exception to the Project Plan
42 Quality Control
43 Risk Monitoring & Control
44 Cost Monitoring and Control
45 Manage Stakeholders
Closing
46 Procurement Audits
47 Product Verification
48 Formal Acceptance
49 Lessons Learned & Best Practices
50 Update Records
51 Archive Records
52 Release Team
End
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About the Author and Successful Projects

Kay Wais is the Owner/President of Successful Projects, LLC and Vice President of The AVS Group, both located in La Crosse, Wisconsin.

She has 23 years of project management experience and thirteen years of teaching project management. She has a Bachelor's degree in Business Administration, a Master's degree in Project Management, and her Project Management Professional (PMP®) certification through the Project Management Institute (PMI®). In 2002 she founded the La Crosse PMI chapter and became its first president. She remains active in PMI at the board level, as well as with many of the PMI communities of practice and with the International Project Management Day.

She is the Director of the Certificate in Project Management program that is offered through six Universities in Wisconsin: UW-Eau Claire, UW-La Crosse, UW-Green Bay, UW-Stout, UW-Stevens Point, UW-Superior, and Texas A&M University.

Kay's project management background also includes extensive experience in project management contracting, project coaching and providing assistance with troubled projects. All workbook readers should feel free to contact Kay regarding any questions, project advice, tools and templates, and additional resources.

SUCCESSFUL
projects

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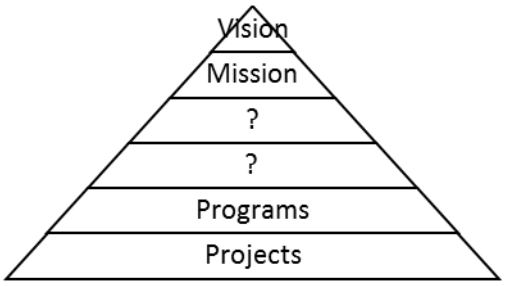


Fill in the two missing layers between mission and programs. (Answer provided at the bottom of p. 6)

Dr. Kerzner 16 Points for Project Management Maturity

1. Adopt a project management _____ and use it consistently.
2. Implement a _____ that drives the company toward project management _____ and communicate it to everyone.
3. Commit to developing _____ _____ at the beginning of each project.
4. Minimize scope changes by committing to _____ objectives.
5. Recognize that cost and schedule management are _____.
6. Select the _____ _____ as the project manager.
7. Provide executives with project _____ information, not project _____ information.

8. Strengthen involvement and support of the _____ management.

9. Focus on _____ rather than resources.

10. Cultivate effective communications, cooperation, and trust to achieve rapid project management _____.

11. Share recognition for project success with the entire project team and _____ _____.

12. Eliminate nonproductive _____.

13. Focus on identifying and solving problems _____, _____, and _____ _____.

14. Measure _____ periodically.

15. Use project management _____ as a tool—not as a substitute for effective planning or interpersonal skills.

16. Institute an all-employee training program with periodic updates based upon documented lessons learned.

Answer to workbook question from previous page:
The layers of the pyramid start with projects and programs. The missing layers are ***portfolio*** *and then* ***strategy****. On top of that is mission. The very top is vision.*

1. Project Selection Methods

- **Cost-Benefit Analysis**: compares the predicted costs and potential benefits of a project.
- **Decision matrix/scoring models**: a decision-support tool allowing decision makers to solve their problem by evaluating, rating, and comparing different alternatives on multiple criteria
- **Opportunity Costs**: a comparison of what an organization cannot do if they choose to do the project.
- **Economic Methods**: Payback period, net present value, or internal rate of return The payback period is the number of years required to return the original investment from the net cash flows (net operating income after taxes plus depreciation).
- **Balance Portfolio Method**: Selecting projects to provide a good mix of project types and market segments, projects completing at staggered times, and varied risk distribution.

2. Feasibility

1. Is the project technically feasible?
2. Does the project have management support, employee involvement and commitment?
3. Does the project generate economic benefits?
4. Can the project be financially supported?
5. Can the project be integrated well with the local cultural practices and beliefs?
6. Will the project elevate or hinder the participants' social status?
7. Is the project physically and organizationally safe?
8. Is the project politically correct?
9. What is the environmental impact?
10. What is the market demand?
11. What are the expected competitive activities, commercial start-up, and price wars potential?

3. High Level Planning

1. Think beyond your first approach idea. Explore thinking small and explore thinking big.

2. Fill in the blank part of the sentence below to help understand the actual completion point of this project:

   This project will be completed successfully when

   _____

   _____

   _____

   is done.

3. Retrieve previous project lessons learned from similar projects. Note them here.

4. Plan with an emphasis on suitability, quality, robustness, and effective integration

Project Flexibility Profile

Mark the level of flexibility for each constraint	Inflexible Rigid	Adaptable Negotiable	Accepting Can Flex
Scope/ Quality			
Costs **(HR, financial, and equipment)**			
Schedule			

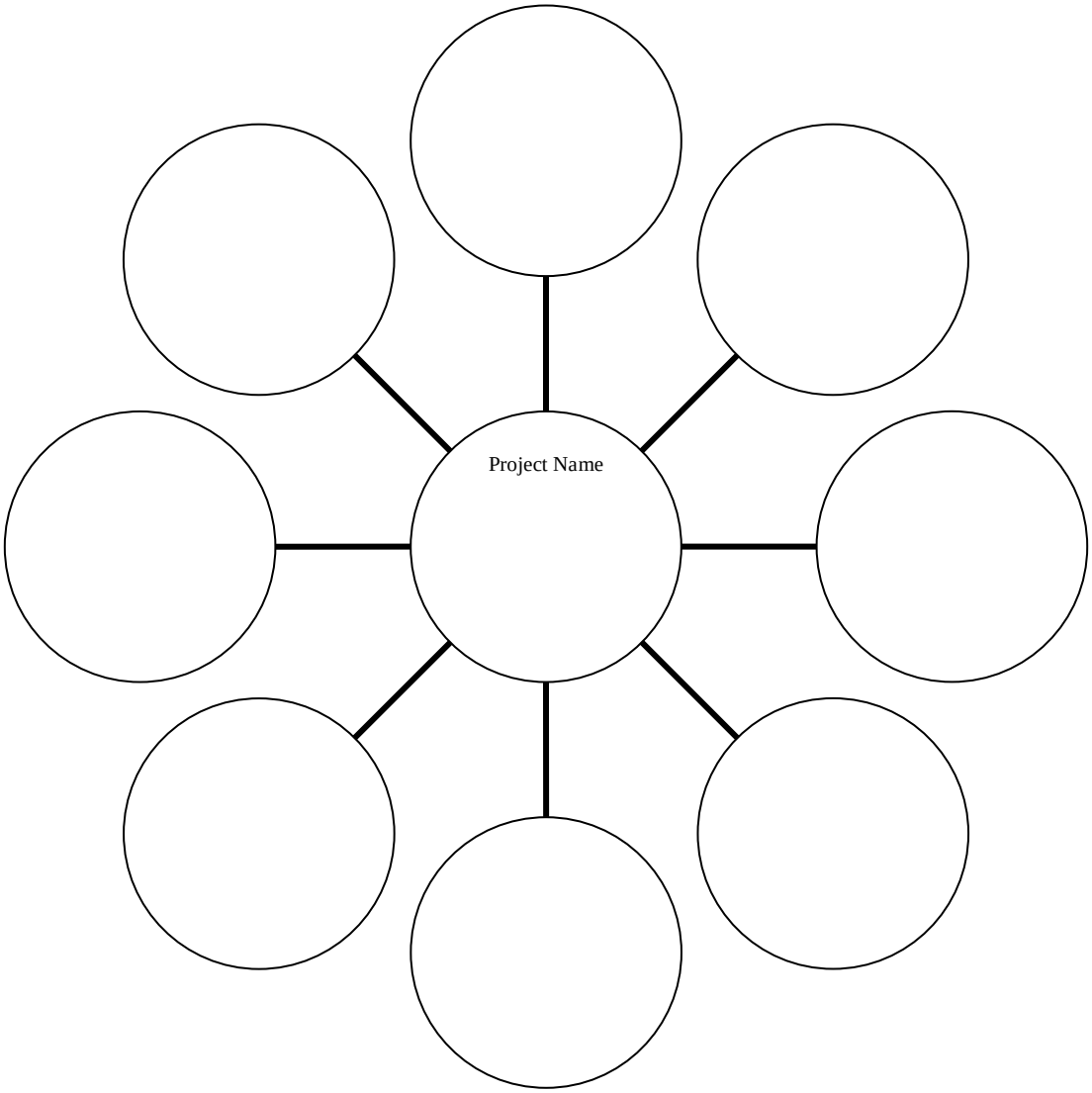
4. Assign a Project Manager

Name the Project Manager:_____

What **Level of Authority** will the Project Manager be given? *(Select one)*

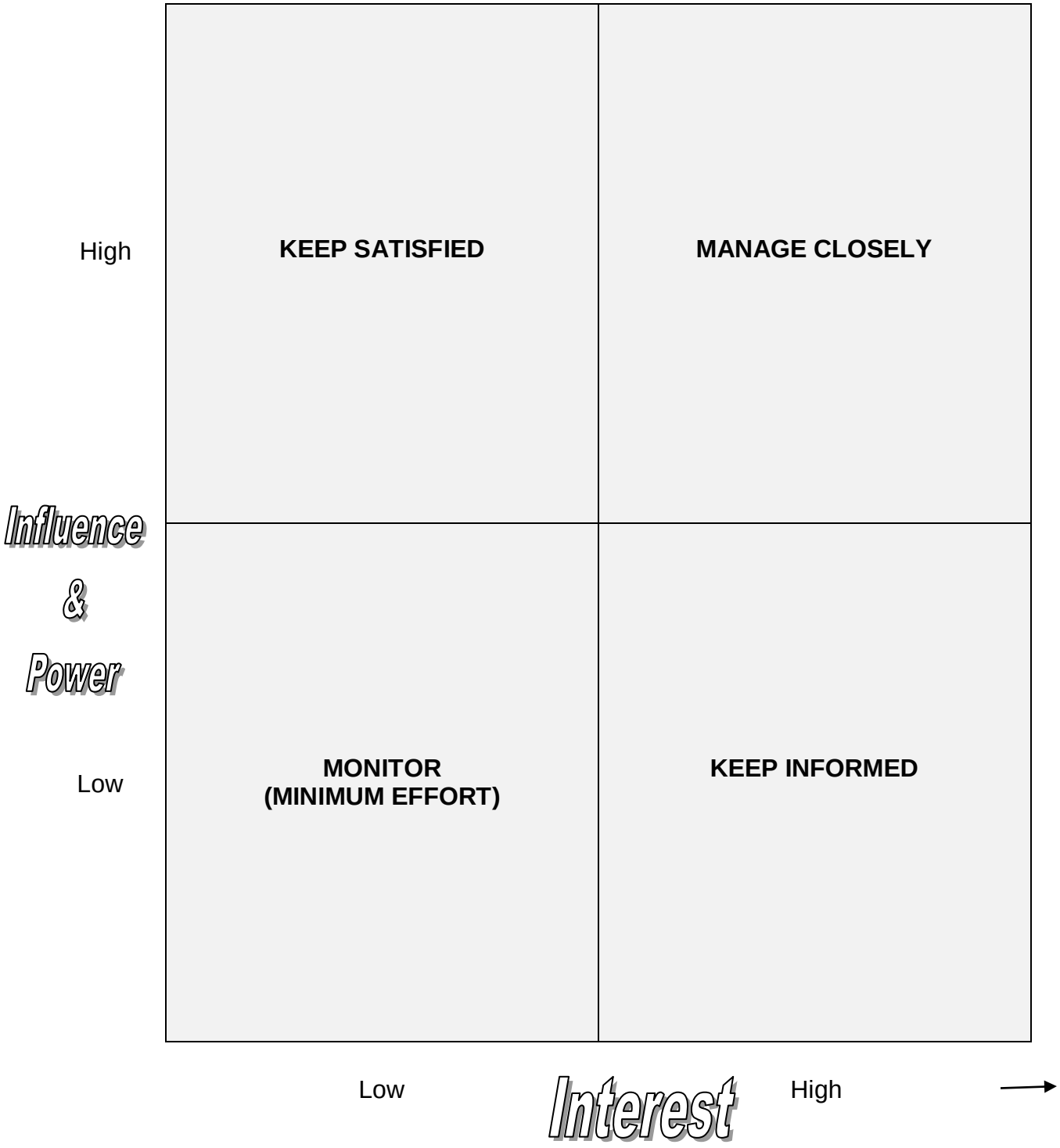
- ☐ **Project Expeditor**: acts primarily as a staff assistant and communication coordinator. This role has no authority.
- ☐ **Project Coordinator**: has some limited, referential authority but still generally serves as a peer to the project team members. However, in addition to his/her hands-on, team-member, tasks, this person also has some limited supervisory responsibilities as well project monitoring and status reporting responsibility.
- ☐ **Project Manager** with very limited authority
- ☐ **Project Manager** with balanced authority with the Department Managers
- ☐ **Project Manager** with authority over the Department Managers
- ☐ **Project Manager** with full authority over all team members

5. Stakeholder Analysis



Common stakeholder categories include the following: team members, subject matter experts (SMEs), negative stakeholders, sponsors, project users and vendors.

Stakeholder Influence/Interest Classification



Source: Mankyelow Rachel, "Stakeholder Analysis & Stakeholder Management"
http://www.mindtools.com/pages/article/newPPM_07.htm
This grid is also defined in section 10.1.2 in the 5th Edition PMBOK®.

Start with the stakeholder analysis (from the previous page) and plot the stakeholders based on their levels of interest in the project, and their level of power and influence on the project. This becomes the basis for your project communication plan.

Your next step will be to ensure that you consult with the interested project stakeholders. Many times individuals who feel that they should have been consulted on the decision to undertake the project, or whose point of view was not heeded, will not support the project or will continue to actively oppose it.

Stakeholder Engagement Level Gaps

In the grid below list the stakeholders in the "Manage Closely" quadrant. Fill in the grid below by assessing their current (C) and desired (D) levels of engagement. In instances where there is a gap, consider the stakeholder communication work that should be done early in the project phases.

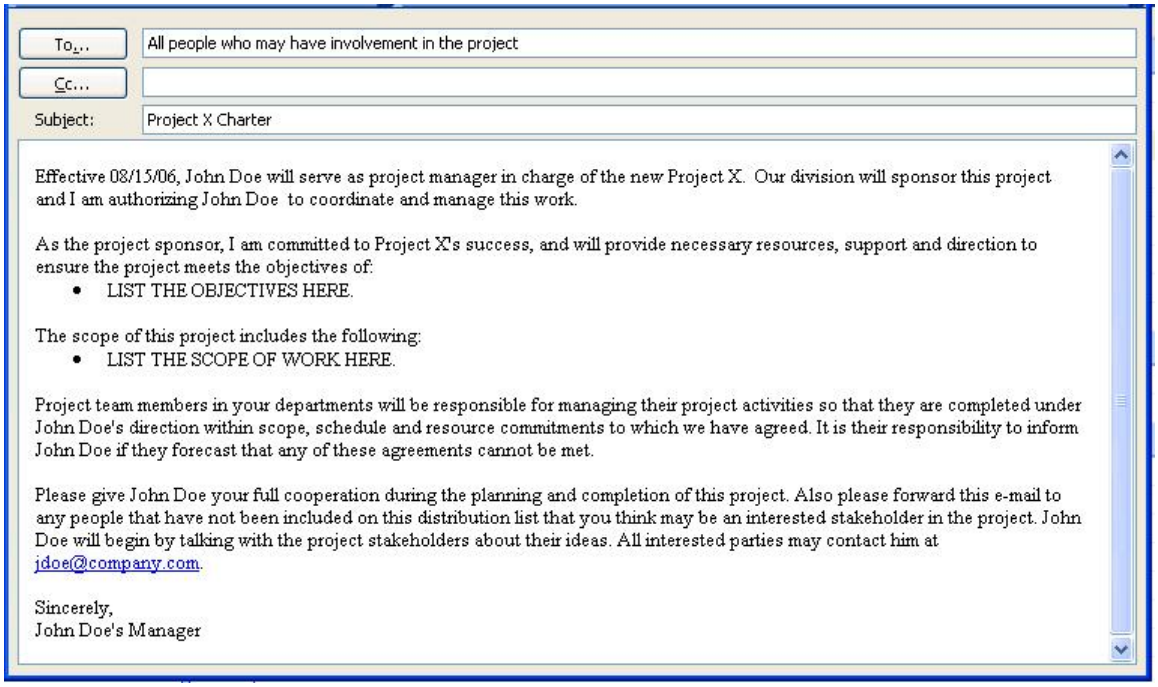
Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder A			C		D

Managing large-scale political projects takes a different skill set and management style. Advanced project management has to focus on developing leadership, matrix management, and other business-oriented skills.

6. Project Charter

The project charter is a simple, yet very powerful tool to authorize the project and to empower the project manager. A common technique is to initiate the project charter for your project sponsor, then review it with them and request to have them edit it as desired and send it out in their name (aka ghost-writing).

Example of informal charter e-mail:



To... All people who may have involvement in the project

Cc...

Subject: Project X Charter

Effective 08/15/06, John Doe will serve as project manager in charge of the new Project X. Our division will sponsor this project and I am authorizing John Doe to coordinate and manage this work.

As the project sponsor, I am committed to Project X's success, and will provide necessary resources, support and direction to ensure the project meets the objectives of:

- LIST THE OBJECTIVES HERE.

The scope of this project includes the following:

- LIST THE SCOPE OF WORK HERE.

Project team members in your departments will be responsible for managing their project activities so that they are completed under John Doe's direction within scope, schedule and resource commitments to which we have agreed. It is their responsibility to inform John Doe if they forecast that any of these agreements cannot be met.

Please give John Doe your full cooperation during the planning and completion of this project. Also please forward this e-mail to any people that have not been included on this distribution list that you think may be an interested stakeholder in the project. John Doe will begin by talking with the project stakeholders about their ideas. All interested parties may contact him at jdoe@company.com.

Sincerely,
John Doe's Manager

Note: You may want to send the Project Scope Statement with the project charter if you have worked that far ahead in your project planning (although the project charter usually comes first).

Charter Questions

1. Who should send out your project charter?

2. List the points you want to remember to include in your project charter:

3. Suggested distribution list for your charter:

7. Scope Statement

Example

Originator: *John Smith, CIO*

Business Purpose:

Our 250 stores have a wide variety of computer problems that are difficult to efficiently fix and support. We need to upgrade and standardize the computer systems. Through this project, we can improve overall computer technology, efficiencies, and IT performance.

Specific Project Objectives and Goals:

- *Upgrade Old Technology: Replace the oldest computers to meet minimum technical specifications (to be defined).*
- *Standardization: Reduce the variety of computers and software to a standard list that our IT department can support (to be defined).*
- *To ensure that store equipment is efficiently testing and operating correctly and that staff is trained and functional on the computers.*

Project Work Statement:

At this time, we are planning to break the project into subprojects to be managed by internal subject matter experts. Sue's department will be in charge of analyzing the software needs, creating specifications, procurement, installation and testing performance at HQ. Bill's department is in charge of the computer setup in the stores, testing on location, and getting operational problems resolved on-site. Mary's department will follow after Bill's team to work on training of the store staff (on location).

We are considering alternatives such as waved deployments, centralizing the training, and working with contractors instead of doing so much internally. The approach will likely be redefined during the analysis and planning phase.

Key Deliverables:

- *Needs analysis*
- *Project plan and project management*
- *Hardware and software specifications*
- *Hardware and software procurement*
- *Documentation*
- *Training*
- *Installation and Testing*
- *Support Plan*

Key Milestones and Schedule Goals:

- *Project plan presentation by end of Q1*
- *Hardware and software procurement by end of Q2*
- *Installation and testing completed by end of Q3*
- *Training and support set-up completed by end of Q4*

Major Constraints and Cost Goal:

- *The project budget is approximately $400,000.*
- *Schedule cannot drag out because computer technology changes fast. If the project gets moved to the back burner, efforts will probably need to start entirely over again.*

Major Assumptions

- *We will be eliminating most or all computers that are over 10 years old.*
- *Most computer peripherals will not be affected by this project.*
- *We are moving towards becoming a PC-platform based organization.*
- *HQ and laptop computers are not included in the scope of this project.*

Your Project Scope Statement

Originator:_____

Project Statement:
(A quick overview of the project in 15 to 20 words.)

Business Purpose:
(What are we trying to accomplish?)

Specific Project Objectives/Background and Goals:
(Reasons for recommending the project, including background information, business problem and more specific goals.)

Project Work Statement

(At a high level, what work will you do in this project to deliver the project product? What is the approach you have decided upon?)

Key Deliverables

(Verifiable outcomes of the work.)

Out of Scope List

(Work that might be part of other projects, purposely decided as out, or on a future wish list.)

Key Milestones and Schedule Goals:

(Major events and points in time indicating the progress in implementing your work. Potentially define the phases.)

Major Constraints and Cost Goal

(Constraints may be physical, technical, resource, or any other limitations.)

Major Assumptions

(Factors that are not entirely known.)

Team Composition

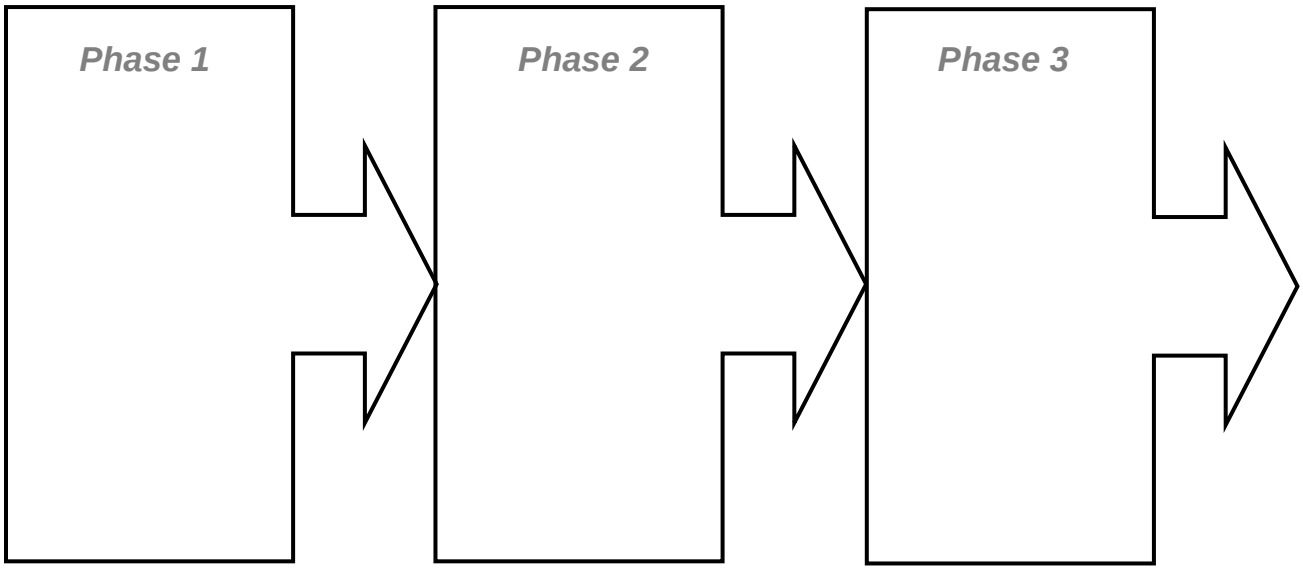
(Identify the core team members including the project manager, sponsors, known vendors, and known subject matter experts.)

8. Scope Statement

The scope statement is the only step in the workbook that has two steps that are basically the same thing. The scope statement writing often spans from step 7 (from the initiation phase) to step 8 (in the planning phase).

9. Divide Large Projects into Phases

Is your project too large? If so, use this space to break down large projects into a program of smaller projects into a program of smaller, time-based sub-projects for the sake of better control.



10. Consult with Subject Matter Experts (SMEs)

Subject	SME Name/Company	Phone	E-mail

11. Solicit Stakeholders Input

When soliciting all stakeholders input, consider these questions:

1. What improvements would you suggest to the scope or high-level plan?
2. What team members should be involved?
3. Who should have approval responsibilities?
4. Which technologies should be used or avoided?
5. What risks might we encounter?
6. How much should things cost?
7. What do you predict regarding the schedule?
8. What do you suggest for quality specifications?
9. What other stakeholders should be involved?

12. Approach Analysis

At a high level, list what we going to make internally versus hire out or purchase.

Make/Do Inside Organization	Hire Out or Purchase

Understanding Your Unique Project Rules

- What percent of team member work time (or average hours per work day) will be dedicated to this project?
- What organizational or industry methodologies will be used?
- How will the project be funded?
- Will there be regularly scheduled meetings, or just "as-needed" meetings?
- Determine the project escalation procedures.
    - What the project thresholds will be? Who will be notified if they are hit?
    - Who will the customer or team members notify if the project manager is not satisfying them?

What project assumptions have not yet been validated?

Assumption	Assigned Person	Date Validated

Validate Critical Data

13. Create the Work Breakdown Structure (WBS)

- ☐ The WBS has been written to create every aspect of the project work.
- ☐ Contingency funds and time has or will be allocated.
- ☐ The project team participated in building the WBS or has reviewed and approved it.
- ☐ Project management work is included in the WBS
- ☐ Work packages have been broken down to a level that can be delegated, but not so far as to be micromanaging.
- ☐ Milestones are added to indicate major approvals, phase gates, and other important time indicators – but with zero duration.

Example WBS for a Web Project

1. Web site redesign for 2018, XYZ Company
    1.1. Planning/Project Definition
        1.1.1. High-level plan
        1.1.2. Assign a PM
        1.1.3. Stakeholder Analysis
        1.1.4. Project Charter
        1.1.5. Project Scope Statement
        1.1.6. Divide Large Web Site Project into Phases or Smaller Projects
        1.1.7. Consult with SMEs
        1.1.8. Solicit Other Stakeholder Input
        1.1.9. Approach Analysis
            1.1.9.1. Technical Approach
                1.1.9.1.1.System Requirements
                1.1.9.1.2.Business Requirements
                1.1.9.1.3.Web Design Methods Evaluation
            1.1.9.2. Determination of What to Do Internally and What To Hire
    1.2. Conceptual Design Development
        1.2.1. Business Logic Design
        1.2.2. User Interface Design
            1.2.2.1.Artist Design Concepts – Alternative Creative Treatments
            1.2.2.2.Graphical Treatment Feedback
            1.2.2.3.Graphical Design Draft #2
            1.2.2.4.Graphical Design - Final
        1.2.3. Internal Design Standards Consultation
        1.2.4. Industry Design Standards Consultation
    1.3. Construction
        1.3.1. Staging/Development Server Set-Up
        1.3.2. Production Server Set-Up
        1.3.3. Graphical Asset Placement

1.3.3.1. Graphical Splitting & Optimization
1.3.3.2. Template Structure/Coding
1.3.4. Navigation
1.3.5. Special feature coding
1.3.5.1.Flash
1.3.5.2.Widgets
1.3.5.3.Video
1.3.6. Application Programming
1.3.7. Content Population
1.4. Testing
1.4.1. Test Plan Development
1.4.2. Testing Execution
1.4.3. Analyze Defects/Correct
1.4.4. Production Readiness Verification/Approval
1.5. Deployment
1.5.1. Files Transferred
1.5.2. Retest
1.5.3. Analyze Defects/Correct
1.5.4. Domain redirected to new site
1.6. Search Engine Optimization (SEO)
1.6.1. Written text optimization
1.6.2. Meta tag entries
1.6.3. Search Engines Seeded
1.6.4. Ranking Monitor/Report
1.7. Marketing/Announcements
1.8. Content Management Training
1.9. Project Closure

Planning Space for Your Project WBS

Create your WBS Levels 1-2. Start by brainstorming your WBS organization with the space below. Then use the following page to begin to decompose your WBS.

Blank page to continue your WBS

14. Resource Identification Estimating

List the people, equipment, and materials that are expected to be needed for the project. The outcome of resource identification is often a printed Resource Breakdown Structure (RBS). If you structure your WBS by organizational departments this is called an Organizational Breakdown Structure (OBS).

People/Skills	Equipment	Materials

15. Time and Cost Estimating

Here is a summary of the estimating best practices:

Compare actuals to estimates
After the work is complete, compare the actual time the work took to the original estimate. Track the percent off (either under or over) and report that information back to the team members. The best way to improve estimating accuracy is by paying attention. The best way to pay attention is by tracking metrics.

Use more than one approach or more than one person, or both.
After you have one estimate, compare the logic using either another approach or another person's perspective.

Clearly write out what makes this work complete.
Many times there are unknown needed revisions, quality acceptance criteria, and a level of completeness that has not been clearly thought out, not to mention communicated to the person doing the estimating.

Present estimates in either a range or by indicating your level of confidence.
For example, our project team estimates this will cost $100,000, and we have a confidence level of -20% to +60% (meaning it could very possibly fall between $80,000 and $160,000).

Understand the definition of an estimate.
In many knowledge projects (such as engineering, research, IT, creative, etc) the time work takes to create unique deliverables can be extremely difficult to accurately estimate. And eventually the estimation discussion turns into a risk tolerance question. It generally needs to be agreed that without seriously inflating estimates to turn them into guarantees, that schedules are best planned with some flexibility and contingency for going over. There are diminishing returns in over-analyzing the project.

Ask SMEs.
Subject matter experts can be a big help, especially in informing project managers what the commonly overlooked work or costs are. There are very common estimation omissions. You will benefit from questioning what they are.

The same work under the same conditions will be estimated differently by ten different estimators or by one estimator at ten different times.

Looping and conditional statements are never allowed.

16. Network Diagramming

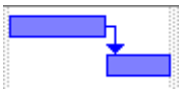
Calculation Instructions

1. Flow chart the activities in the order that the work needs to be done.
    a. Put the Task Names or IDs in the boxes and draw dependencies with arrows
    b. Insert the Duration Estimate for each box. You may use any time units (such as hours, days, weeks, months, or years), but remember to be consistent by using the same unit of measurement throughout the project. The most common choice is business days.
2. Calculate the forward pass to determine the early start and finish for the work.
    a. Put 1 in the Early Start for the work that can begin at the start.
    b. Add the Early Start number to the Duration number. Then subtract one. That becomes the Early Finish number of the first task.
    c. Add one to the Early Finish from that task and put it into the Early Start of the tasks coming off that box.
    d. When faced with a sink point (aka convergent point), the Early Start that we do this for is the largest of the Early Finish numbers from the preceding boxes.
3. Calculate the backward pass from right to left. This fills in the Late Start and Late Finish for each task. Below are step-by-step instructions for helping to do that:
    a. Begin the backward pass at the end of the project. Take the number in the Early Finish of the Last Task, or in the end marker, and put it into the Late Finish of the same task.
    b. From the Late Finish, subtract the task duration and add one to get the number for the Late Start. Remember you are working from right to left now.
    c. As you move left in the tasks, subtract one from the early start task to fill in the late start of connected tasks.
    d. When you have multiple choices, the Late Start that carries to the predecessors Late Finish is the smallest number of the options.
    e. Calculate the Slack/Float for each task. The value of the Slack/Float is calculated as the difference between the Early Start and the Late Start.
4. Find the critical path and mark it in red. The critical path is the longest path through the project schedule. All activities on the critical path have 0 slack.
5. Calculate the calendar dates that correspond with the schedule numbers, depending upon when you plan to start the first tasks.
6. Perform workload leveling (which lengthens the schedule)
    a. Bypass any non-work days.
    b. Communicate with the team members regarding schedule and accommodate the project schedule for conflicts.

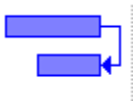
Common Types of Dependency Relationships

Listed from most to least common

- **Finish-to-Start:** The task to the left must be completed before the task to the right can start. This is by far the most commonly used dependency relationship in network diagrams, accounting for over 90% of most dependency relationships.



- **Finish-to-Finish:** The second task cannot finish until the first task finishes. For example, "Inspect Electrical" cannot finish until "Add wiring" finishes.



- **Start-to-Start**: The second task cannot start until the first task starts. For example, if you "Pour foundation" first, you can and should begin the process to "Level Concrete".

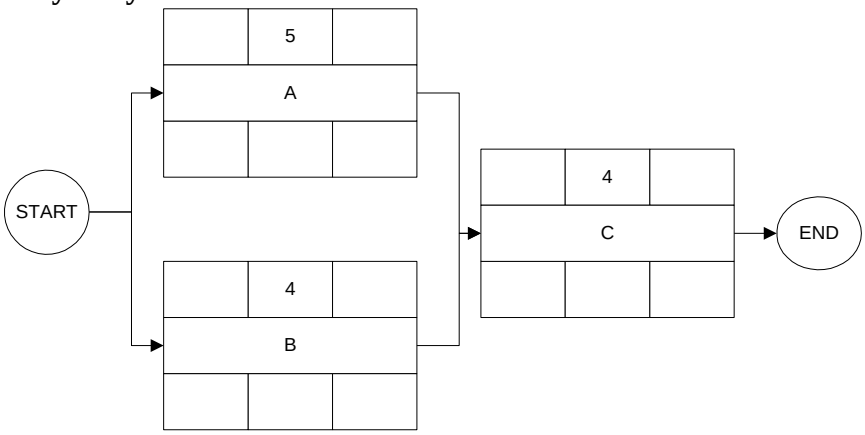
Common Types of Imposed Dates

- **Fixed Early Start**: A tasks early state date is set to the imposed date. It does not affect the tasks late date calculations.
- **Fixed Early Finish**: A tasks early finish is set to the imposed date. It does not affect the tasks late date calculations.
- **Fixed Late Start**: A tasks late start is set to the imposed date. It does not affect the tasks early date calculations.
- **Fixed Late Finish**: A task must finish on the imposed date. It does not affect the early date calculations.
- **Start Not Earlier Than**: A task cannot finish earlier than the imposed date. This has implications on late start-finish dates.
- **Start Not Later Than**: A task cannot start later than the imposed date. This has implications on early start-finish dates.
- **Finish Not Later Than**: A task cannot finish later than the imposed date. This has implications on early start-finish dates with the potential for float.
- **Must Start On**: Customer or organization imposed start date; driven by project start.
- **Must Finish On**: Customer or organization imposed finish date; potential for negative float.
- Work Between: Must work between two imposed dates; potential for negative float.

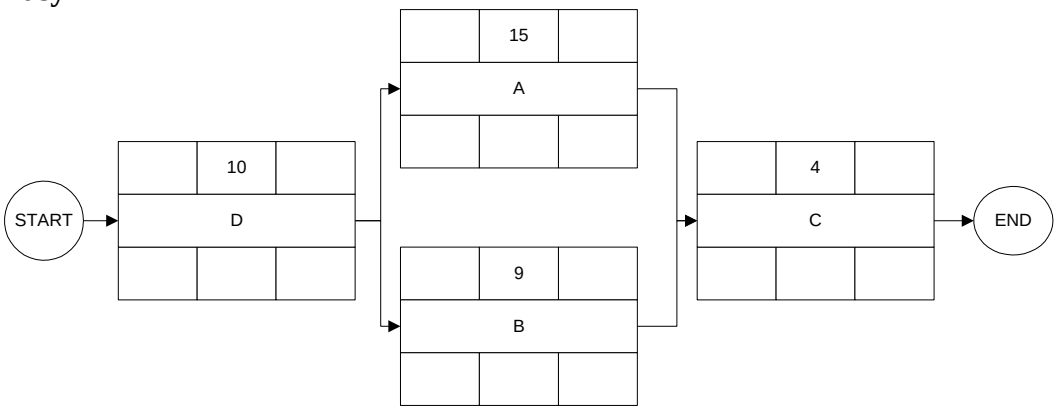
Network Calculation Exercises

Early Start	Duration	Early Finish
Task Name or ID		
Late Start	Slack	Late Finish

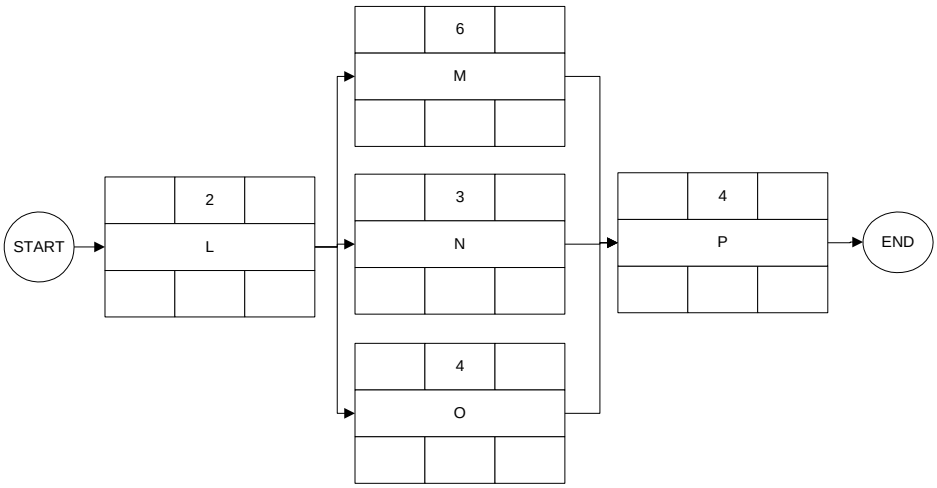
Very Easy



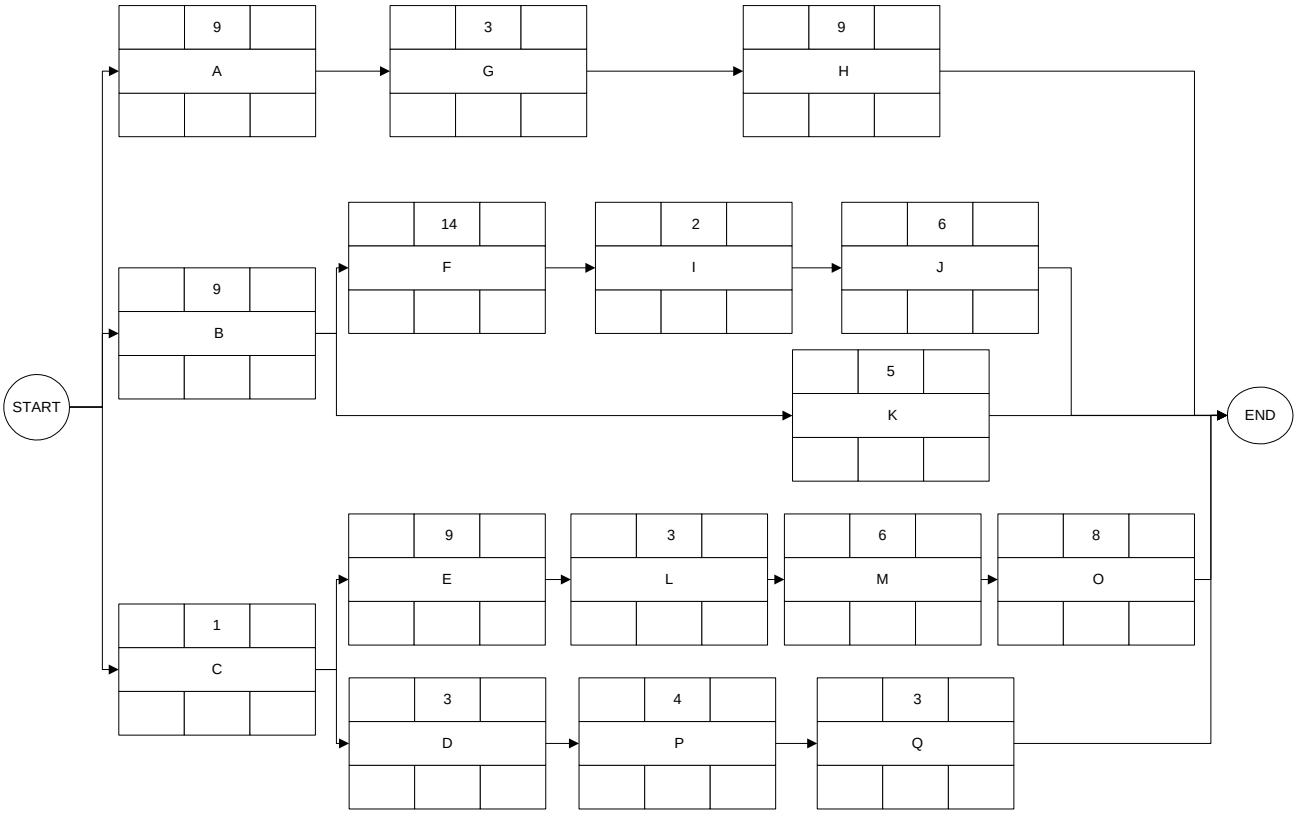
Easy



Moderate

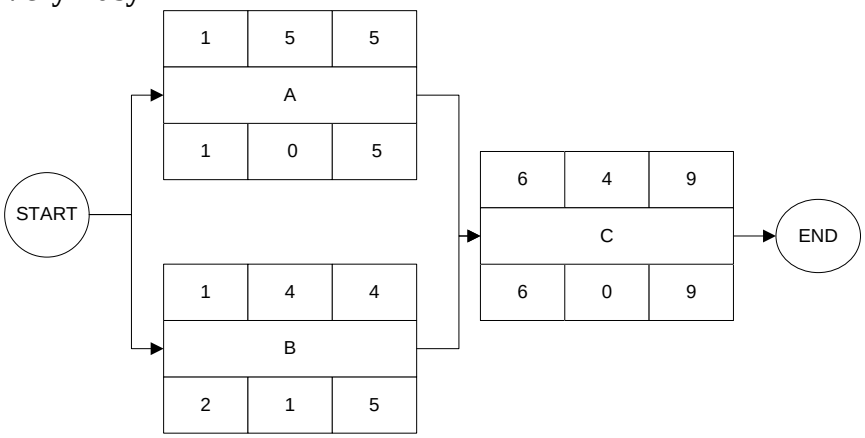


Difficult

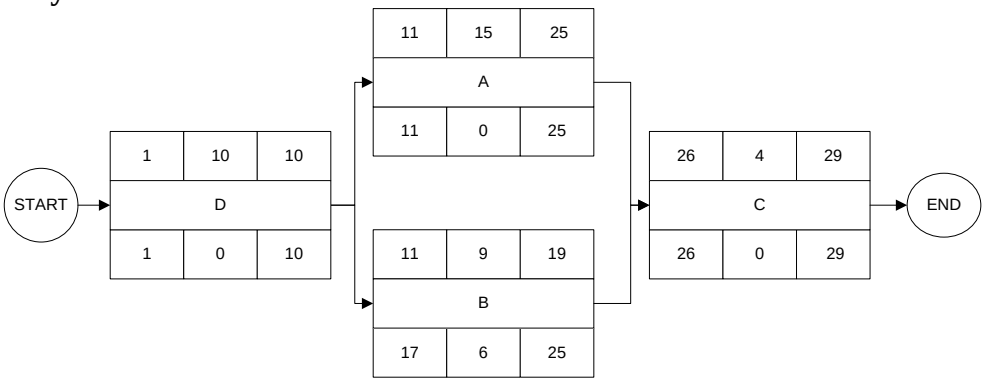


Answers

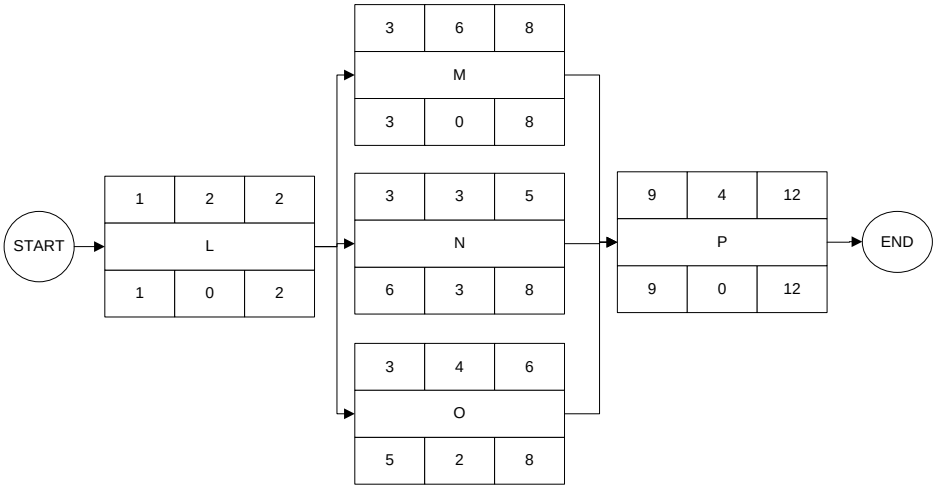
Very Easy



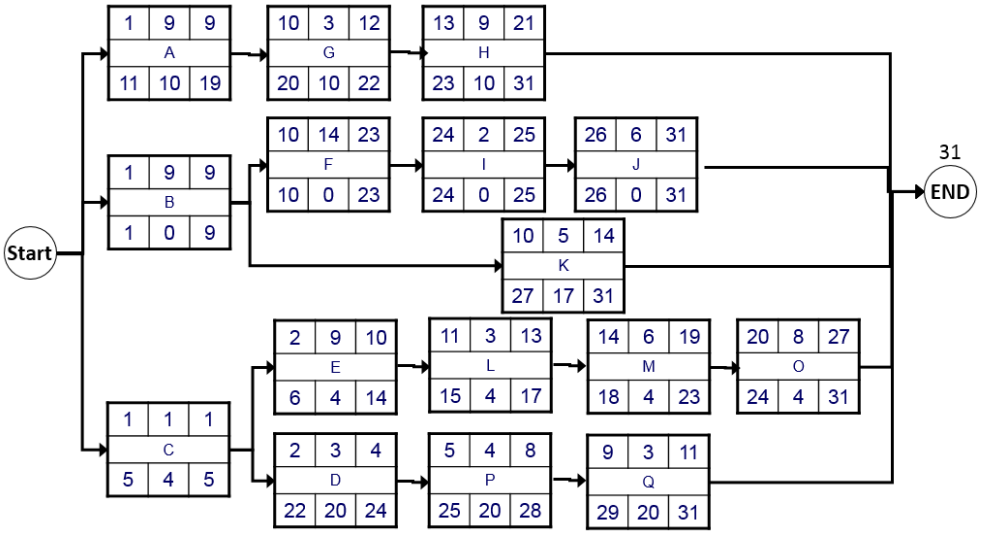
Easy



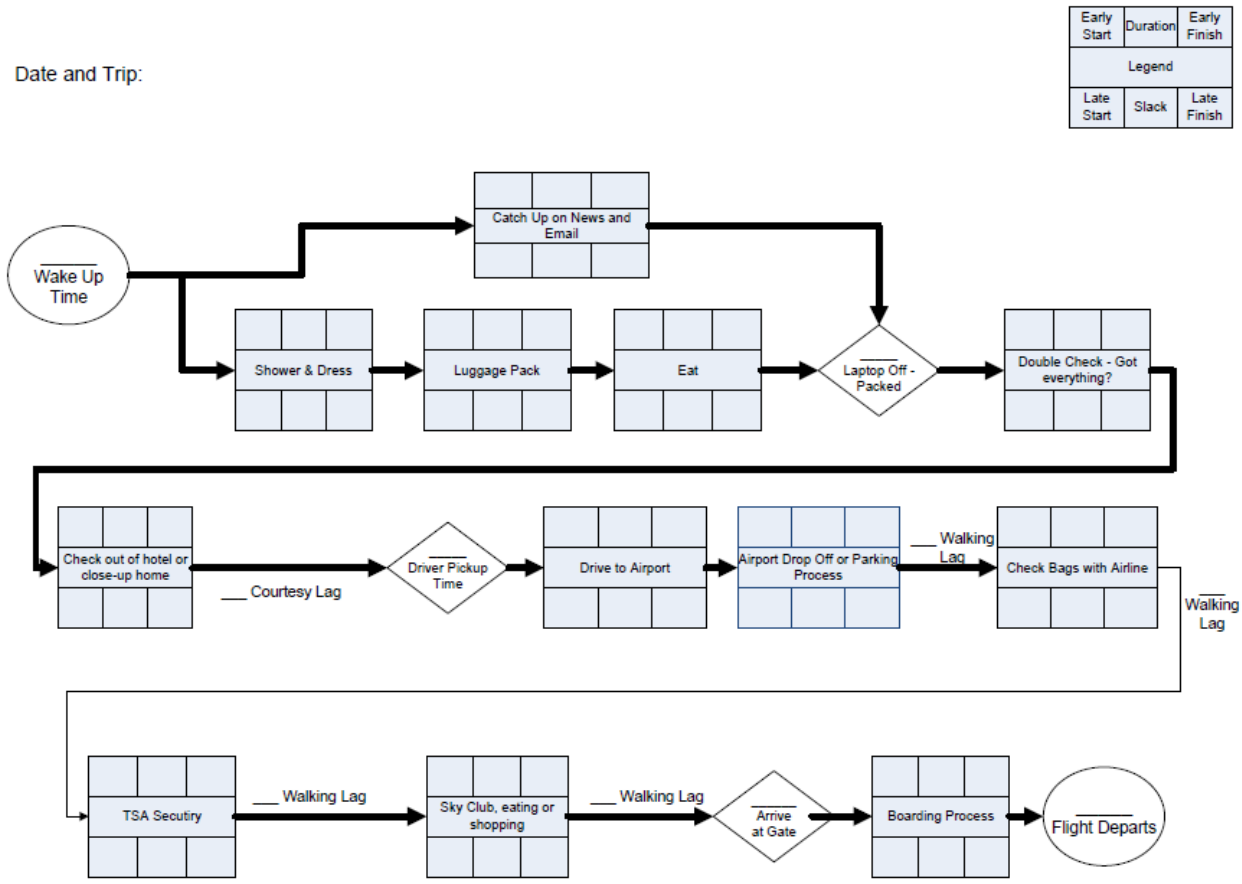
Moderate



Difficult



Sample Travel Plan



Network Diagrams to Calculate from Tables:

Project A		
Work Package	**Duration**	**Dependent Upon/Relationship/Lag**
A	5 weeks	Start
B	3 weeks	A, F-S
C	6 weeks	A, F-S, -1
D	2 weeks	B, S-S, + 3
E	7 weeks	D, F-S
F	5 weeks	C, F-S, -2
G	8 weeks	F, S-S, +1
H	2 weeks	F, F-S, +3
I	4 weeks	H, F-S, -1

On Project A (previous page) the critical path was ACFHI. The duration was 21. Activity B's float is impacted due to the start-to-start relationship with D. There is potential that B could start just enough to start D, and then it could utilize its float before finishing. Try another practice with a start-to-start relationship below:

Project B		
Work Package	**Duration**	**Dependent Upon/Relationship/Lag**
A	5 weeks	Start
B	3 weeks	Start
C	6 weeks	B, S-S
D	2 weeks	C, F-S, + 5
E	7 weeks	D, F-S, -1
F	5 weeks	C, F-S, +3
G	8 weeks	F, F-S, +10
H	2 weeks	E, F-S, +3
I	4 weeks	C, F-S, +12

On Project B (previous page) the critical path was CFG and it had a duration of 32. Try another project with another S-S relationship below:

Project C		
Work Package	**Duration**	**Dependent Upon/Relationship/ Lag**
A	15 weeks	Start
B	13 weeks	A, F-S
C	16 weeks	B, F-S
D	12 weeks	C, F-S, + 5
E	17 weeks	D, S-S, -1
F	15 weeks	C, F-S

On project C (previous page), the critical path is ABCDE with a duration of 65. You will note that the S-S relationship of E to D again causes an issue with the late start of D – forcing it to be 50 (although the late finish may be 65 – therefore making the float hard to define (and prone to allowing the activity to start and stop). The late start of E is 49 and its late finish is 65. Remember that the -1 indicates a lead between the S-S of D to E. It may seem strange that the dependency relationship of D to E has a lead - when it might have been done as a E to D dependency with a lag of 1 instead. But the dependency relationship given in a problem must be assumed to be correctly defined. So think of track relay race where the person grabbing the baton (E) starts running to gain speed before D can pass the baton.

Normal Estimates and Buffers

_____
_____
_____

Critical Chain Method

_____
_____
_____
_____
_____

Resource Optimization

Resource Leveling

_____
_____
_____

Schedule Compression

Crashing _____

Fast Tracking _____

Your Network Diagram Workspace

Hard logic is an activity relationship based on technical needs (i.e.: the software must arrive before we can install it on our server). Soft logic is a preference to do work in a certain order that may be based on team member time, available skills, or other reasoning that may have flexibility.

Continued space for your network diagram

17-18. Scheduling and Workload Leveling

After you have your idealized network diagram, you will need to negotiate the workload leveled work dates with your project team. Start at the left of your project network diagram to meet with your team members and their department managers, perform the workload leveling, and schedule the work as actual appointments for the upcoming 3 months. For the remainder of the project schedule it is normal to plan around milestone dates.

Practice Problem: Determining Mark's Project Work Completion

You are a project manager trying to determine the date one of your team members, Mark, can be done with his part of your project work. In preparation for doing this you have already talked with Mark to discuss his part of the project deliverables, the dependency of the order of work, and his estimated time to complete his 7 tasks. Mark has informed you that although he has other work as well, but can devote 6 hours a day to this project except for on the first two days – when he can only devote 3 hours a day to the project.

The tasks that Mark's work is dependent upon should be completed in time so that Mark can start his part on the first day of a month that coincidentally also falls on a Monday. Mark estimates his 7 tasks will each take 6 hours, totaling 42 work hours. The 7 tasks all have finish-to-start dependency relationships.

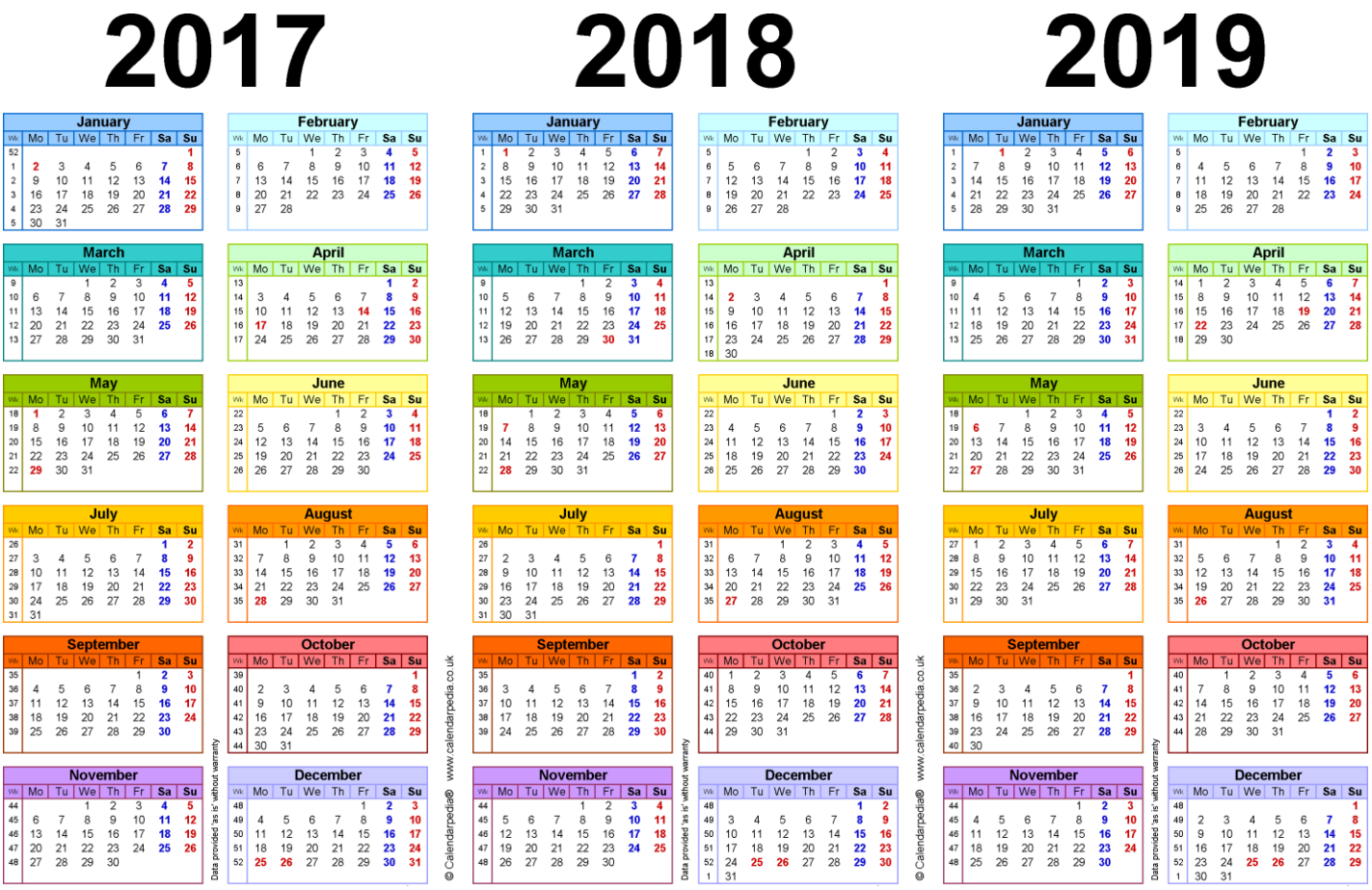
There is a lag of 3 work days between tasks 2 & 3 for inspection and approval of task 2 (which is expected to go well). Saturdays and Sundays are non-working days and Mark is on vacation on the 12th. When will Mark be complete with his part of the project? You may use the table below to help you in your schedule planning.

# Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Day of Week	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Mon	Tues	Wed	Thur	Fri	Sat

(Answer key in 2 pages.)

Yearly Calendar

Use this 3-year calendar to help plan the dates associated with your project schedule.



Answer to Practice Problem: Determining Mark's Project Work Completion

# Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Day of Week	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Mon	Tues	Wed	Thur	Fri	Sat
Hours Mark Can Work	3	3	6	6	6	Off	Off	6	6	6	6	Vac	Off	Off	6	6	6	6	6	Off
Task Progress	Start 1	End 1	2	Lag	Lag			Lag	3	4	5				6	7				

The answer is that Mark will be done on Day 16.

Here is the logic process used in deriving the answer:

1. Start by noting what days Mark doesn't work in the grid (the weekends and his planned vacation date).

2. Insert the number of hours per day that Mark expects he can work on your project.

3. Insert the tasks in the dates the work will start and end including the 3 days of lag between tasks 2 & 3.

Making Smart Project Schedule Decisions

Build a network diagram based on the project information below.

Activity Name	Preceding Activity (Assume all are finish-to-start relationships)	Time (weeks)	Planned Value	Assigned Team
A	-	7	$1,000	Fred
B	-	8	$22,000	Mary
C	-	6	$3,000	Jane & Team
D	A	6	$5,000	Fred
E	B	6	$11,000	Mary
F	B	8	$1,000	Jane & Team
G	C	4	$5,000	Jane & Team
H	D, E	7	$10,000	Fred
I	F, G, H	3	$1,000	Jane & Team
J	I	3	$5,000	Fred
K	I	2	$1,000	Mary
L	I	5	$10,000	Jane & Team

Create a network diagram and determine how long the project will take if the estimated durations are correct?

1. What activities create the project's critical path?
2. What is G's slack time if C used 6 weeks of its available slack time?
3. During week 1 what activity is your greatest concern?
4. If Jane and her Team can't do any work on this project during weeks 9 and 10, can we still work with them and achieve our schedule?
5. If you had to pick 4 milestone points in the project based on the network diagram, where would they fall?
6. Assume you are the project manager and you want to take a 2-week vacation sometime during the project. When is the best time for you to be out on vacation? Does the network diagram or Gantt chart do a better job of helping you make this decision?
7. Create a line chart of the cumulative planned project expenditures assuming work happens as soon as possible, and that billing is done upon completion of the activities.
8. Compare and contrast the usefulness of the network diagram, Gantt chart, and line chart of expenditures.
9. If the customer wants the project schedule shortened, what is the best activity to focus on shortening (crashing)? The second and third best? Remember that it only pays to crash the work that is on the critical path because the other work already has float/slack time available.
    - What are the best crash decisions if crashing had no additional cost?

- Assuming the crash table information in the table that follows to be correct, what are the best crash priorities based purely on cost?

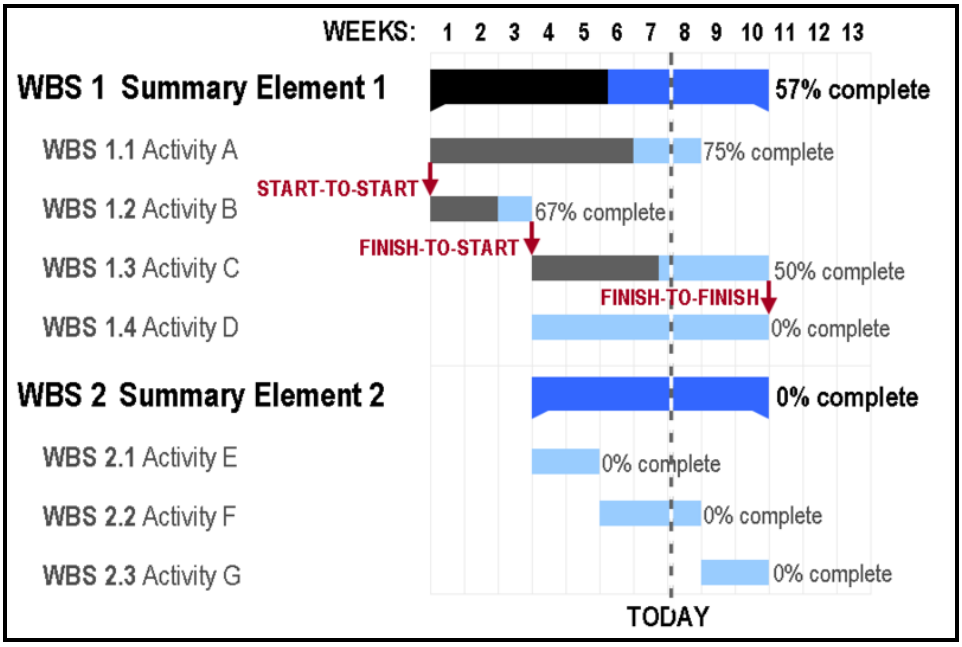
Crash Table

	Current		Compressed		Weekly cost to compress (crash cost)	Crash priority
Task	Duration	Cost	Duration	Cost		
A	7	$1,000	3	$5,000		
B	8	$22,000	4	$30,000		
C	6	$3,000	5	$4,000		
D	6	$5,000	6	$5,000		
E	6	$11,000	4	$17,000		
F	8	$1,000	7	$2,000		
G	4	$5,000	2	$8,000		
H	7	$10,000	3	$25,000		
I	3	$1,000	2	$2,000		
J	3	$5,000	2	$6,000		
K	2	$1,000	1	$1,500		
L	5	$10,000	2	$16,000		

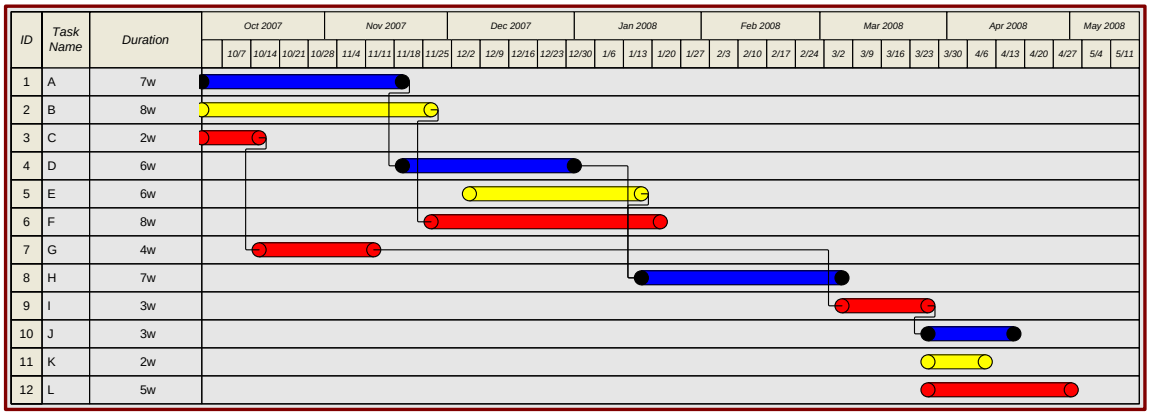
Gantt Charts

Gantt charts tend to be the favorite schedule view for many senior executives. They are easy to comprehend, and can show the completed work (usually indicated by showing a line through the bar).

The disadvantage of a Gantt chart, as compared to a network diagram, can be the difficulty in seeing the critical path, dependency relationships, and slack time. However this information may be of more importance to the project manager than the executive level sponsors.



1: Another style of Gantt chart. Source: Garry L. Booker, Rights released to public domain. Oct. 8, 2007. http://en.wikipedia.org/wiki/Image:GanttChartAnatomy.png#filelinks



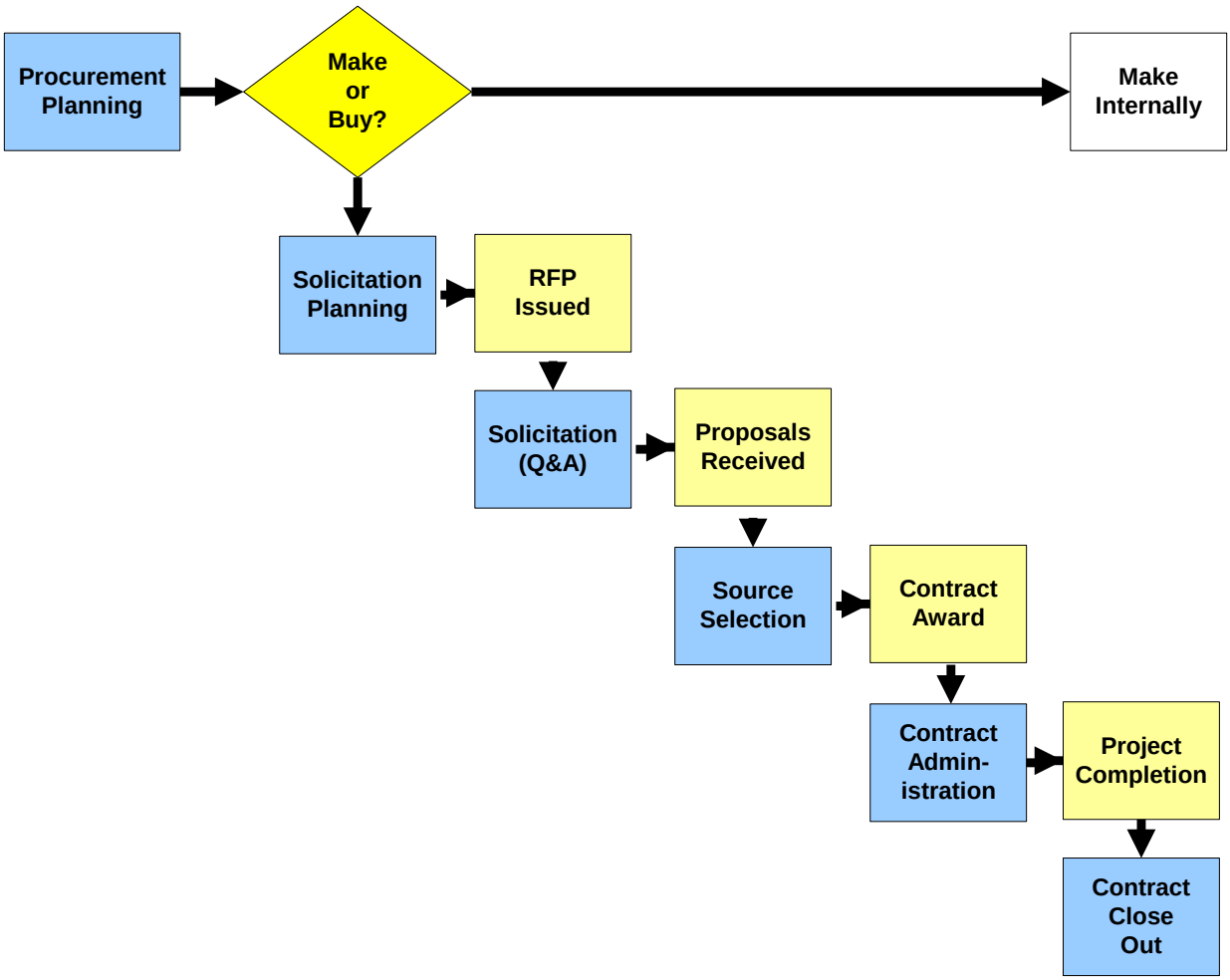
2: Gantt chart example produced in MS Visio

19. Cost Budgeting

The cost budget is generally the sponsor-approved total cost baseline of a project. This often includes the estimated amount plus any approved project contingency and management reserves.

Sum of Costs of Work packages
+Total Project Cost Contingency/Reserves
+ Management Contingency/Reserves
= Total Project Budget

20. Procurement Plan



For each significantly sized procured service or product answer the following questions:

1. How will we identify good potential sellers?
2. What type of pricing/service proposal best fits the project (RFI, RFP, RFB)?
3. What type of contract legal issues could be written into our procurement contract to protect the project and our organization?
4. Are there project risks that can be transferred to the sellers?
5. What will payment arrangements be? Should retainage be considered?
6. How will we ensure that all bidders receive the same project information at the same time?

21. Quality Plan

Parameter	Quality of a PRODUCT	Quality of a SERVICE
Value	The product is worth the cost to the customer in terms of its usability, reliability, and longevity.	The implementation of the service improves the customer's operation commensurate with the cost. The cost-benefit ratio is appropriate.
Usability	The product delivers what is promised.	The service delivers what is promised.
Reliability	The product functions when needed without constant need for maintenance or replacement parts.	The service functions as expected without failure and excessive downtime.
Longevity	The product is not made obsolete prematurely and has an appropriate life cycle relative to its cost.	The service is not made obsolete prematurely and has an appropriate life cycle relative to its cost.

What quality parameters are keys to your project success?

Quality Aids

The following are instructional aids that can help ensure the quality of your project:

Aids	Description	List aids of this type that you could use for this project.
Standards	Instructions that detail how a particular aspect of the project must be undertaken. There can be no deviation from "Standards" unless a formal variation process is undertaken, and approval granted.	
Guidelines	Unlike "Standards", "Guidelines" are not compulsory. They are intended to guide a project rather than dictate how it must be undertaken. Variations do not require formal approval.	
Checklists	"Checklists" are lists that can be used as a prompt when undertaking a particular activity. They tend to be accumulated wisdom from many projects.	
Templates	"Templates" are blank documents to be used in particular stages of a project. They will usually contain some examples and instructions.	
Procedures	"Procedures" outline the steps that should be undertaken in a particular area of a project such as managing risks, or managing time.	
User Guides	"User Guides" provide the theory, principles and detailed instructions as to how to apply the procedures to the project. They contain such information as definitions, reasons for undertaking the steps in the procedure, and roles and responsibilities.	
Example Documents	These are examples from prior projects that are good indicators of the type of information, and level of detail that is required in the completed document.	

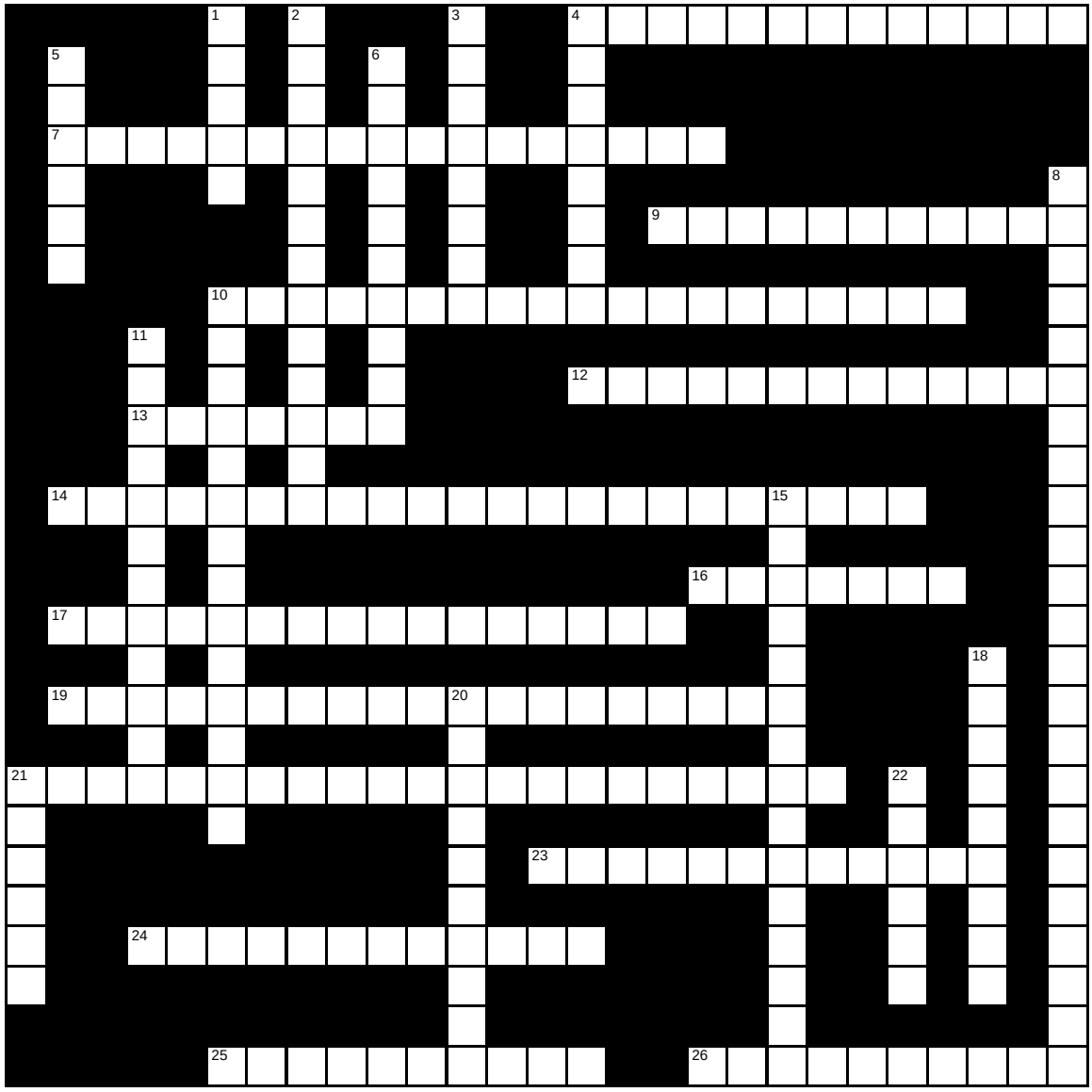
Built upon ideas presented at http://www.projectperfect.com.au/info_project_quality_planning.php

Technical Documentation or Specifications

ID	WBS Code	Specification	Classification*

* Classification is a way of grouping specifications in your project. Some examples of common classifications include product, design, printing, materials, testing, or programming. But they will vary for your projects.

Quality Terminology Crossword Puzzle



CLUES

(The number at the end of the clues are the letter count for the separate words.)

Across

4 A source of variation that is not inherent in the system, is not predictable, and is intermittent (7,6)

7 Unable to be both true (or happening) at the same time (8,9)

9 A quality histogram (6,5)

10 Where a random sample is selected instead of measuring the entire population (11,8)

12 A data display tool to analyze if a process is "in control" or not (7,6)

13 Examples of this include defect density, failure rate, availability, reliability, and test coverage. (7)

14 Plans how quality activities will be streamlined and improved (7,11,4)

16 A certification standard that ensures that companies document what they do and do what they document. (3,4)

17 Concerned with overall process improvement during the execution phase. A focus on steadily improving the activities and processes. (7,9)

19 Helps identify which factors may influence specific variables of a product or process under development or in production. (6,2,11)

21 Ishikawa diagrams and fishbone diagrams (5,3,6,7)

23 A standard by which something can be judged (12)

24 Visual representation of a process (12)

25 Limits your project has set for product acceptance. (10)

26 A manufacturing method that brings inventory down to zero (or near zero) levels. (4-2-4)

Down

1 Quality guru widely credited for adding the human dimension to quality mgmt (5)

2 A review process to determine how well the process fulfills requirements (7,6)

3 Displays observed data in a time sequence (3,5)

4 A popular quality philosophy that focuses on controlling processes and reducing defects. (3,5)

5 Quality guru who often said "think of manufacturing as a system" not as bits and pieces. (6)

6 Used to ensure that all steps were performed. (10)

8 The occurrence of one event makes it neither more nor less probable that the other occurs (11,12)

10 Shows the pattern of relationships between two variables (7,7)

11 A source of variation that is inherent in the system and is predictable (6,6)

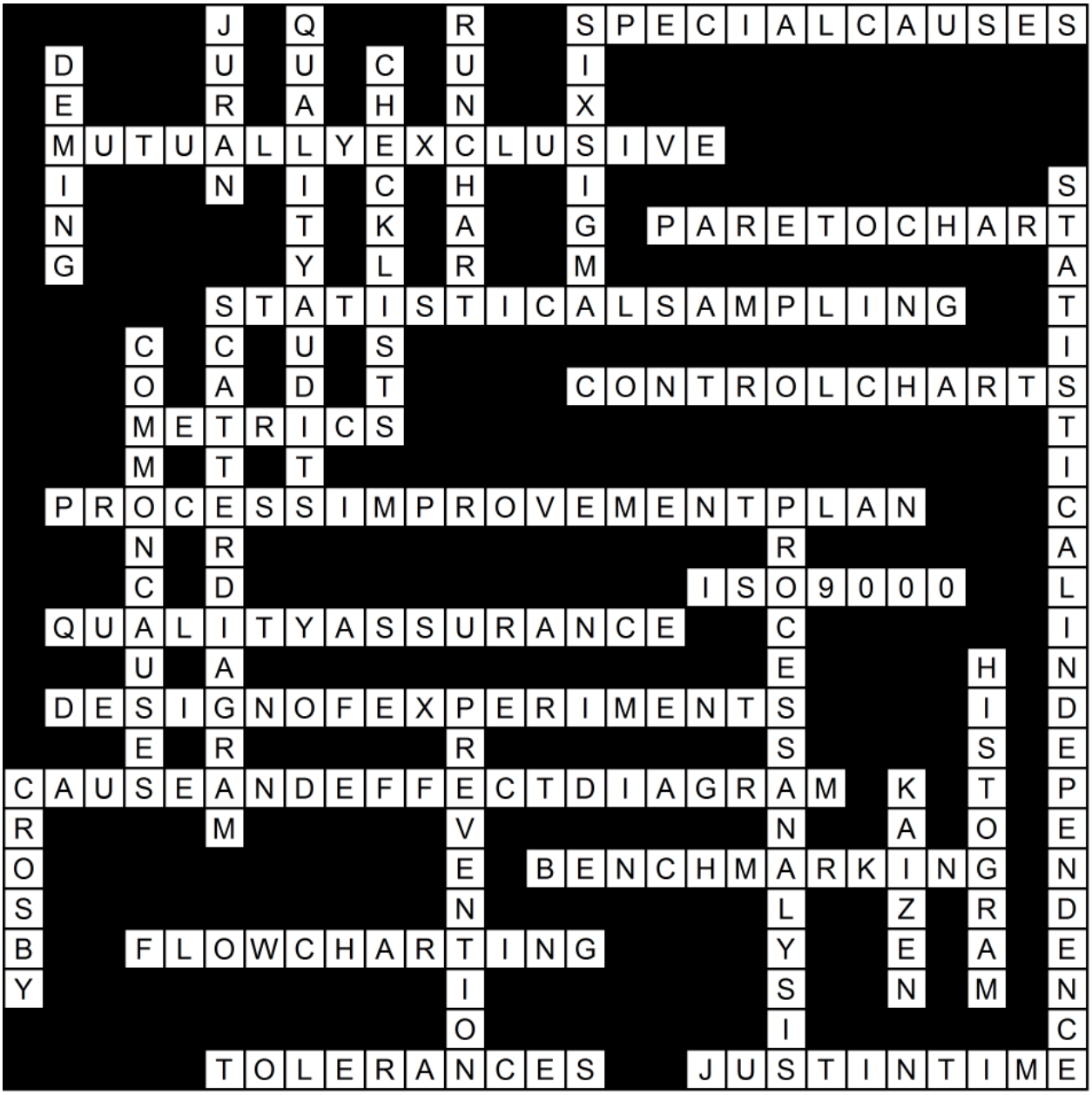
15 A review of the quality process to ensure that it is working effectively (7,8)

18 A bar chart showing observed frequencies (9)

20 Taking action to reduce the probability of negative consequences (10)

21 Quality guru who often said "Do it right the first time." (6)

22 A Japanese business philosophy of continuous improvement (6)



22. Human Resource Planning

Responsibility Assignment Matrix (RAM) – RACI Format

The person responsible for the execution of an activity needs to know the stakeholders who will need to be consulted, informed, or who will approve the work. The WBS and software often do not communicate this information. The RAM is one of the best ways to clarify and communicate these responsibilities.

You will see the typical chart below and immediately following the chart you will find guidelines to consider when creating your RAMs.

Traditional Roles
R = Responsible for doing the work
A = Accountable/Approval
C = Consult
I = Inform

Occasional Additions
D = Devil's Advocate
V = Veto Power

	Stakeholders								
Activity	Project Manager								
Project planning and communication									

Best Practice: Think A=Approval.

The A may stand for Approval or Accountable in some organizations. The difference between Responsible and Accountable is often very hard to differentiate. However the difference between Responsible and Approval seems to be better understood. So by using Approval instead of Accountable, the roles seem clearer.

Approval responsibilities represent a certain degree of power and the putting the A role in a RAM often raises a political question. A good project plan adds clarity and visibility to these issues that otherwise often become sources of conflict.

Another issue that this role delineation raises to the surface is the need for time to be planned into the schedule for the approver to handle the work review or decision logic.

Best Practice: Have an R for every activity.

You may have more than one R in a row, but that is not ideal. There are cases where it is accurate, but when you see multiple Rs associated with one activity in your plan you may want to consider breaking the roles down a bit further to aid in role clarity.

Best Practice: Do not put more than one letter in a cell.

You would not put an R, C, and I together in one cell. There is a hierarchy.

- R trumps C.
- C trumps I.
- A and R are quite different roles and ideally you will assign them to different stakeholders.

Best Practice: Don't be afraid of empty cells.

Every person is not involved with every part of every project.

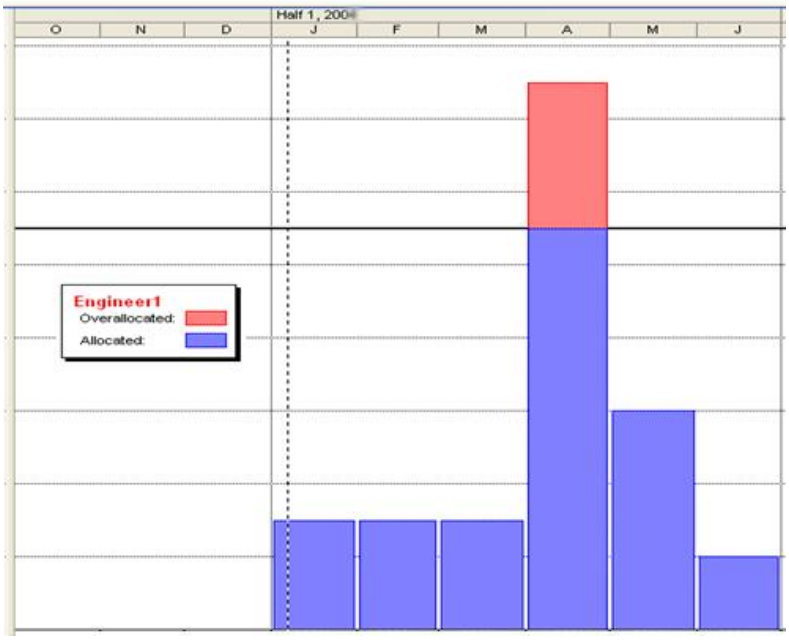
Best Practice: Push yourself to use more C's and I's to improve your project quality.

Escalation Guidelines

1. Establish a process for escalation at the start of the project (Kickoff meeting)
2. Define / identify the chain of command / decisions makers
3. Establish mutually agreed upon monitoring and control procedures
4. Define / explain the key items that would require escalation
    - Possibility of Missing a milestone
    - Safety issues
    - Accidents / injuries
    - Loss of personnel
    - Significant change in requirements
    - Significant task or schedule delays
    - Critical path issues
    - Disasters – A notification process should be in place
    - Classify project jeopardy situations – Critical or red, Serious or yellow
5. Gather information about the issue
    - Who is involved?
    - What has occurred?
    - What are the ramifications if not resolved?
    - When is action required?
    - Impact on other projects, operations, company image
    - Who is responsible to resolve the issue?
    - Recommended actions
    - Required response date / time
6. Identify who should receive the project escalation and others who should be informed. Keep the distribution to a minimum. No need to include people who are not directly related or who don't have a need to be involved.
7. Escalations are not personal. It is part of the business environment.
8. Escalation is partly a judgment call. In some cases, there is a specific protocol to follow. How serious is the issue? What are the alternatives? Is escalation benefitial?
9. Inform the other parties before the escalation is implemented. Professional courtesy will prevent reverse escalation and unnecessary conflict.
10. Follow up. Make sure that the issue receives the appropriate attention
11. Document the final solutions / decisions and the outcome.
12. When appropriate, issue a thank-you. Cooperation, support, willingness to find a solution are all worthy of a thank you.

Prepared by: Frank P. Saladis PMP. Reprinted with permission.

Workload Histogram for Human Resources



1 **The graph above is an example of a resource histogram from MS Project.**

Workload leveling is the process of balancing out the times when human and equipment resources are over-allocated, and to accommodate other commitments, holidays, and other schedule interference.

To create resource histograms, the project manager must plan not only the duration of the work, but how much work will get done in each planned work unit (usually in weeks). If you maintain the initial assumed estimated resources, workload leveling always has the effect of lengthening the project schedule. However histograms can help in determining times when additional resources could be most helpful.

23. Risk Plan

Risk Control Forms

1 of 3

Risk ID:	Date Raised: Last Reviewed:	Raised By:	Owner:
Short Description:			
Status: (select one) • Draft • Open • Rejected • Closed		Triggers *(early indicators that the risk event may be starting to occur)*	

Which Option or Combination of Options is Best?

Negative Risks	**Positive Risks** *(aka Opportunities)*
Mitigate: Take actions to minimize the impact and reduce the likelihood.	**Exploit**: Take action to definitely make the occurrence happen.
Transfer: Have another organization take responsibility for the risk.	**Share**: Spread the business/profits/money/pleasure around.
Avoid: Take the risk component out of the project.	**Enhance**: Take action to increase the probability and positive impact.
Accept	**Accept**

Describe how this strategy will be implemented:

What secondary risks may come out of this strategy?

Probability (score 1-10)	Very Likely: 10 Probable: 8 Possible: 3 Unlikely: 1	Impact (score 1-10)	High: 10 Medium: 5 Low: 1
	Risk Score (Probability x Impact):		
Closed Date:	Outcome:		

Risk Control Form 2 of 3

Risk ID:	Date Raised: Last Reviewed:	Raised By:	Owner:
Short Description:			
Status: (select one) • Draft • Open • Rejected • Closed		Triggers *(early indicators that the risk event may be starting to occur)*	

Which Option or Combination of Options is Best?

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Accept	**Accept**

Describe how this strategy will be implemented:

What secondary risks may come out of this strategy?

Probability (score 1-10)	Very Likely: 10 Probable: 8 Possible: 3 Unlikely: 1	Impact (score 1-10)	High: 10 Medium: 5 Low: 1
	Risk Score (Probability x Impact):		
Closed Date:	Outcome:		

Risk Control Form 3 of 3

Risk ID:	Date Raised: Last Reviewed:	Raised By:	Owner:
Short Description:			
Status: (select one) • Draft • Open • Rejected • Closed		Triggers *(early indicators that the risk event may be starting to occur)*	

Which Option or Combination of Options is Best?

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Accept	**Accept**

Describe how this strategy will be implemented:

What secondary risks may come out of this strategy?

Probability (score 1-10)	Very Likely: 10 Probable: 8 Possible: 3 Unlikely: 1	Impact (score 1-10)	High: 10 Medium: 5 Low: 1
	Risk Score (Probability x Impact):		
Closed Date:	Outcome:		

Risk Log

Risk Ranking	Risk Score	Risk Description
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
12		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

24. Change Control Plan

Change Approval Template

Control Number: Date Created: Originator:

Name of Project:

Change Proposal Title:

Proposed Change Description and References:

Justification:

Impact of Not Implementing Proposed Change:

Alternatives:

Initial Review Results

Review Date: _____ *Assigned to:* _____

Decision:

□ Approve for Implementation □ Reject □ Defer Until: _____

Reason:

Cost/Schedule Impact Analysis Required? □No □Yes

Impact on Cost:

Impact on Schedule:

Impact on Resources:

Reviewing Body:

Name: _____ *Signature:* _____

25. Communication Plan

Consider including the following components with your communication plan:

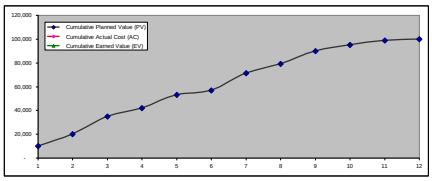
- Collection and filing structure for gathering and storing project information
- Example of a project status report (showing the format and type of information to be included)
- Escalation procedures
- Stakeholder communications analysis
- Glossary of new project terms

Audience	Vehicle of Communication	Frequency	Other Information
(Example) Project steering committee	*Formal presentations by the PM*	*Project plan presentation, major change requests, major milestones, and at formal acceptance.*	*Steering committee meets on the 2nd Tuesday of each month.*
Core Project Team Members			
Comments:			

26. Baseline Project Plan

The baseline is the approved version of all of the elements planned for the project including the WBS, schedule, time-based budget, and plan for how the resources, quality risk, communications, and procurement is expected to go.

Draw your project baseline here. Leave this as it is throughout the project. Also draw this as the baseline in step 37, where it will become the base for the Earned Value Performance Reporting.



2: Sample Cost Baseline

27. Project Plan Approval

Gradients of Agreement Chart

	Level of Agreement	Commonly Verbalized as…
+3	**Endorsement**	I like it. I support it.
+2	**Endorsement with a minor point of contention**	Basically I like it. However, there is one small part I'm unsure of or don't like.
+1	**Agreement with reservations**	It is not my ideal and there are parts I'm fairly negative about. I will continue to lobby to remove the gap between this idea and my reservations about it while I support the idea moving forward.
0	**Abstain**	I have no opinion or I feel other people should make this decision.
- 1	**Stand aside**	I don't like this, but I don't want to hold up the group.
- 2	**Formal disagreement but willing to go with majority**	I want my disagreement noted in writing, but I will support the decision.
- 3	**Formal disagreement, with request to be absolved of responsibility**	I don't want to stop anyone else, but I don't want to be personally involved in implementing it.
- 4	**Block**	I veto this proposal. I want to stop this from proceeding.

Adapted from Sam Kaner, 1996

Request Sponsor Sign-Off

When you have the plan completed entirely, review the baseline project plan with the major sponsor. Make sure you include a sample of the format planned for the project status reports, and then request sponsor sign-off.

Note requested plan changes:

Change thresholds:

1. The project needs to be stopped, pending authorization to proceed, when the schedule variance is more than _____% off plan.

2. The project needs to be stopped, pending authorization to proceed, when the cost variance is more than _____% off plan.

Sponsor Approval Signature Date

28 Acquire Project Team

In this conversation “fast is slow and slow is fast”.

- If you are working with functional managers, stress the following:
  - Which tasks need experts and which may be suitable for less skilled staff.
  - The importance of creating experts within the team by putting the same people on related tasks.
- Ensure that each core project team member has a chance to address any serious project concerns.
- Either involve the core team members in the creation of the WBS or get their approval on the WBS if they are added to the project later.

29. Develop Project Team

The development of the project team also often involves taking steps to improve the team interactions and skill competencies for the project.

1. Has the entire team been briefed on the project rules?
2. Will the team benefit from having the project manager create a project glossary?
3. What skills or training may be needed prior to the project work beginning?
4. What team members need to get to know each other in order to facilitate effective work and communications?
5. What is in it for the team member? Possibly the ability to learn new skills, add something wonderful to their portfolio, or help their career?

30. Complete Work Packages

This is the executing of the project work. This is the effort of creating the project deliverables as scoped in the project work breakdown structure.

Remember that completion measures accomplishment, not effort expended. Consider using the 0-50-100 rule for tracking the completion of work packages.

- 0% complete = The task has not yet begun.
- 50% complete = The task has been started but not finished.
- 100% complete = The task is complete.

Track this percent complete either in a Gantt chart or in the WBS.

31. Scope Verification

This is the work of obtaining formal acceptance of the completed project deliverables. What form of inspection is appropriate?

32. Information Distribution

This includes providing team member work information such as the WBS Dictionary (below) executing the communication management plan, often including providing project status reports and facilitating project meetings, as well as responding to unexpected requests for information.

WBS Dictionary Example

WBS Dictionary (Task Description)			
Project Name	Job and Task No	Date Issued	Person Assigned
Length	Due Date	Budget	Sign Off/Approver
Task Description			
Goals and objectives			
Product description			
Acceptance criteria			
Interdependencies: Before this task _____ After this task _____ Contact for any questions or concerns:			

Studies show that formally written work instructions are better followed than casual instructions.

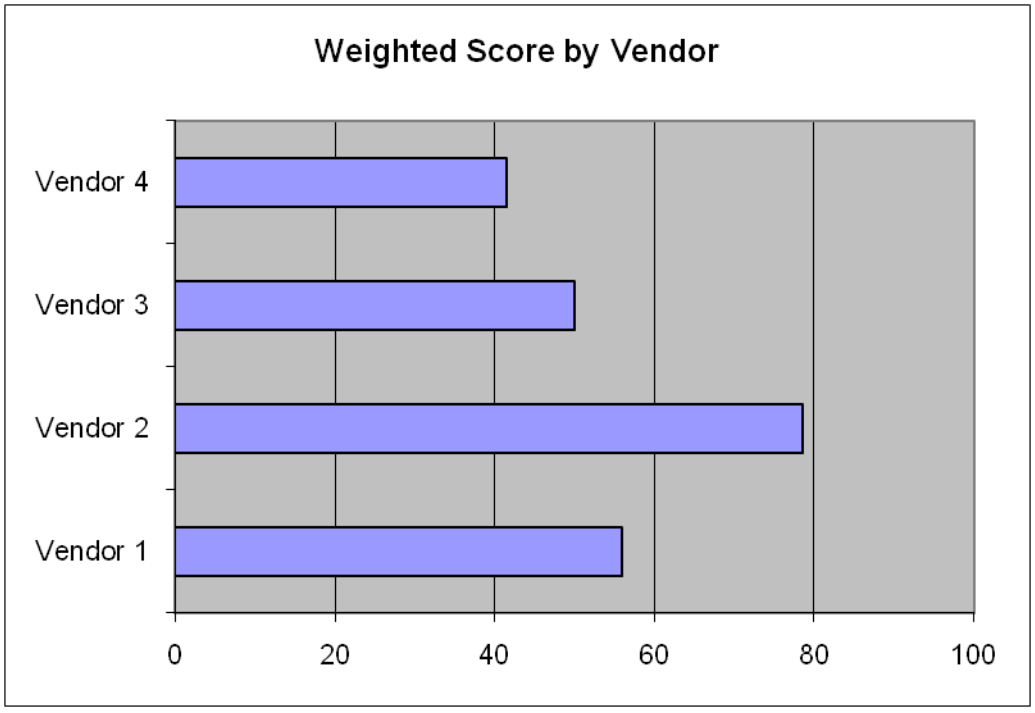
33. Quality Assurance

This involves the work of applying the quality plan, or more specifically to ensure that the project has the necessary quality tools and techniques, performing the quality audits, and analyzing the processes. The results of quality assurance include making improvements to the project deliverables, processes, and/or plan.

34. Procurement Solicitation and Selection

Example of a Weighted Decision Matrix

Criteria	Weight	Vendor 1	Vendor 2	Vendor 3	Vendor 4
A	25%	90	90	50	20
B	15%	70	90	50	20
C	15%	50	90	50	20
D	10%	25	90	50	70
E	5%	20	20	50	90
F	20%	50	70	50	50
G	10%	20	50	50	90
Weighted Project Scores	**100%**	**56**	**78.5**	**50**	**41.5**



35. Overall Change Control

Keep a log of the Change Decisions (tracked from step 24).

Change ID	Description	Date Changed	Effect to Quality, Schedule, and/or Cost	Notes

36. Scope Control

The project manager works to influence both the factors that create project scope changes and the impact of those changes. This includes noticing when changes are occurring, filtering out changes from inappropriate people, and ensuring that changes that are accepted into the project are beneficial.

37. Performance Reporting

This involves collecting and distributing performance information on the project status (often including schedule, budget, quality, risk and team performance information). This often also includes using the status information to forecast the future results.

38. Schedule Control

Determine the current schedule status and what the variance is from the plan. Work on influencing the factors that might affect the schedule, determining what may be causing any large schedule changes, and managing the schedule changes as they do occur.

Post your schedule report in the Earned Value chart with step 43-44.

39. Contract Administration

The work of managing the agreement and performance between the buyer and the vendor/seller. This also involves managing contract-related changes.

40. Manage Project Team

Managing the project team involves tracking team member performance, providing feedback, resolving issues, and coordinating changes to enhance the project performance. It usually involves communicating both formally and informally with team members.

Accountability Questions

1. Do you often experience gaps between team member project schedule commitments and actual performance?
   _____
   _____
   _____

2. Is the culture of the organization training people that slipped project schedules are acceptable?
   _____
   _____
   _____

3. Are the team members personally involved with the planning, and are they individually committed to the schedule initially?
   _____
   _____
   _____

4. Are the team member's functional managers informed of the schedule, and supportive of the project schedule, initially?

   _____
   _____
   _____

5. What are the common barriers causing the team members to miss their schedule commitments on your projects?

   _____
   _____
   _____
   _____

6. Who is the best person in the organization to help remove these barriers?

   _____
   _____
   _____

Fixing Performance Problems

Executive coach Bud Bilanich states that there are eleven reasons why employees don't do what they're supposed to do, that must be explored before disciplinary action is considered.

They are:

1. People don't know *what* they're supposed to do.
2. People don't know *why* they should do what they are supposed to do.
3. People don't know *how* to do what they're supposed to do.
4. People think the prescribed methods will not (or do not) work, or they believe that their way is better.
5. People think other things are more important.
6. People think they are performing in an acceptable manner.
7. Nonperformance is rewarded.
8. Good performance feels like punishment.
9. There are no positive consequences for good performance.
10. There are no negative consequences for poor performance.
11. There are obstacles to performing that the individual cannot control.

If you are interested in learning more about these problems, why they happen, and what to do about them, you may want to visit Bud Bilanich's web site at www.successcommonsense.com or pick up his book *Solving Performance Problems – A Leaders Toolkit*, ISBN 1885228767.

41. Manage by Exception to the Project Plan

If the project has been well-planned and work is proceeding on track, communications may expect to be focused on those aspects of the project that are not exactly as planned. When questions arrive the project plan should answer most predictable questions. This frees the project manager to address the things that are differing from the baseline project plan – usually meaning they are spending most of their time managing the project changes to improve the project results.

42. Quality Control

1. What deliverables need to go through a quality check?

2. What is the most appropriate way to check the quality?

3. When should it be carried out?

4. Who should be involved?

43. Risk Monitoring and Control

- ☐ Known risks are monitored and, where possible, mitigation strategies are followed to reduce the probability or impact.
- ☐ Update the risk log (located with step 23). Are there any new risks?
- ☐ Monitor the associated contingencies for both known risks (in your log) and also for the pool of yet unknown risks.
- ☐ There is a plan in place to continue to monitor and control risks.
- ☐ All risks are assigned to someone.
- ☐ Move those things that are occurring to your Issue Log (below).

Issue Log

Issue #	Issue Description	Impact on Project	Date Reported	Reported By
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

More columns for the issue log continued on the next page.

Right side of Issue log table from previous page

Issue #	Assigned To	Priority (M/H/L)	Due Date	Status	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

44. Cost Control

1. Have any significant pricing changes occurred during the timeframe of the project?
2. Are there new opportunities to deliver the same or better project quality at a lower cost?

45. Manage Stakeholders

The project manager must communicate with the stakeholders to inform, resolve issues, and set accurate expectations with the people who have interest in the project. This is especially important whenever there are problems on the project.

The following is a checklist provided from the Web site of Eric Verzuh, author of *The Fast Forward MBA in Project Management, Second Edition.*

- ☐ The project sponsor is fully aware of the state of the project, including revised schedule and budget estimates.
- ☐ The customer is fully aware of the state of the project, including revised schedule and budget estimates.
- ☐ The project team is fully aware of the state of the project, including revised schedule and budget estimates.
- ☐ Team members understand their specific assignments and how they fit into the overall project.
- ☐ Part-time team members and support organizations within the firm understand their contribution to the project. These expectations are clearly communicated both well in advance and again just prior to their involvement in order to give them the opportunity to plan to meet these expectations.
- ☐ The responsibility matrix is accurate.
- ☐ All stakeholders who need to be informed of project progress have adequate access to project information.

46. Procurement Audits

The project manager must lead the responsibility of inspecting and identifying any weaknesses in the seller's work processes or deliverables.

47. Product Verification

Evaluating a deliverable at the end of a project or project phase with the intent to assure or confirm that it satisfies the planned intent. Review the final project WBS and validate that everything planned was included. This is often done immediately before the formal acceptance.

48. Formal Acceptance

Note any required "punch list" of minor work that can be completed after formal project close-out.

_____

Sponsor Approval Signature Date

49. Lessons Learned and Best Practices

Start the closure by presenting the factual project information, including the project name, project dates, project manager and core team members, the baseline project plan, and the final project information. Then discuss the project report card.

Review of the Completed Project	**Grade Ranking (A – F)**
How much did the project schedule vary from the original plan? What were the main factors that contributed towards variance?	
How much did the actual cost vary from the original budget?	
Grade the final performance/specification/grade and quality level.	
Did the sponsor accept the final project? Did they think the process went well, that expectations were set accurately, and that they would commend the PM and team for a job well done?	
Was the project completed with minimal, mutually agreed upon, scope changes?	
Was the project performed without disturbing the main work flow of the organization?	
Was the project completed without going against the corporate culture?	

Lessons Learned Questions

1. What was the single most frustrating part of our project?

2. Are you proud of our finished deliverables (project work products)? If yes, what's so good about them? If no, what's wrong with them?

3. Describe any training and skill development that should be considered for our team to be better prepared for this type of project in the future.

4. Describe why the project was completed under, within, or over budget.

5. How should the project management process be improved in the future?

6. Provide a description of the major risks identified for the project and how they were handled.

7. How was change management handled during this project? What were the major project changes that occurred?

8. Was the communication process effective? Were there any major areas of misunderstandings or miscommunications during the project?

9. In hindsight, were there any topics that would have been helpful to have communicated much earlier in the project?

10. If you could wave a magic wand and change anything about the project, what would you change?

11. How were expectations different than expected?

12. What is the primary lesson learned on this project?

Sharing Lessons Learned

The goal for collecting these lessons learned is to share them with the organization to help future projects. Ask these two questions often:

1. How can the organization better share the project lessons learned?

2. How can the organization better collect and organize best practices?

Common Lessons Learned from Unsuccessful Projects

Keep reminders of old lessons learned nearby.	Insufficient use of project/status reports	Meandering project attention	Inadequate project management, administrative, human & technical skills
	Insufficient project manager influence and authority	Poor coordination with client	Lack of rapport with client/parent organisation
	Client disinterest in budget criteria	Lack of project team participation in decision making/Problem solving	Excessive structure within project team
	Job insecurity within project team	Lack of team spirit and sense of mission within project team	Planning based on insufficient data
	New type of project	Project more complex than handled previously (too complex)	Initial underfunding/ under resourcing
	Inability to freeze design early	Inability to close out effort	Unrealistic project schedules
	Inadequate change procedures	Problem not clearly defined	Planning just performed by planning group
	No one is in charge	Project estimates are best guesses, made without consulting historic data	People are constantly pulled off project or reassigned with no regard for impact
	People don't see themselves working as one team	Ballpark estimates become official targets	The project plan lacks detail
	The project is not tracked to plan	People lose sight of the original goal	Resource planning is inadequate
	Use of superficial status reports	Senior managers refuse to accept reality	Blockages went unaddressed
	90% done syndrome	We had a hammer and we made the project our nail.	Team members didn't follow instructions.
Add new lessons here.			

50-51. Update Records and Archive Records

Documenting the final information pertaining to the acceptance documentation, project files, closure documents, and lessons learned. This often includes the completion of any needed compliance documentation. Archiving involves putting the updated project records into a long-term storage location for later retrieval as needed.

Review the list of "Out of Scope" work and forward it with recommendations when appropriate. Also review the "Wish List for Future Projects" and communicate it for consideration for future project selections.

52. Release Team

Acknowledgement and communication that the project team members have completed the required temporary work and that their services will no longer be required for this project. Often this is a point of recognition of the individual team member contributions, appreciation of their efforts, performance reporting, and transition to other activities.

Performance Feedback Best Practice

Most team members want honest and constructive feedback, however how and when it is done is very important. They want to be in control of it and they don't necessarily want it to be a formal part of their job evaluations. One technique that tends to work well with project teams is for the project manager to support performance feedback at the end of the project closure meeting in the following way:

1. Briefly educate the team about the importance of feedback.
2. Explain what the feedback process is going to be.
    a. Distribute envelopes marked "confidential".
    b. Instruct each person to write their name on the envelope (where the mailing address usually goes) and put the name of a person they want feedback from in the upper left corner (where the sender name/address usually goes). Use as many as they want.
3. End the meeting by putting the envelopes into a centralized pile.
4. The project manager puts a reminder of the feedback guidelines in each envelope and distributes them to the appropriate parties after the meeting. Guidelines are as follows:
    a. You have three days to provide feedback to the team member who asked for it. You may use the envelope or make it a conversation.
    b. The feedback is private. No one else gets to see it. Any major corrective action that needs to be taken should be handled outside of this process.

Glossary of Project Management Terms and Acronyms

Acronyms

CISD: Critical Incident Stress Debriefing
ERP: Enterprise Resource Planning
FUD: Fear, Uncertainty, and Doubt
PBS: Product Breakdown Structure
PM: Project Management or Project Manager
PMI: Project Management Institute
PMBOK: A Guide to the Project Management Body of Knowledge®
PMO: Project Management Office
PMP: Project Management Professional
RAM: Responsibility Assignment Matrix
SME: Subject Matter Expert. (See consult with SME's below.)
SOW: Statement of Work
WBS: Work Breakdown Structure (see below)

Glossary

8/80 Rule: Although this is named a rule, it really isn't one – it is an occasionally used guideline that suggests that work packages in a WBS should be decomposed to equate to no more than 80 hours and no less than 8 hours of work. This guideline should be subordinated to the more appropriate guideline that the WBS should be decomposed to work packages at the level to which the work will be delegated.

Acquire Project Team: The processes of obtaining the assignment and commitment of the project team members. In a matrix environment this often involves working with the functional managers to help establish team member availability, skills, interests, and administrative actions required. See section 9.2 of the PMBOK.

Agile Project Management: Agile project management has six principles and five phases. The principles are 1) deliver customer value, 2) employ interactive, feature-based delivery, 3) champion technical excellence, 4) encourage exploration, 5) build adaptive teams, and 6) simplify. The five phases are envision, speculate, explore, adapt, and close. Adherents of agile often believe it is a cultural phenomenon whose tenets are based more on chaos theory than didactic project management techniques.

Analogous Estimating: This form of estimating is very high-level and done quickly. It uses general experience with similar work to predict the time or cost of similar work in the future. It is often stated as, "This is similar to something we have done in the past. That took X amount of time and cost. This is a little bigger than that – so it will probably be about 15% longer and more expensive."

Apportioning: Apportioning begins with a total project estimate, then assigns a percentage of that total to each of the phases and subprojects or work packages.

Approach Analysis: The work of consideration of alternative ways for how to technically or logistically achieve the project goals. This usually is performed during the planning phase. Approach analysis varies greatly depending on the type of project and the organization.

Archive Records: Putting the updated project records into a long-term storage location for later retrieval as needed.

Assign a PM: The initiation process step of naming a project manager to lead the project responsibilities on behalf of the project sponsor. This is ideally done before a project charter is announced.

Baseline Project Plan: This is the initial, approved project plan which usually includes a work breakdown structure, schedule, budget, and plan for how the resources, quality, risk, communication, procurement will be handled. See section 3.2.2.1 of the PMBOK.

Bottom-Up Estimating: This is the most accurate approach to project estimating. The process involves decomposing a project WBS into clear and assignable work packages and then gathering estimates for each work package from the responsible party. This form of estimating takes considerable time and effort, therefore it often is not available during the early planning processes.

Brook's Law: The complexity and communications of a project rise geometrically with the number of team members, expressed as [n(n-1)]/2 where n equals the number of team members. The law is named after Dr. Fred Brooks and named after his book *The Mythical Man-Month.*

Budget: Generally the sponsor-approved total cost baseline of a project. This often includes the estimated amount plus any approved project contingency and management reserves. See section 7.2 of the PMBOK.

Burst Point: A point in the project network diagram where when one task is complete many other tasks can begin. This is an important time for project managers to focus on project communications. It is a good time for team meetings.

Change Control Plan: Deciding what the processes will be for handling the project changes that occur after the baseline plan is created until the end of the project. This usually includes informing team members and sponsors what the processes are for identifying, approving or rejecting changes to the project, recording the changes, and integrating them into the project plan. See section 4.6 of the PMBOK.

Code of Accounts: The ID system used in work breakdown structures and other configuration management documentation during the project management process (e.g.: a common level 3 work package code of accounts would be 1.1.3).

Communication Plan: This involves determining the information and communication needs of the project stakeholders. This usually includes planning what the project status will be reported, how meetings will be conducted, and who needs what information. The project communication plan often needs to evolve during the project. See section 10.1 of the PMBOK.

Complete Work Packages: This is executing the work of the project. This is the effort of creating the project deliverables as scoped in the project work breakdown structure.

Consult with SME's: The input of subject matter experts (SME's) is greatly valued in project management. Getting the input, advice, and recommendations from technical and industry experts should be a step performed by the project manager during the project planning phase.

Contingency: Contingencies are also called buffers, reserves, or padding. They are the funds or time needed above the initial estimate to reduce the risk to an acceptable level. It is important to include contingencies in the project estimates.

Contract Administration: The work of managing the agreement and performance between the buyer and the vendor/seller. This also involves managing contract-related changes. See section 12.5 of the PMBOK.

Cost Budgeting: See the definition for budget.

Cost Monitoring and Control: The work of gathering and reporting information on the project costs, managing the changes as they occur, and acting to bring any potential cost overruns into acceptable limits. See section 7.3 of the PMBOK.

Customer/Sponsor: The individual or group that has requested or who is paying for the project. This could be an internal department, someone in management, or an external organization or person.

Crashing: The technique of speeding up the project schedule by using more resources (i.e.: people, materials, or equipment) than what was originally planned.

Critical Path: The series of activities that determines the duration of the project. The critical path is usually defined as those activities with no slack. It is the longest path through the project.

Decomposition: Decomposition involves subdividing the major project deliverables into smaller, more manageable components until the deliverables are defined in sufficient detail to support future project activities (planning, executing, controlling, and closing).

Deliverable: Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project. Often used more narrowly in reference to an external deliverable, which is a deliverable that is subject to approval by the project sponsor or customer.

Develop Project Team: Taking steps to improve the team interactions and skill competencies for the project. See section 9.3 of the PMBOK.

Divide Large Projects into Phases: The process of breaking large projects into a program of smaller time-based subprojects for the sake of better control.

Enterprise Resource Planning (ERP): Integrated applications involving forecasting and planning, purchasing and material management, warehousing and inventory management, finished product distribution, accounting, and finance.

Fast Track: The technique of speeding up the project schedule by altering the planned schedule through doing work simultaneously that would have ideally been performed consecutively.

Fallback Plan: a plan for an alternative course of action that can be adopted to overcome the consequences of a risk, should it occur (including carrying out any advance activities that may be required to render the plan practical).

Feasibility: The project initiation step of determining that a project is likely to be completed successfully. It is often an evaluation that there are enough available financial resources, technology, or skills to meet the needs of the project. See the Enterprise Environmental Factors listed in the PMBOK section 4.1.1.3.

Formal Acceptance: Sponsor acknowledgement and approval of the final project deliverables. See section 4.7.3.4 of the PMBOK.

Gantt Charts: Bar charts that list all activities vertically with corresponding bars which visually display the planned timeframe for each of the activities by use of a hollow bar, which is shaded in as percentages of the activity are completed.

Going Native: Another possible pitfall of project groups is going native. This phenomenon can occur within project teams working off site or when the project team becomes closely identified with the customer

Grade: A category or rank used to distinguish items that have the same functional use (e.g.: a Web site), but do not share the same requirements for quality (e.g.: different Web sites may have to provide much more functionality).

Hammock: A point in a project network diagram where many tasks feed into Task X, and then many other tasks can start as soon as Task X is complete. It is an important time for the project manager to schedule sponsor reviews and approvals. It may be a natural start for a new project phase.

High Level Planning: The work done during the project initiation phase that helps set the general approach to be used by a project team. This may include an analysis of various potential approaches and providing a high-level recommendation on a preferred way to approach achieving the project goals.

Human Resource Plan (HR Plan): The process of identifying and documenting project roles, responsibilities and reporting relationships. This often includes the coordinating with functional managers and the process of creating a responsibility assignment matrix (RAM). See section 9.1 in the PMBOK.

Hypercritical Activities: Activities on the critical path with negative float.

Information Distribution: This includes performing the communication management plan, often including providing project status reports and facilitating project meetings, as well as responding to unexpected requests for information. See section 10.2 of the PMBOK.

Ishikawa Diagram: Sometimes called a fishbone diagram, this diagram is a problem-solving approach by Kaoru Ishikawa used to show how causes and sub-causes relate to cause possible problems or effects.

Kubler-Ross Five Stages of Grief Model: Named after Elisabeth Kubler-Ross, Swiss psychoanalyst, the model stages are denial, anger, bargaining, depression, and acceptance. Why is this in the project management glossary? This model often forms the underpinnings of organizational change (which projects often are involved with).

Lessons Learned: Documented and stored information pertaining to the continuous improvement suggestions for handling similar projects in the future.

Loop: A network path that passes the same node twice. Loops cannot be analyzed using traditional network analysis techniques and are treated as errors.

Manage by Exception to the Project Plan: This is based on a philosophy that the project baseline plan should be well-planned, clear and understandable to the project stakeholders. When questions arise the project plan should answer most predictable questions. This frees the project manager to address the things that are differing from the baseline project plan – usually meaning they are spending most of their time managing the project changes to improve the project results.

Manage Project Team: Tracking team member performance, providing feedback, resolving issues, and coordinating changes to enhance the project performance. It usually involves communicating both formally and informally with team members and managing conflicts. See section 9.4 of the PMBOK.

Manage Stakeholders: Communicating to inform, resolve issues, and set accurate expectations with the people who have interest in the project. See section 10.4 of the PMBOK.

Management Contingency: A financial or schedule reserve, or buffer, that is available to the project, but that the project manager must get permission to utilize. This reserve is for "unknown unknowns" unlike the project contingency, which is for "known unknowns".

Milestone: A significant event in the project, usually completion of a major deliverable.

Mind mapping: Nonlinear diagramming of words, ideas, or topics around a main concept. This was popularized by Tony Buzan, who reportedly developed the concept because he studied the notebooks of Leonardo da Vinci.

Modern Project Management (MPM). A term used to distinguish the current broad range of project management (scope, cost, time, quality, risk, etc.) from narrower, traditional use that focused on cost and time.

Moses Factor: When a group subconsciously follows a charismatic leader and adopts their preferred risk attitude, even when it may contradict the personal preferences of individual group preferences.

Near-Critical Activity. An activity that has low total float.

Network Diagram: Any schematic display of the logical relationships of project activities. Always drawn from left to right to reflect project chronology (like a flow chart). Often referred to as a PERT Chart. Network diagrams should show the critical path of a project. The following information should be shown for each work package: the name or ID, early start date, duration, early finish date, the late start date, slack time, and late finish date. See Unit 4 in this workbook for instructions on how to create network diagrams.

Order of Magnitude Estimate: An initial, broad estimate with a broad accuracy range (the PMBOK defines it as +/-50%, but much of the industry defines it as +75% to -25% accuracy).

Overall Change Control: This is the work of performing the project change management activities. The changes often occur at unexpected time and require time to properly manage and integrate. See section 4.6 of the PMBOK.

Parametric Estimate: An estimating technique that relies on quantifying the project scope through metrics. For example the cost may be based on a set cost per foot, per minute, per unit, etc.

Performance Reporting: This involves collecting and distributing performance information on the project status (often including schedule, budget, quality, risk and team performance information). This often also includes using the status information to forecast the future results. See section 10.3.3.1 of the PMBOK.

PERT Estimate: The practice of basing an estimate on the calculation of three scenarios including a pessimistic scenario (P), most-likely (ML), and optimistic (O) scenario. The formula is generally calculated as (P + 4ML + O)/6.

Preliminary Project Scope Statement: A high-level initial description of the work and/or deliverables that are intended to be included in the new project. This is usually preliminary during the initiation phase and it becomes more well-defined during the planning phase. See the scope planning inputs and outputs in section 4.2 in the PMBOK.

Procurement Audits: The buyers work of inspecting and identifying any weaknesses in the seller's work processes or deliverables. See section 12.5.2.3 of the PMBOK.

Procurement Plan: Determining the approach that will be used for purchasing outside products and services for the project. See section 12.1.3 of the PMBOK.

Product Breakdown Structure (PBS): A hierarchy of deliverable products which are required to be produced on the project. It forms the base document from which the execution strategy and product-based work breakdown structure may be derived. It provides a guide for configuration control documentation.

Product Verification: Evaluating a deliverable at the end of a project or project phase with the intent to assure or confirm that it satisfies the planned intent. This is often done immediately before the formal acceptance. See section 5.4.1 in the PMBOK.

Program: A group of related projects managed in a coordinated way. Programs usually include an element of ongoing work.

Project: A temporary endeavor undertaken to create a unique product, service, or result.

Project Charter: A document issued by senior management that formally authorizes the existence of a project. And it provides the project manager with the authority to apply organizational resources to project activities. See the sample in Unit 3 of this workbook. Read more about charters in the PMBOK section 4.1.2.

Project Contingency: A financial or schedule reserve, or buffer, that is available to the project, but may not have to be used. This reserve is for "known unknowns" (such as an artistic redesign if the client doesn't like the first draft) unlike the management contingency, which is for "unknown unknowns".

Project Cost Management: A subset of project management that includes the processes required to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control.

Project Life Cycle: A collection of generally sequential project phases whose name and number are determined by the control needs of the organization or organizations involved in the project.

Project Management: The application of knowledge, skills, tools and techniques to project activities to meet the project requirements.

Project Plan Approval: The step of having the major project sponsors approve of the project management plan which includes the project scope, planned management processes, and baseline schedule and budget. See section 3.2.2.1 of the PMBOK.

Project Selection Methods: The organizations techniques for selecting which projects get chartered. (Recommended reading: Chapter 2 of the *Project Management Toolbox by Dragan Z. Milosevic*. See recommended reading list shown prior to this glossary.)

Quality Assurance: This involves the work of applying the quality plan, or more specifically to ensure that the project has the necessary quality tools and techniques, performing the quality audits, and analyzing the processes. The results of quality assurance include making improvements to the project deliverables, processes, and/or plan. See section 8.2 of the PMBOK.

Quality Control: Identifying and implementing ways to eliminate unsatisfactory results. This often includes prevention efforts, attribute sampling, identifying the causes of problems, defining acceptable and unacceptable variances, and managing defect repair. See section 8.3 of the PMBOK.

Quality Plan: The work of determining what quality standards will be important to the stakeholders of the project and coming up with plans to satisfy them. (Recommended reading: *Managing Quality – An Integrative Approach*. See recommended reading list shown prior to this glossary.) See section 8.1 in the PMBOK.

Release Team: Acknowledgement and communication that the project team members have completed the required temporary work and that their services will no longer be required for this project. Often this is a point of recognition of the individual team member contributions, appreciation of their efforts, performance reporting, and transition to other activities.

Request Vendor Responses: This is a step when buying products and/or services from vendors/sellers. It is the work of requesting bids and proposals. See section 12.3 of the PMBOK.

Resource Identification: The step of listing the people, equipment, and materials that are expected to be needed for the project. The outcome of resource identification is often a printed Resource Breakdown Structure (RBS).

Responsibility Assignment Matrix (RAM) also often referred to as RACI for Responsible, Accountable, Consulted, and Informed: A table form that relates the project team structure to the areas of work of the project to help ensure that all of the responsibility roles are understood.

Risk Categories: High-level groupings (such as safety, equipment, weather) used for aiding accurate risk identification. Categories should be well defined and should reflect common sources of risk for the industry or application area.

Risk Plan: The process of deciding how to approach and conduct the risk management activities of a project. See section 11.1 of the PMBOK.

Risk Response: The work of developing options and to determine how to enhance opportunities and reduce threats to the project. See section 11.5 of the PMBOK.

Schedule Control: The work of determining the current schedule status, influencing the factors that might affect the schedule, determining when a schedule change has occurred, and managing the schedule changes as they do occur. See section 6.6 of the PMBOK.

Scheduling: Setting the project plan dates for executing project work and achieving project milestones. See section 6.5.2 of the PMBOK.

Scope: The sum of the products and services to be provided as a project.

Scope Control: The work of influencing the factors that create project scope changes and controlling the impact of those changes. This includes noticing when changes are occurring, filtering out changes from inappropriate people, and ensuring that changes that are accepted into the project are beneficial. See section 5.5 of the PMBOK.

Scope Statement: Usually a written document describing the project business purpose, objectives and goals, and scope. It often is begun in the project initiation phase (as a preliminary scope statement) and further evolves with the project planning. It is often similar (at least initially) to the project charter. See Unit 3 for a scope statement worksheet. See section 5.2.3.1 in the PMBOK for more information.

Scope Verification: The work of obtaining formal acceptance of the completed project deliverables. This usually involves some form of inspection. See section 5.4 of the PMBOK.

Scrum: A project approach first described by Hiotaka Takeuchi and Ikujiro Nonaka in their Harvard Business Review Article "The New New Product Development Game" (1986). Today it is one of the widely used agile methods that accepts that the development process is unpredictable. The term is borrowed from the game of rugby.

Select Vendors: This is the work of evaluating vendors/sellers ability to provide the requested products and/or services. Specifically, this relates to the final decision and negotiation involved with coming to the purchasing agreement contract.

Sink Point: A point in a network diagram where multiple tasks converge into one. This usually is a high-risk time for the project schedule. This is a time when the project manager should focus on quality and project control.

Soft project: A project that is intended to bring about change and does not have a physical product.

Solicit Stakeholder Input: The step of gathering input from various project stakeholders is often done during the project planning phase. This may take the form of interviews, surveys, or other information gathering techniques.

Stakeholder Analysis: The step of identifying and considering the interests of the various potential project customers and other individuals and organizations who will potentially be affected by your project. It is recommended that stakeholder analysis is done during the initiation phase. Actually, soliciting the input of stakeholders often occurs slightly later, during the project planning phase. See Unit 3 in this workbook for further information and a stakeholder identification brainstorming sheet. See section 2.2 in the PMBOK for an excellent business case for doing stakeholder analysis.

Statement of Work (SOW): A narrative description of products or services to be supplied under contract.

Sunk costs: Past costs in a project that can never be recovered. It is strongly suggested that sunk costs should not be considered a factor in deciding whether to terminate a project or allow it to continue to the next phase.

Time and Cost Estimating: Making decisions regarding the duration of work or the financial resources required for a project (or individual tasks in a project) based on the best available information. This is required for schedule and budget creation. It is usually done during the planning phase, and refined during the control and monitoring phase. For more information see the Kerzner text, chapter 14 on Pricing and Estimating (listed in the recommended reading list). Also see section 6.4 in the PMBOK.

Time Box: A set time in which an activity, task, iteration, or other effort must be completed. Used in agile software development methods to fix the amount of time devoted to developing a particular iteration. Once the time box is closed, work stops and whatever was developed is used for the next step in the process. Sometimes called "time boxing".

Tornado Diagrams: A type of bar chart where the bars are sorted from widest on top down to smallest. They are useful for comparing the importance of variables. The PMBOK references tornado diagrams on p. 298 as a tool for sensitivity analysis associated with "*Quantitative Risk Analysis and Modeling Techniques*".

True-Up: To make balanced or to integrate plans. Used in project and program management as an expression meaning to bring into alignment with plans and processes.

Update Records: Documenting the final information pertaining to the acceptance documentation, project files, closure documents, and lessons learned. This often includes the completion of any needed compliance documentation. See section 4.7.3.4 of the PMBOK.

Work Breakdown Structure (WBS): The WBS is an outline of the work that is to be done to complete the project. It is a way to organize the project, it is the basis from which the project is controlled, and it ensures that the plan is complete. See the *Project Management Institute Practice Standard for Work Breakdown Structures* in the recommended reading list shown in this workbook (located immediately before this glossary).

WBS Dictionary: Work-package working instructions for the assigned party. This usually includes the time and budget allocated for this work.

Workload Leveling: The process of fitting the planned work into the availability of the resources assigned in a way that evens out the ups and downs of work performed and accommodates for the prior commitments of the team members. This generally has the effect of lengthening the project schedule and making it more realistic than a non-workload leveled schedule.

Work Package: A deliverable at the lowest level of the Work Breakdown Structure, when that deliverable may be assigned to another person.

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