



Project Management Tools and Techniques

An Introductory Course in Project management Foundations

Training to capstone faculty by Skill Right Sponsored by Texas Instruments, Inc. Minor modifications by Nayda Santiago



What Is Project Management?

"Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations."

Source: Project Management Institute





Benefits of Project Management

- Enables completion of projects in the shortest time possible while balancing cost and quality
- Enhances staffing flexibility and can help accomplish more work with fewer resources
- Provides timely information to multiple levels of the organization in consistent formats
- Enhances decision making based on facts and project information
- Enhances ability to achieve business objectives and goals

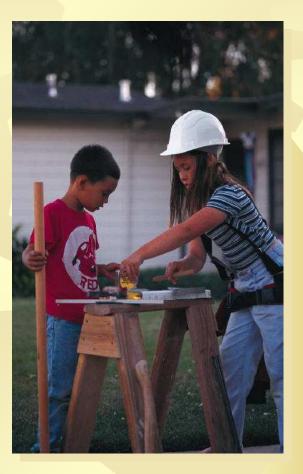




What Is a Project?

"A project is a temporary endeavor undertaken to create a unique product or service."

Source: PMI







Project Characteristics

- Has a goal/meets a need
- Is a set of related activities that are nonrecurring
- Has a definite beginning and end
- Has clearly defined goals and deliverables
- Consumes resources
- Needs to be managed





Project Manager

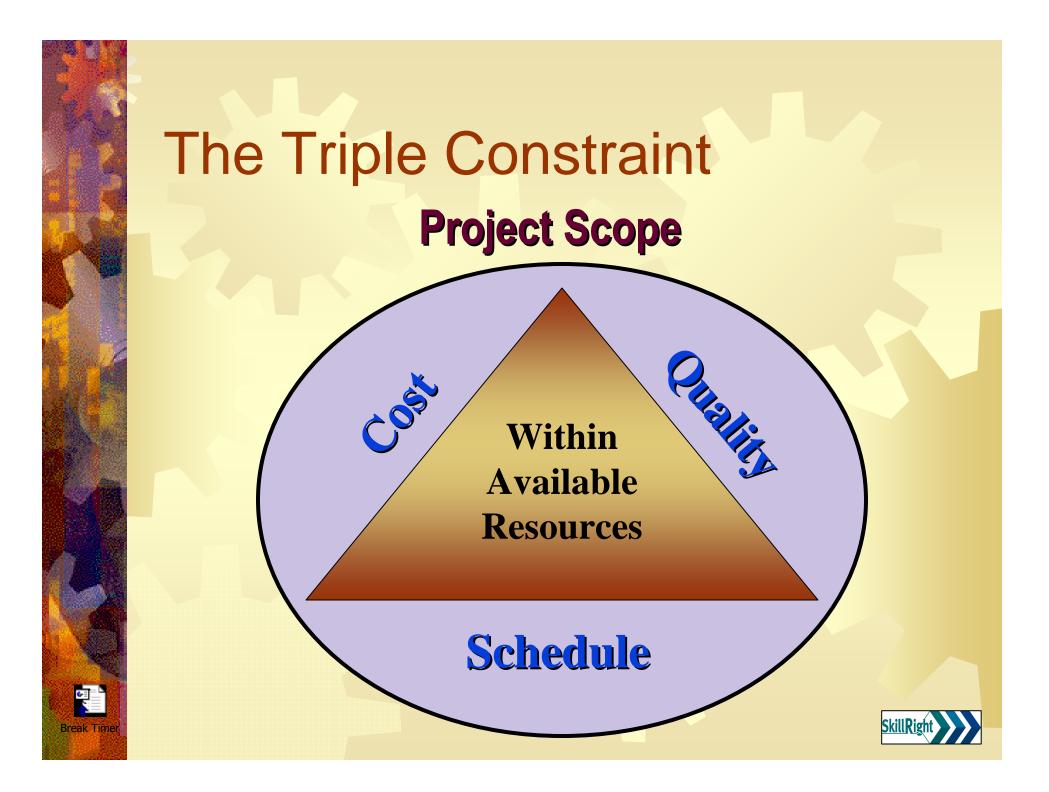
"The person who is responsible for the project and will be held accountable for its success or failure."



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Break Time





Balancing the "Project Success Triangle"

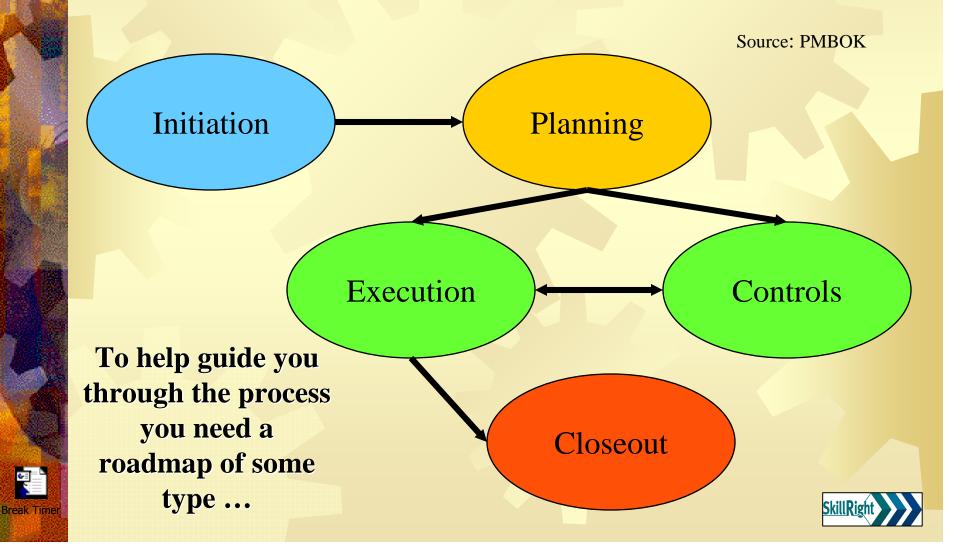
A clear understanding of customer priorities
"People" skills
Thorough planning
An organized, structured process

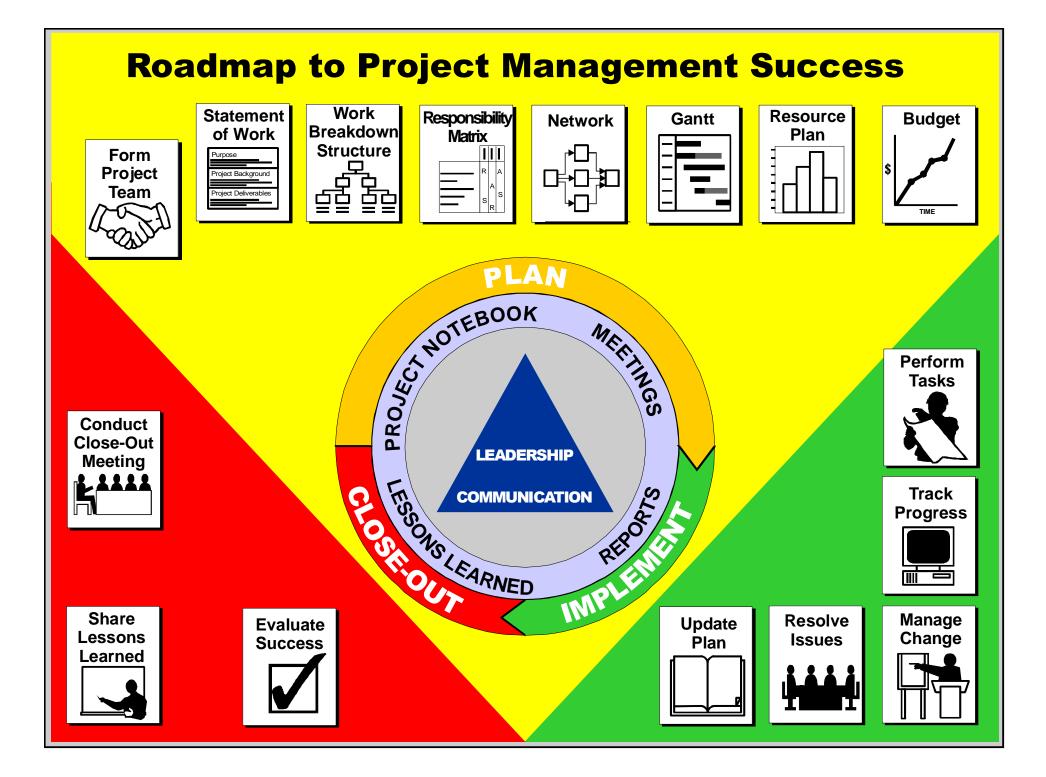






Project Management Process

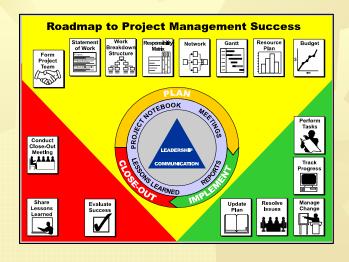






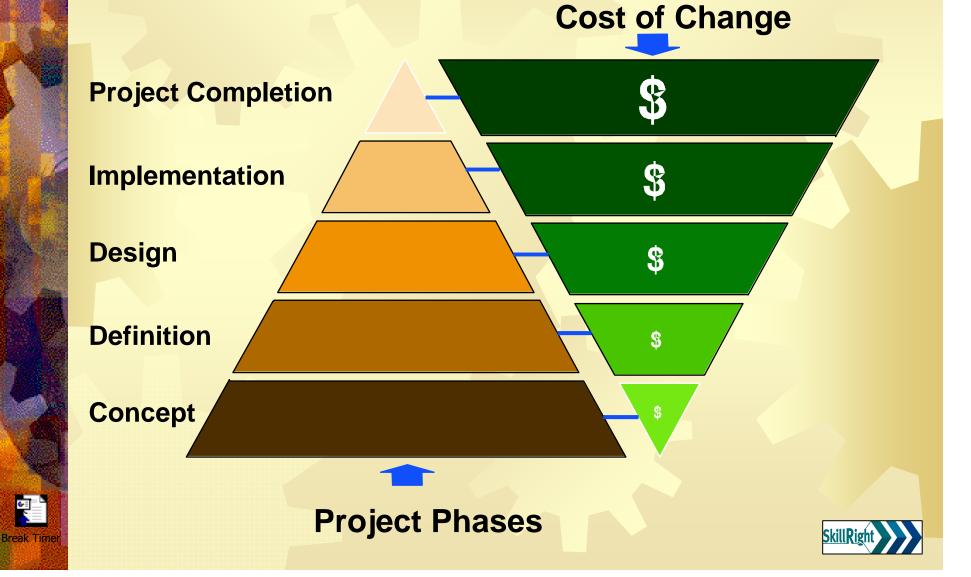
Goals of the Project Management Roadmap

Meet customer expectations.
Work within organizational constraints.
Continuously improve the process.
Control the cost of *Change*





The Cost of Change



Project Stakeholders

What is a project stakeholder?
 If you can gain or lose from the success or failure of a project, you have a "stake" in the project.







Key Project Stakeholders

Customer/client
Project sponsor
Project manager
Project team







Project Manager

- Define and manage customer expectations.
- Coordinate development of the project plan.
- Monitor and control project work according to the approved plan.
- Communicate project status by preparing status reports and conducting progress review meetings.

- Establish and follow a change management process.
- Lead the project team and resolve conflicts between team members.
- Maintain the project notebook.
- Conducting project close-out activities.





Project Manager Skills

- Leadership
- Communications
- Organizing
- Negotiating
- Managing conflict
- Motivating
- Controlling

- Team building
- Planning
- Directing
- Problem solving
- Coaching
- Delegating
- Supporting

The skill set for a good general manager!!



Project Team Members

- Identify work tasks
- Estimate the duration of work tasks
- Help prepare the project network diagram
- Honestly report work status
- Keep the project manager informed on project issues

- Attend scheduled progress review meetings
- Raise issues important to the project's success
- Keep their functional managers updated
- Participate in the project close-out







Break Timer

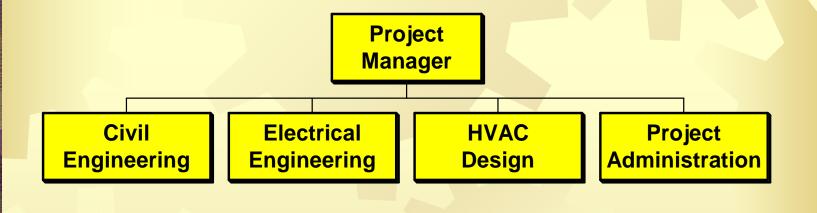




Team selection and the strength of the team depends on the company's type of Project Organization!

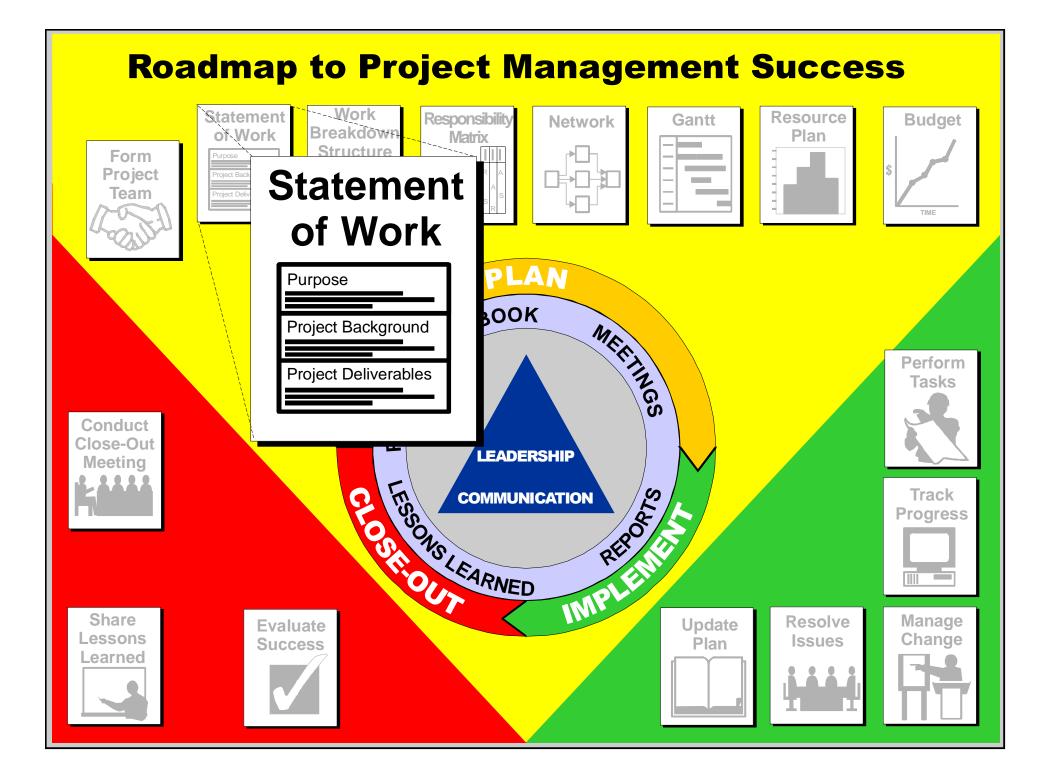


Organizational Breakdown Structure (OBS)



Break Timer





Why Plan?

"The nicest thing about not planning is that failure comes as a complete surprise and is not preceded by a period of worry and depression."

John Preston, Boston College



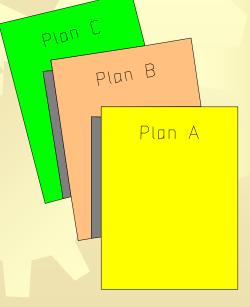


Project Plan Contents

- Statement of work
 (SOW)
- Work breakdown structures (WBS)
- Responsibility assignment matrices
- Project schedule
- Resource plans/histograms
- Budget

Break Time

- Risk management plan
- Communications plan
- Quality plan
- Verification and validation plan





Project Plan Benefits

- Provides an effective communication tool to ensure understanding of project goals and the means to achieve them
- Defines outcomes and commitments
- Establishes guidelines and standards
- Establishes the baseline for evaluating and reporting progress
- Forms the basis for scope control and change management





Project Notebook

- Project Pre-plan
 - Background information
 - Customer data
 - Third-party data (vendors, suppliers, etc.)
- Project Plan
 - Statement of Work (SOW)
 - Work Breakdown Structure (WBS)
 - Organization/responsibility charts
 - Schedule data
 - Budget/capital plan
 - Risk management
- Project Implementation
 - Meetings (agenda/minutes)
 - Team/management/customer/third party progress reports
 - Customer change requests/decision matrix issue resolution forms/reports

- Project Close-out
 - Final evaluation of measurable success indicators
 - Close-out meeting (agenda/minutes)
 - Final project report
 - Reference letters
 - Lessons learned
- Project Administration
 - Contractual documents
 - Invoices
 - Expenses
 - Correspondence
 - Contact log





Statement of Work — Purpose

Define the scope of the project
Establish customer expectations
Serve as a "contract" if necessary





A Good SOW will answer ...

- What is the purpose or goal of the project?
- Why is the project being done?
- Who is the initial customer?
- Who is the end user or final customer?
- What are the customer deliverables?
- What technical support is required for the deliverables?





And continue to answer ...

What is the budget?
What is the final date for the deliverables?

- What are the measurable success indicators (metrics)?
- What kind of support is required from the customer?

What contingency plans are in place?





SOW — Generic Contents

- Customer
- Project
- Title
- Purpose
- Background
- Deliverables
- Measurable success indicators
- Customer support
- Risk plans

Break Time





Statement of Work - Page 1

STATEMENT OF WORK

Form completion date

Contributors

Date:

People who helped write the statement of work

Person or organization requesting the work Person or organization who will Final End User: use the results of the project

PROJECT TITLE:

The project title should be a short, concise statement that defines the project.

PURPOSE:

The purpose of the project is the goal; why you are doing the project. This should be clearly stated.





PROJECT BACKGROUND:

The project background should contain information pertaining to the history of the project. It also includes a statement that justifies the project.

- For a first draft, brief statements are acceptable. Formal statements of work are usually in paragraph form.
- Supply information that explains the philosophy behind the project. Also describe what makes the project unique/special.
- This information can be used later to:
 - Leverage resources
- Accommodate management directives
- Gain support from external organizations/departments
- Accommodate changes

Many of the statements made in the background section must be substantiated in the measurable success indicators section of the statement of work.

The project background includes the following key elements:

- History
- Justification

- Consequences
- Uniqueness of project

Some examples on the type of information to include in the project background section include:

- Meet safety requirements
- Support business plan
- Meet quality requirements
- Meet customer expectations
- Improve performance/efficiency



DELIVERABLES:

Deliverables are the outputs of the project. They are what is promised to the customer.

- Deliverables are written as nouns. They are things.
- Quantities must be identified in this section.
- Include the major elements of the deliverables.

It is important to be very clear in the deliverables section. Misinterpretation of project deliverables can establish incorrect customer expectations.

The following are examples of deliverables:

- Parts
- Prototypes
- Procedures
- Equipment
- Installation of equipment
- Written reports

- Test results
- Training
- Specifications
- Technical drawings
- Plans





STATEMENT OF WORK (Page 2)

MEASURABLE SUCCESS INDICATORS:

Measurable success indicators include concise, measurable, information that will be used to determine if a project was successful. Measurable success indicators must substantiate any statements made in the background section.

Include what is known about quality, cost, and schedule expectations.

Examples of measurable success indicators include:

- Complete project in three months
- Reduce mass by 30%
- Complete ROI for initial expenditure by Nov. 30, 20xx
- Achieved \$1.00 reduction in piece cost
- Demonstrate meeting of EPA Standard # xxxx
- New process will require two fewer operators
- Stay within budget of \$275,000.00



Two specific measurable success indicators which are most important in terms of seeing the "big picture" of a project are:

- Overall schedule
- Budget

It's also important to note any key milestone dates that have been established. "SMART" is an acronym used to help write good measurable success indicators for a project. The words which comprise the acronym SMART are:

Specific

Break Time

- Measurable
- Aareed upon

- Realistic
- Time (cost) framed

Smart Measurable Success Indicators (SMART)

- **S** Specific
- M Measurable
- A Agreed upon
- **R** Realistic
- **T** Time and cost framed





CUSTOMER SUPPORT:

The customer support area provides a means to list the items and services that must be provided by the customer/sponsor to ensure the success of the project. Examples include:

- Drawings
- Subject matter experts
- Equipment

- Computer time
- Photocopying
- Phone/secretarial support

PROJECT RISK PLANS:

The last section of the statement of work is the risk plan. Risk plans consider the possibility of an event occurring that would drastically alter the schedule, budget, or quality of the project.

- Identify what is likely to go wrong, and also what can have the most impact.
- Ask "What can go wrong?" "How will I handle it?"
- Put your statements in "If _____, then _____." format

Examples of risk plans are:

- If a labor strike occurs, then outsource production.
- If supplier cannot ship materials in time, then contact another vendor.
- If design freeze date is not maintained, then use current product design.





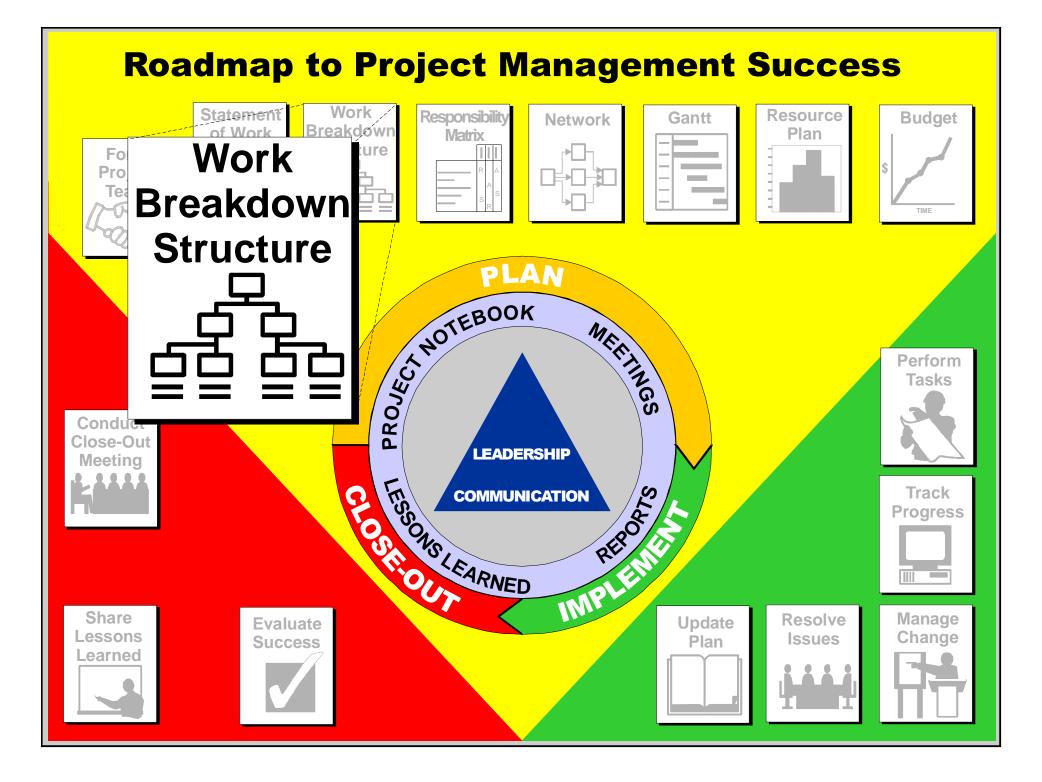
Exercise

Prepare a Statement of Work









Work Breakdown Structure— Purpose

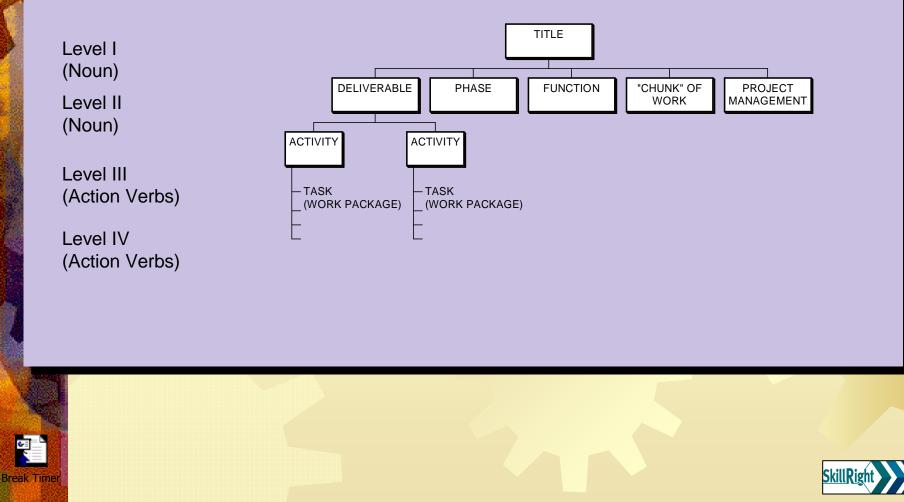
- Identify all of the work that needs to be done to complete the project.
- Structure the work into logical components and subcomponents.
- Define the work to a level of detail so individual responsibilities can be assigned.
- Summarize and report project data.





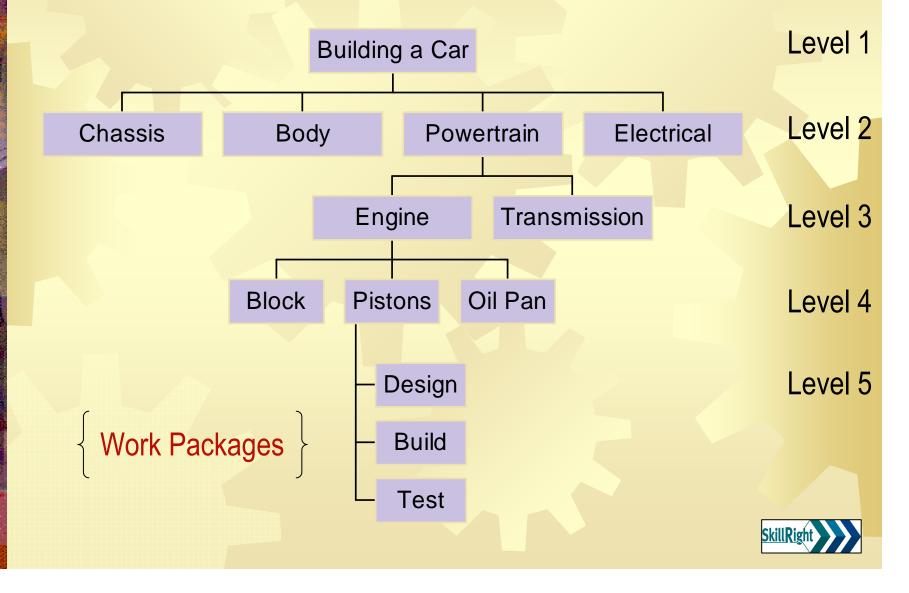


Representative Work Breakdown Structure



Automotive WBS

Break Timer





WBS Work Package – Level of Detail

- **WHO** will be the responsible individual or organization?
- How much TIME will the activity take?
- What COST is associated with accomplishing the activity?
- Can PROGRESS be tracked easily?



WBS — Outlining Approach ³⁻⁴⁻¹

Level 3

Level 3

I. Main Project Deliverable ----- Level 1

- A. Major Element ----- Level 2
 - 1. Activity
 - 2. Activity
 - a. task ····.
 - b. task
 c. task
 - 3. Activity Level 3
- B. Major Element Level 2
 - 1. Activity ·····
 - 2. Activity

The outline approach is used by Microsoft[®] Project[®]





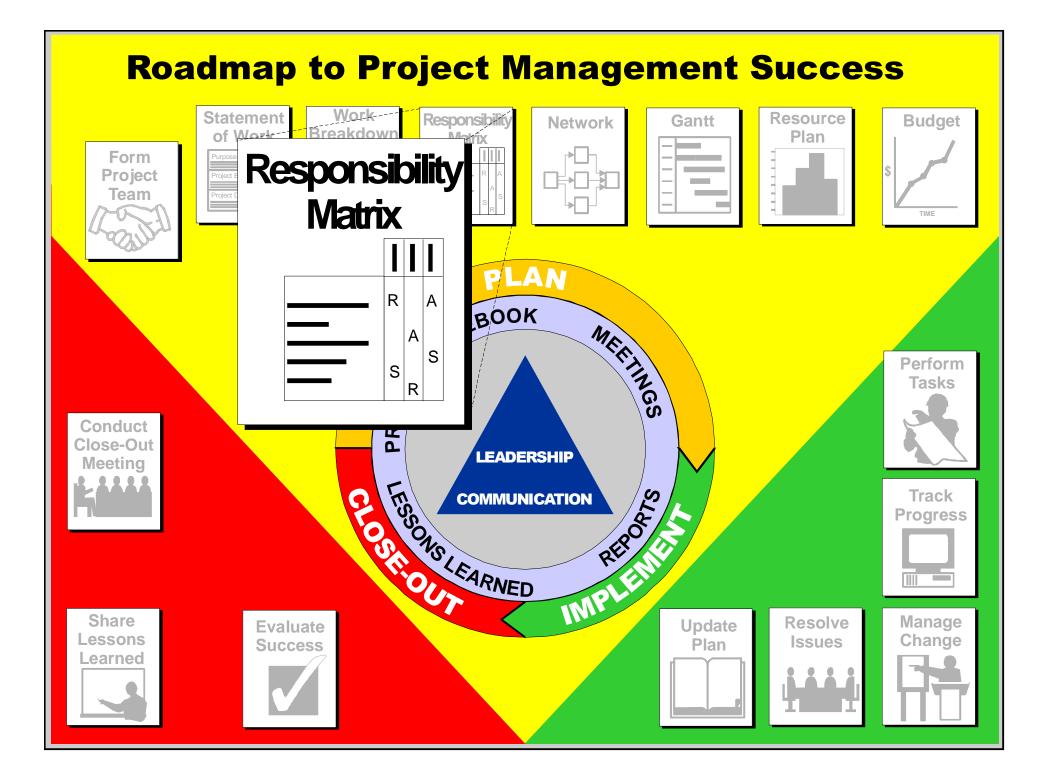
Exercise

Create a WBS









Responsibility Assignment Matrix (RAM) — Purpose

- Ensure that all tasks are assigned to people
- Show levels of involvement of people to work





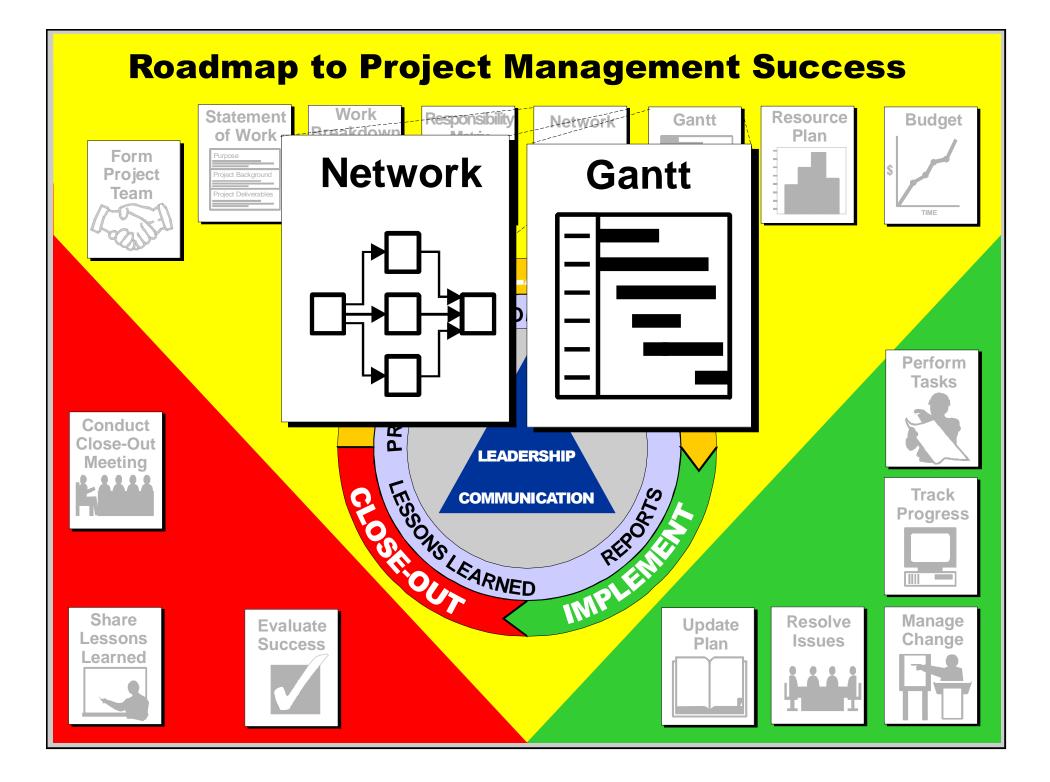
() 数、数、3.4	Responsibility Assignment Matrix									
R	ASIC Method	PROJECT MANAGER	CUSTOMER	TEAM MEMBER	SENIOR MANAGEMENT	SUPPORT STAFF				
	MARKETING STUDY	PRC	cus	TEAM MEMB	SEI MA	SUI ST/				
	IDENTIFY POTENTIAL MARKET	С		S	R					
	IDENTIFY SURVEY POPULATION	С	R	S	I					
	DEVELOP SURVEY	R	Т	S	I					
	TEST SURVEY ON SAMPLE	R	T	S		S				
	FINALIZE SURVEY	R	A	S	I	S				
	CONDUCT SURVEY	R	I	S	Т	S				
LEGEND R - RESPONSIBLE	COLLECT SURVEY	R	Т	S						
A - APPROVE S - SUPPORT (DOES THE WORK) I - INFORM	ANALYZE DATA			R/S		I				
C - CONSULT	REPORT RESULTS AND SUGGESTION	R	Α	S	Α	S				
Break Timer					Skill	Right				

RASIC Coding System

R = Responsible

- Ensures that the assigned work is completed, responsible for the delivery.
- A = Approve
 - Approves that the work meets all requirements.
- S = Support
 - Does the work. Committed to its completion
- I = Inform
 - Is kept informed of work status, no decision making
- C = Consult
 - Is consulted on the work. Provides input.





Project Schedule — Purpose

- Determine if requested completion date is possible.
- Identify start and completion dates of all work.
- Determine the controlling sequence of activities.

Provide data for resource allocation.

Track progress by providing a baseline.





Scheduling

Step 1: Estimate Activity Durations
Step 2: Determine Activity Sequence By Creating a Network Diagram
Step 3: Calculate the Schedule Using Critical Path Method (CPM) Procedures
Step 4: Show the Schedule by Drawing Gantt and/or Milestone Charts





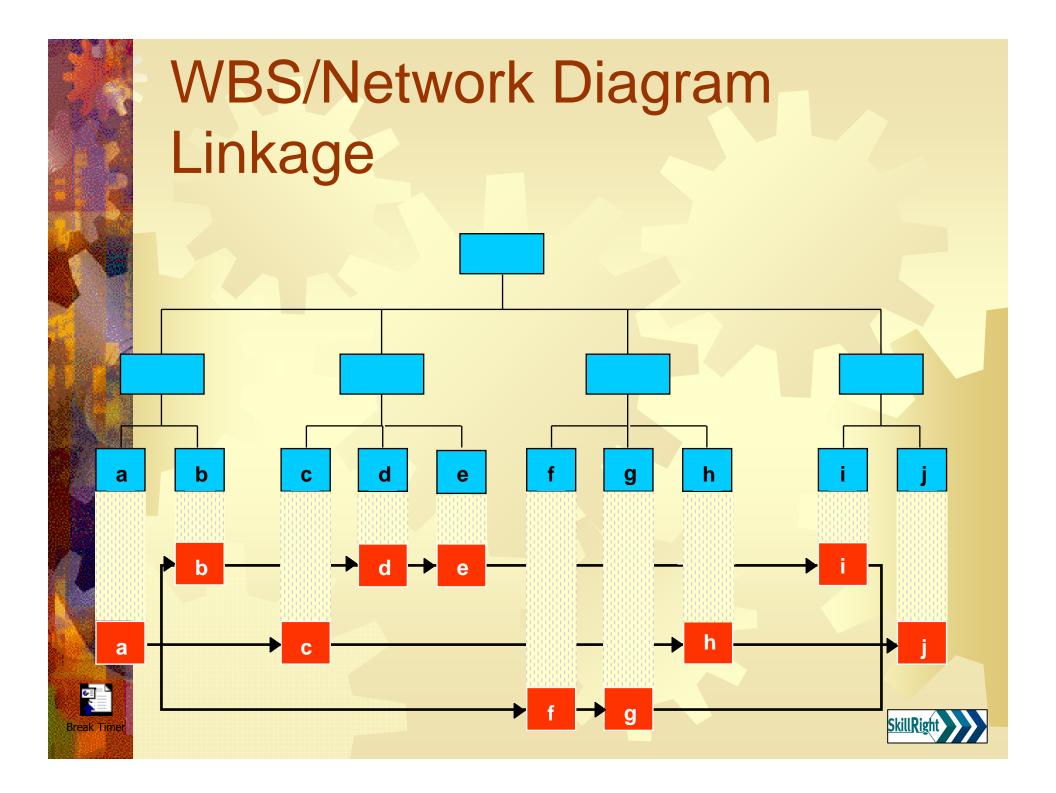
Estimate activity duration

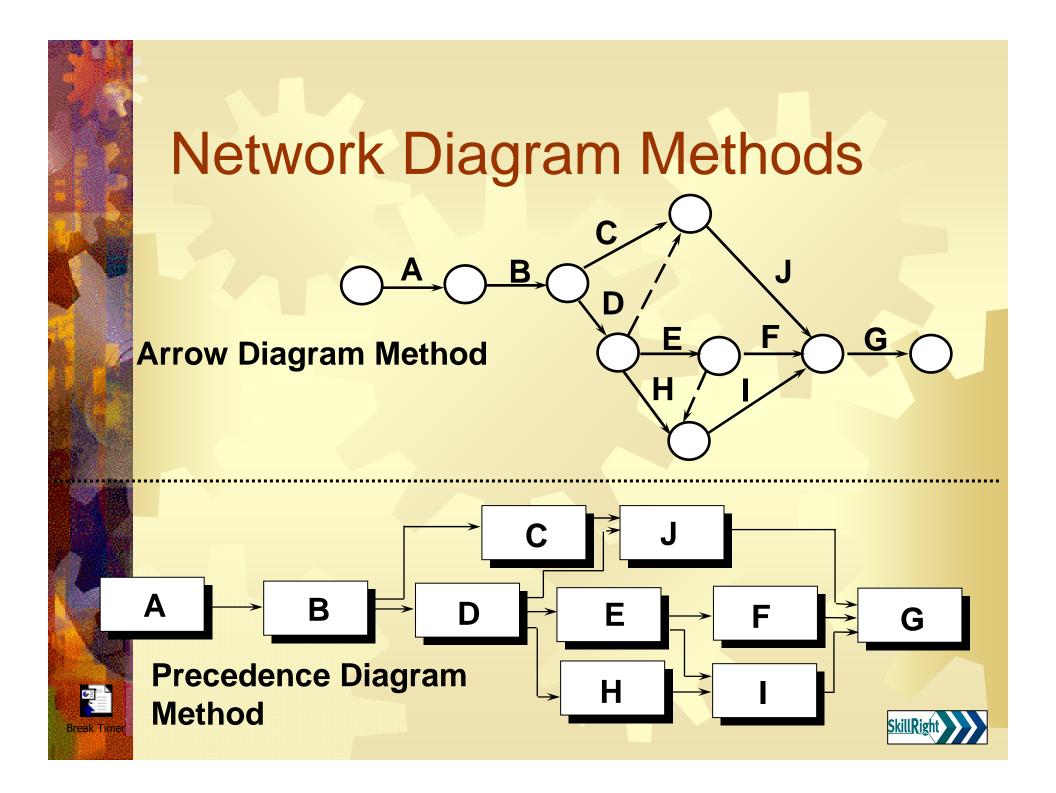
- Expert judgment
 - Individuals who have performed similar activities.
- Analogous estimating
 - Use similar projects to estimate this one.
- Three point estimate (PERT project evaluation and review technique)

estimate = $\frac{\text{pessimistic} + (4 \text{ times realistic}) + \text{optimistic}}{6}$

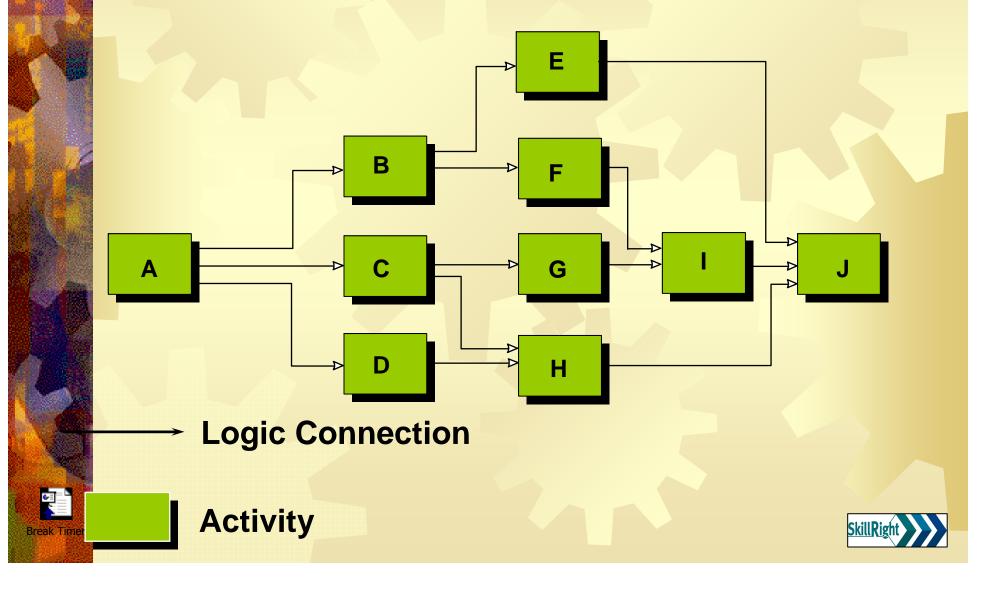








Precedence Diagram Method

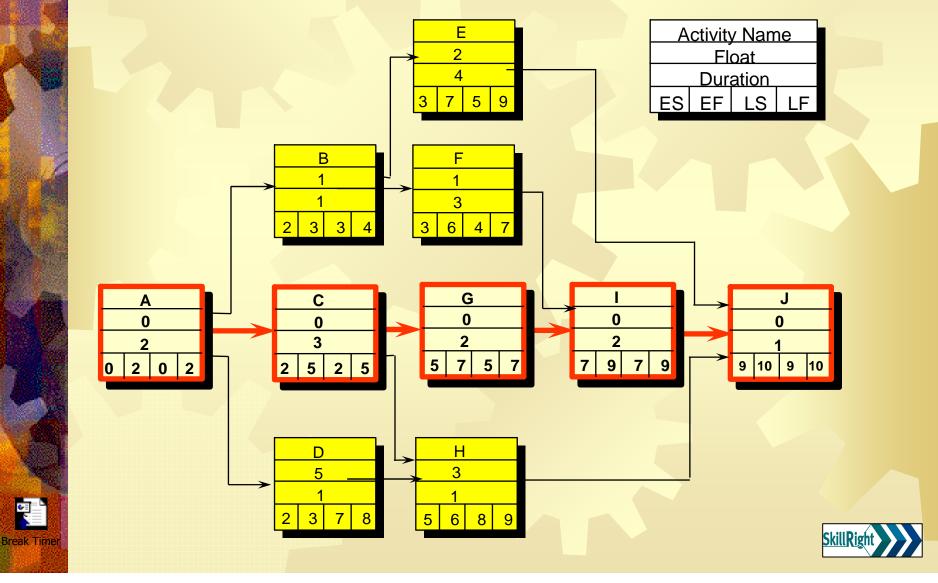


What's is the Critical Path?

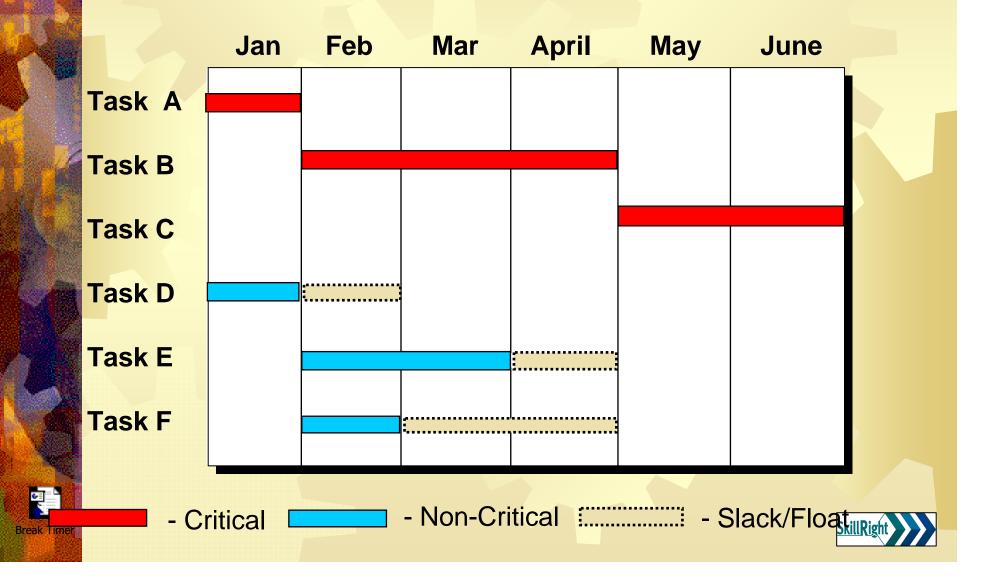
- Path with least slack
- Path with longest duration
- Critical Path Method is a project management technique that analyzes what activities have the least amount of scheduling flexibility (i.e., are the most mission-critical) and then predicts project duration schedule based on the activities that fall along the "critical path."
 - Activities that lie along the critical path cannot be delayed without delaying the finish time for the entire project.



Project X — Critical Path Solution



Enhanced Gantt Chart



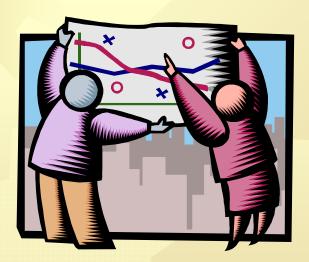


Project X — Gantt Chart Solution

Time		1	2	3	4	5	6	7	8	9	10
Activity	Duration										
A	2										
В	1										
С	3										
D	1										
E	4										
F	3										
G	2										
н	1										
I	2										
J	1										
Break Himer	Critical 🗖] - No	on-Cr	itical	[- Sla	ck/Flo	DatkillRig	

Exercise

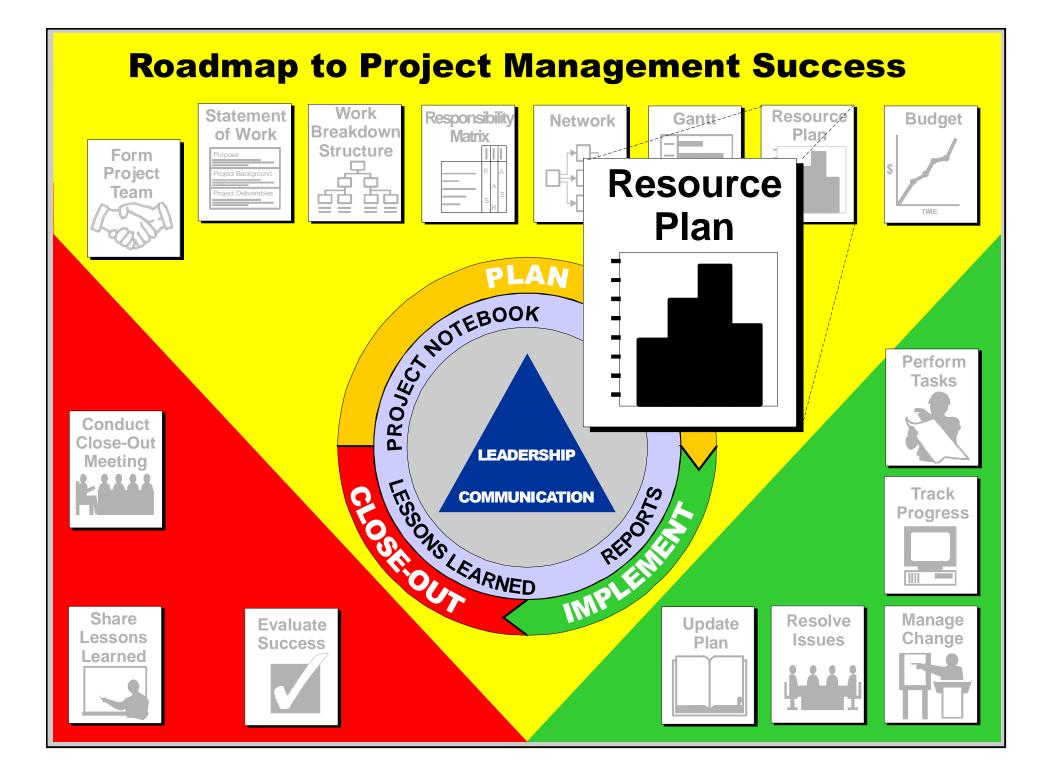
Prepare a project
 schedule for your
 project.



Break Timer

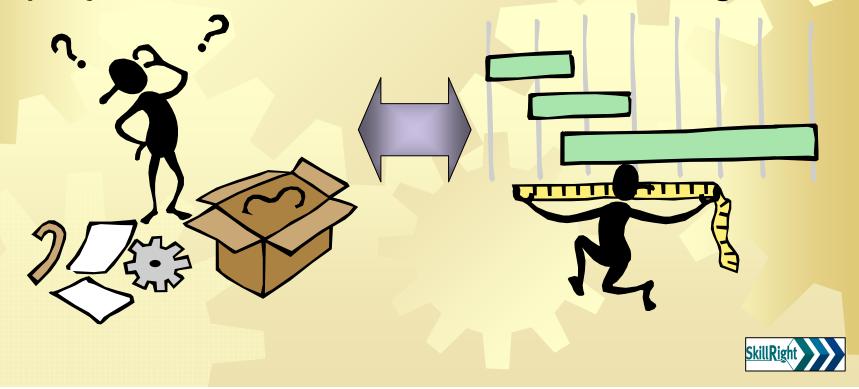






Assigning Resources

A schedule is not complete until all the resources necessary to complete the project have been committed or assigned.



Factors to Consider

Availability of other resources
Depletion of available float time
Impact on critical path
Impact on budget



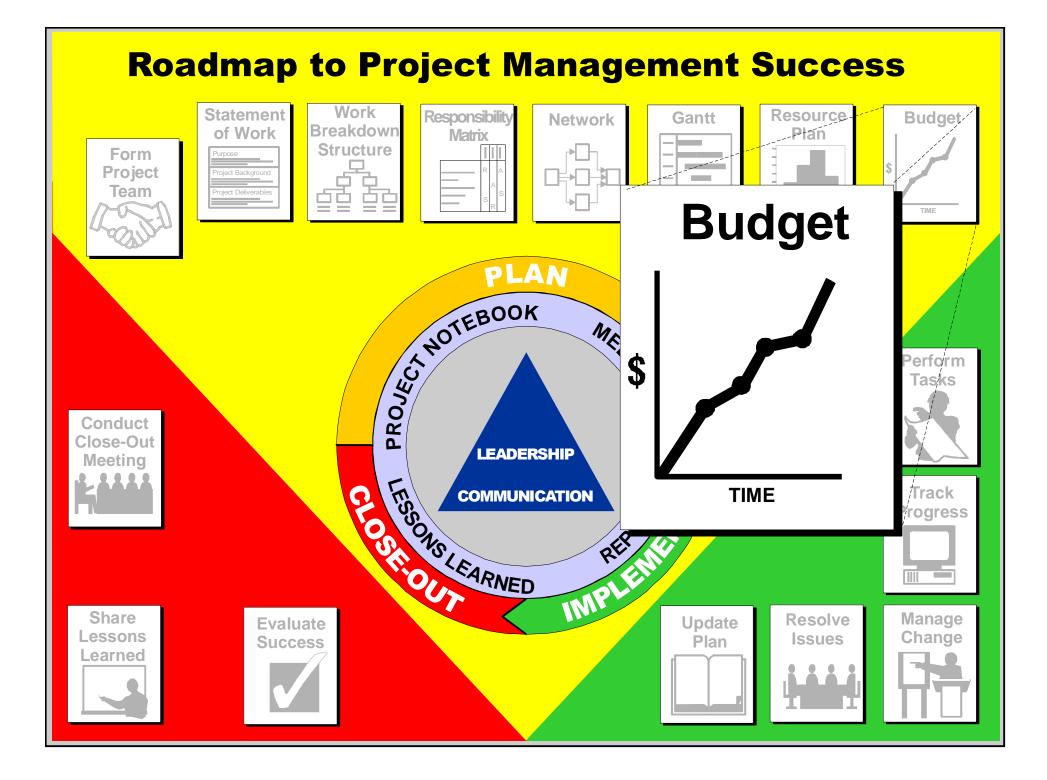
Non-Labor Resources

Lab time
Facilities
Prototype parts/systems
Equipment
Materials



Break Time



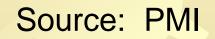


Estimating costs

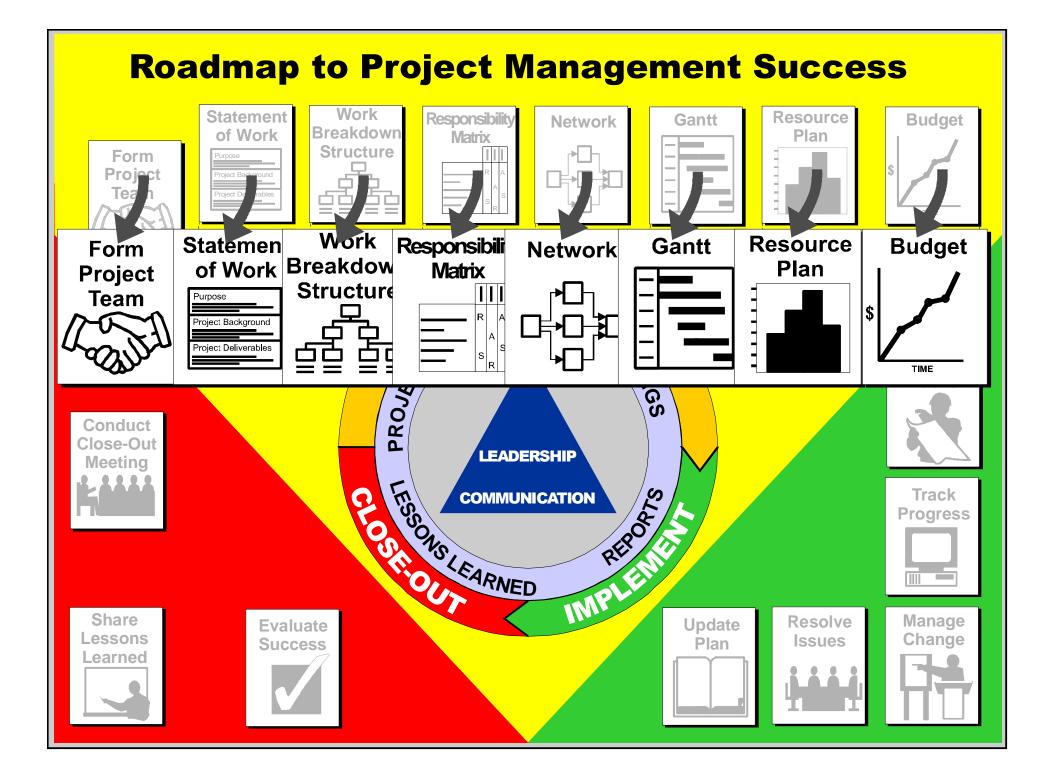
- The costs of a project are derived from the WBS, schedule, resources, and risks.
- Include
 - Labor
 - Equipment-remember S/H
 - Supplies –remember S/H
 - Materials-remember S/H
 - Travel

Break Time

- Training
- > Overhead
- Contingency plan







What Is Risk?

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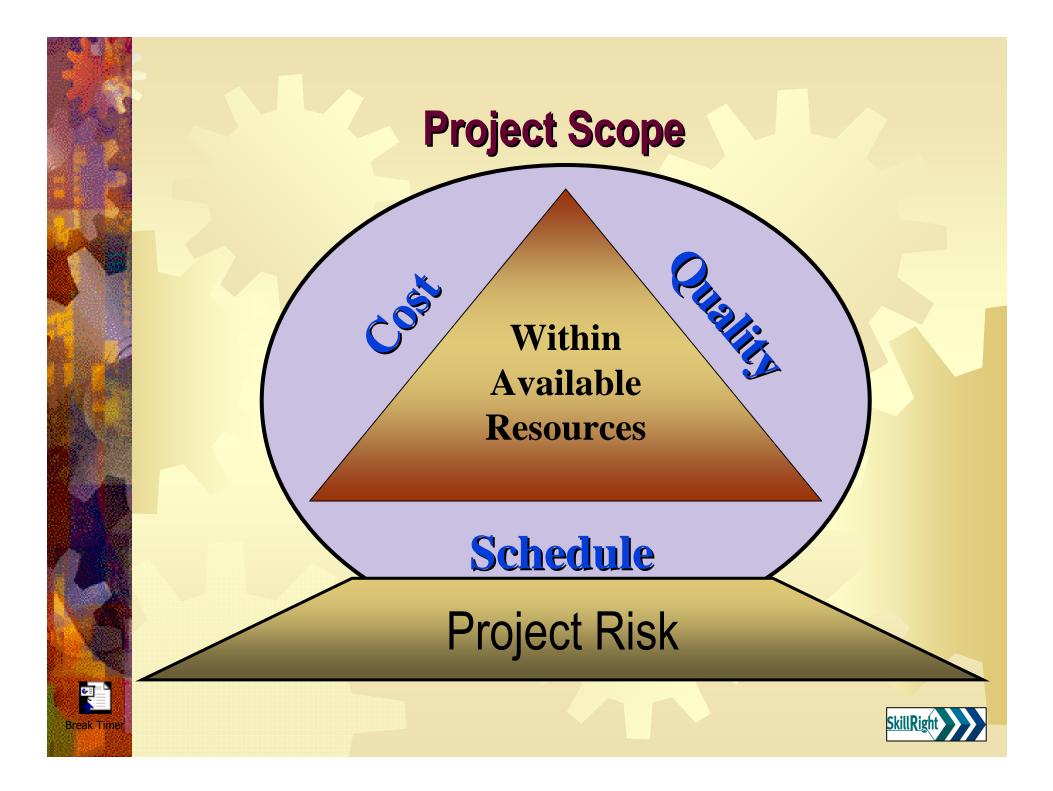
Break Time

Risk can be defined as:

"Any threat to project success."







Risk Management

"Risk Management is the art and science of identifying, analyzing and responding to risk factors throughout the life of the project and in the best interests of its objectives."

Source: PMI



Risk Plan Development



Prioritizing & Planning

Break Timer

Occurrence	100%	PRIORITY 2 RISKS (High Probability) (Low Impact) Reactive Measures		PRIORITY 1 (High Proba (High Imp Proactive and Measure	bility) act) Reactive				
Probability o	0%	PRIORITY 3 (Low Proba (Low Imp Monitor C	bility) act)	PRIORITY 2 (Low Proba (High Imp Reactive Mea	bility) act)				
	Low Medium High								
Negative Impact on Scope/Quality/Cost/Schedule (Risk Event Value)									
						SkillRight			

End of Planning Phase



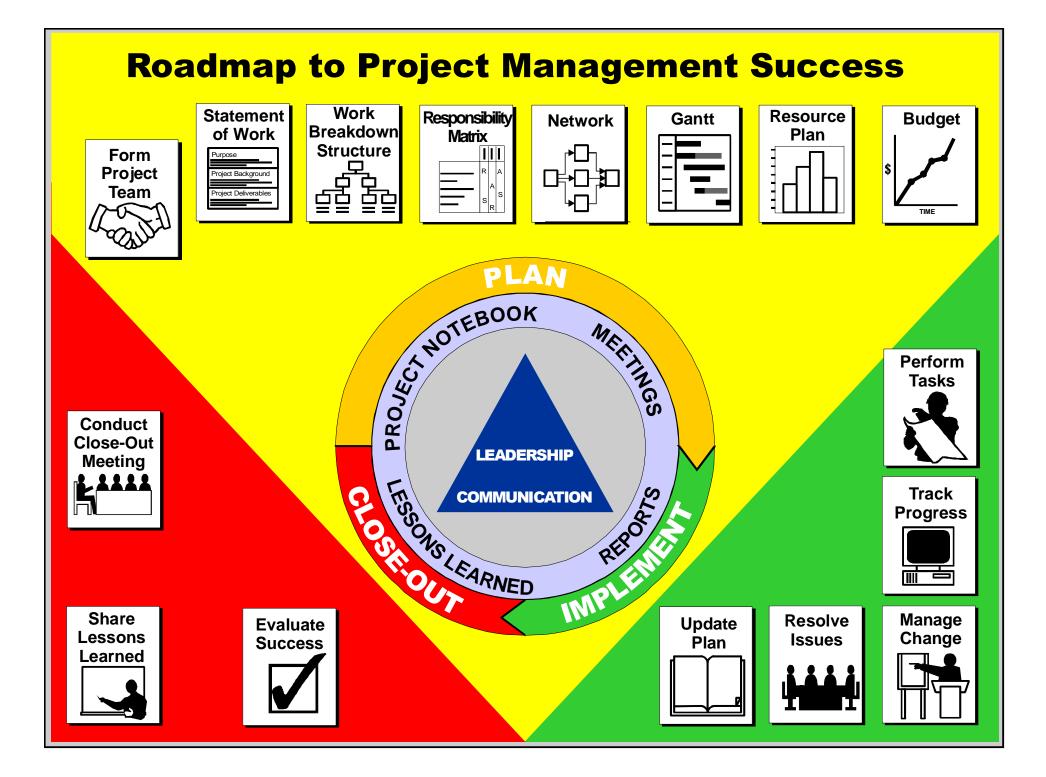




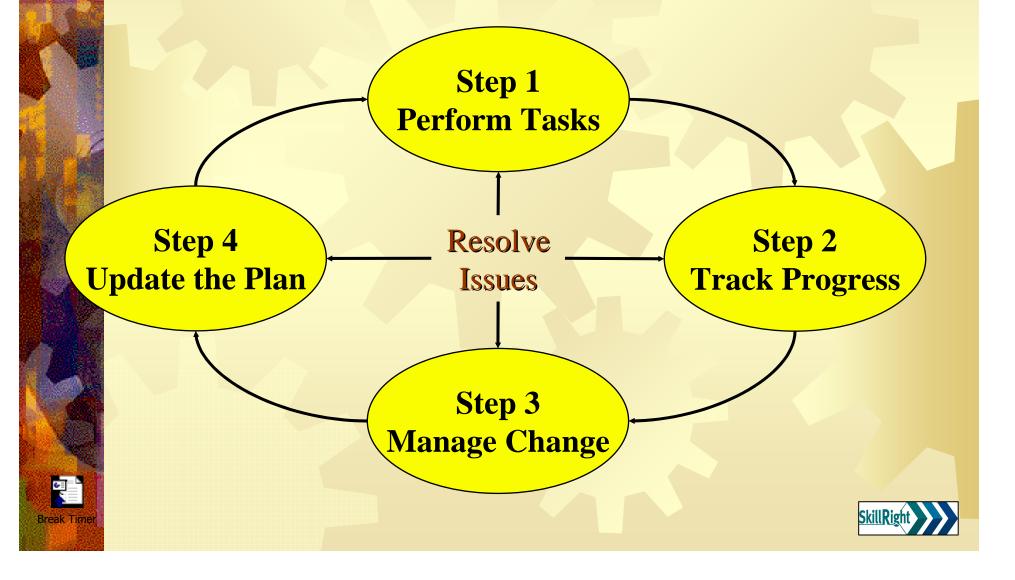
Project Implementation

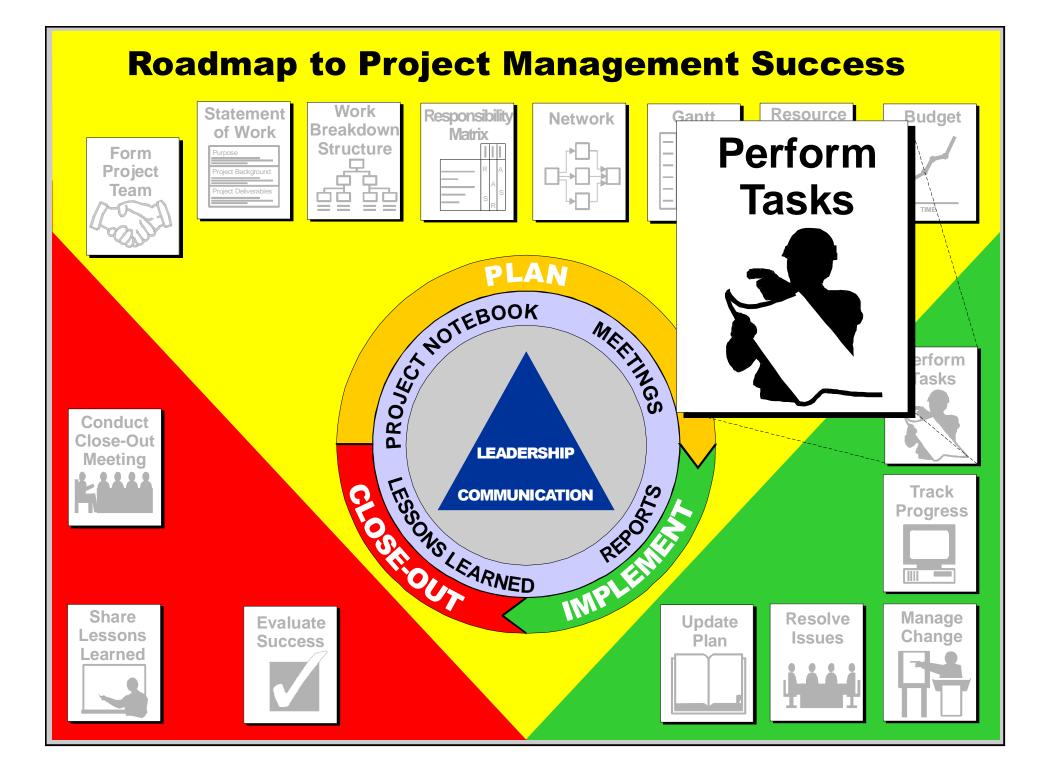






Implementation Model





Reporting Project Progress

Progress review meetingProject reports





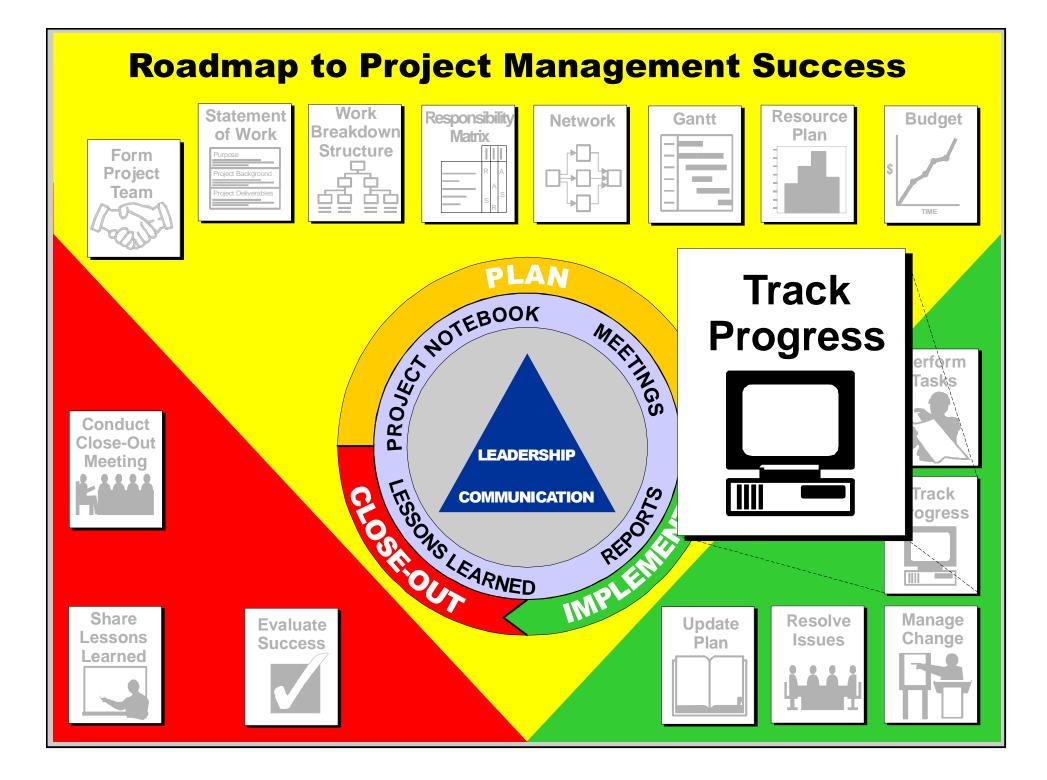


Project Progress Review Meetings

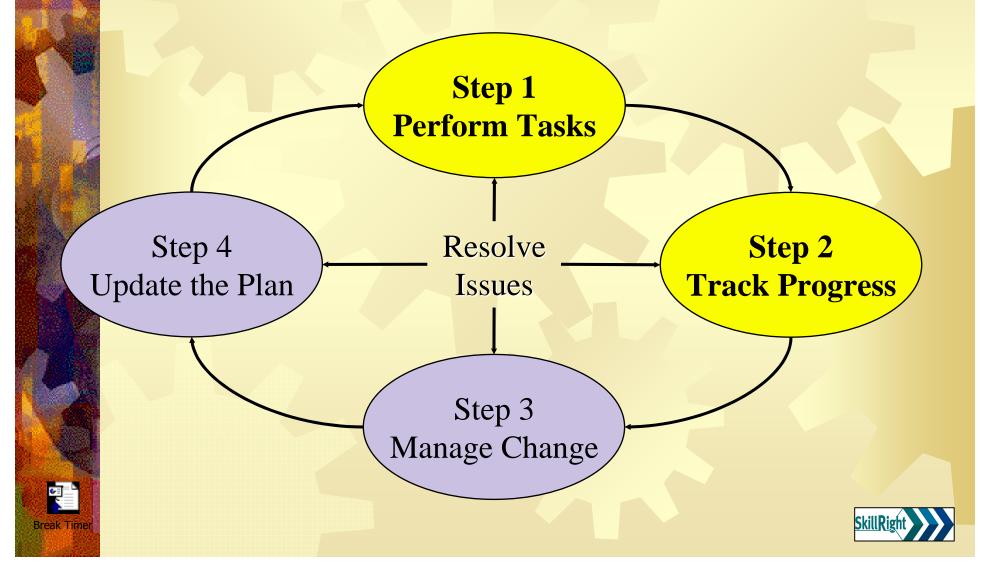
- Review of action items from last meeting
- Update on activities and schedule
- Problem identification and corrective action planned
- Review of issues (closed, open, new)
- Change request status
- Risk status
- Plan for next period







Project Tracking and Control



Compare Progress to Plan

Quality reviews
Gantt schedule performance charts
Cost performance charts

Break Time

Cost Performance

Planned Value	Actual Costs
\$3,000	\$8,000
\$6,000	\$16,000
\$18,000	\$30,000
\$30,000	\$48,000
\$44,000	\$66,000
\$54,000	
\$64,000	
\$80,000	
\$83,000	
\$89,000	
	\$3,000 \$6,000 \$18,000 \$30,000 \$30,000 \$44,000 \$54,000 \$64,000 \$80,000 \$83,000





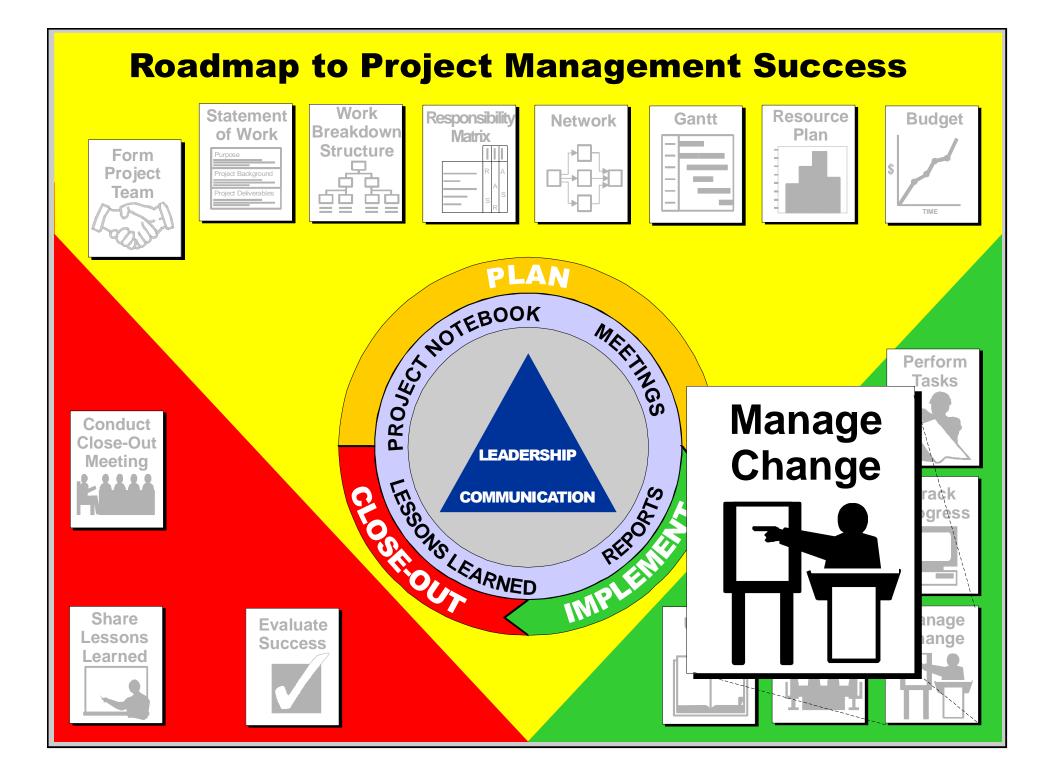
Cost Performance Chart



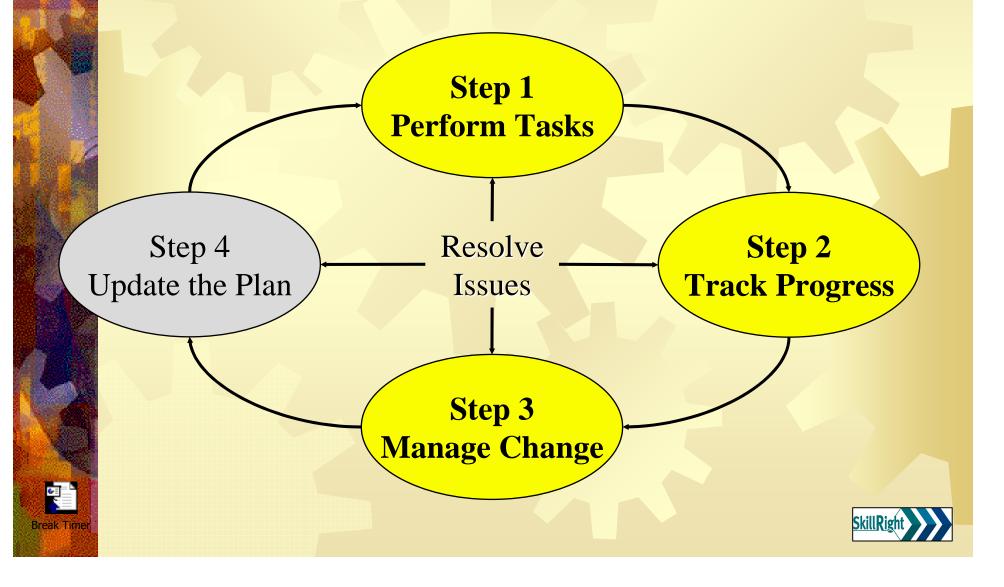
Break Timer

Weeks





Managing Project Change



Categories of Change

Customer requested
Typically the largest source of change
All others

Internal company requests
Government regulation
Team members



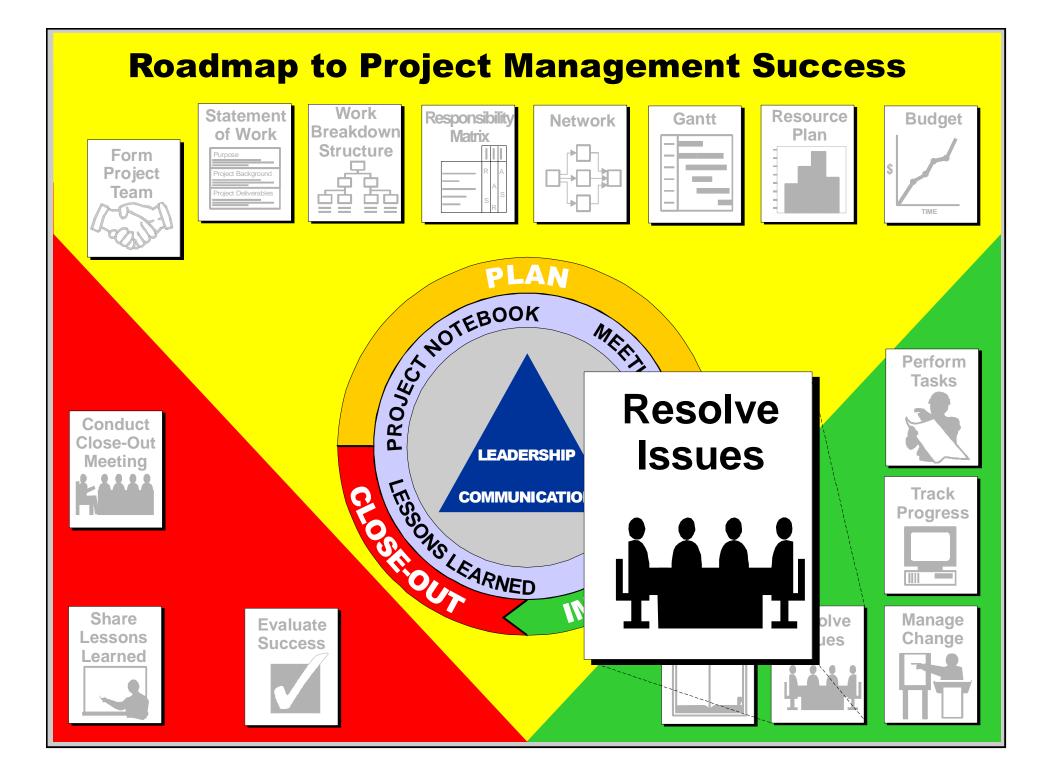


Addressing Project Changes

- Call a team meeting.
- Explain what the change is.
- Obtain feedback from team members.
- Identify alternative corrective options.
- Prepare a decision matrix.
- Select a recommended option(s).
- Present information to upper management/customer.
- Implement the approved course of action.







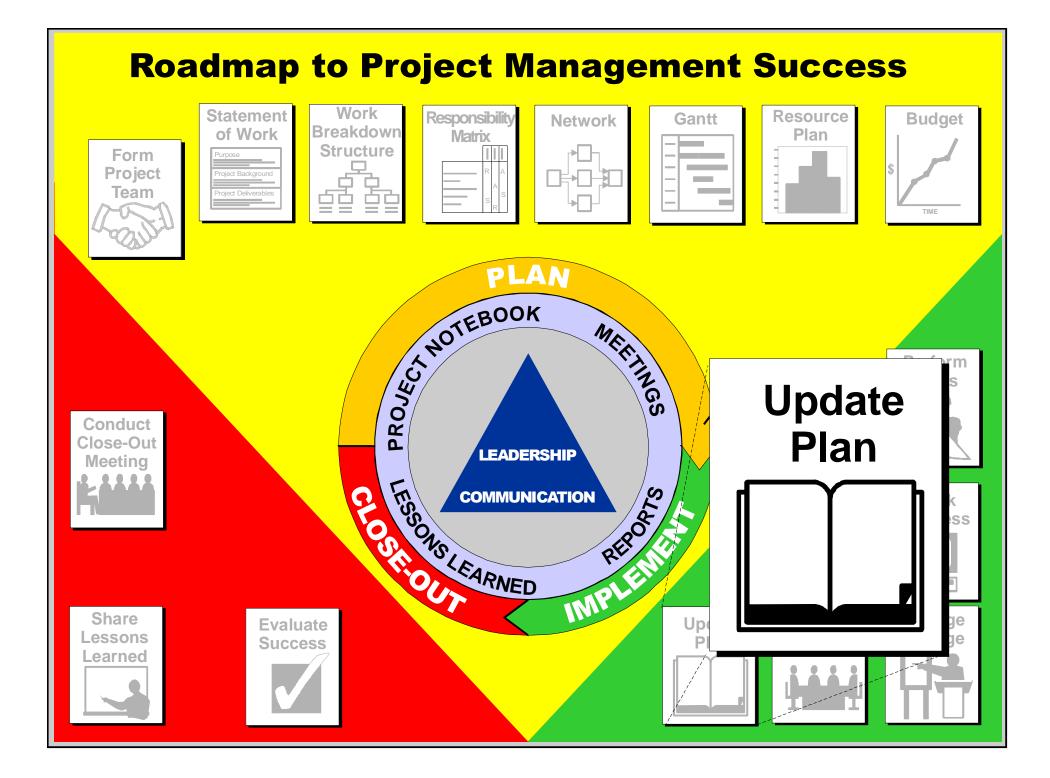
Issue Resolution

- Disagreements that should be ...
 - Documented
 - Assigned
 - Scheduled
 - Tracked
 - Escalated
 - Resolved









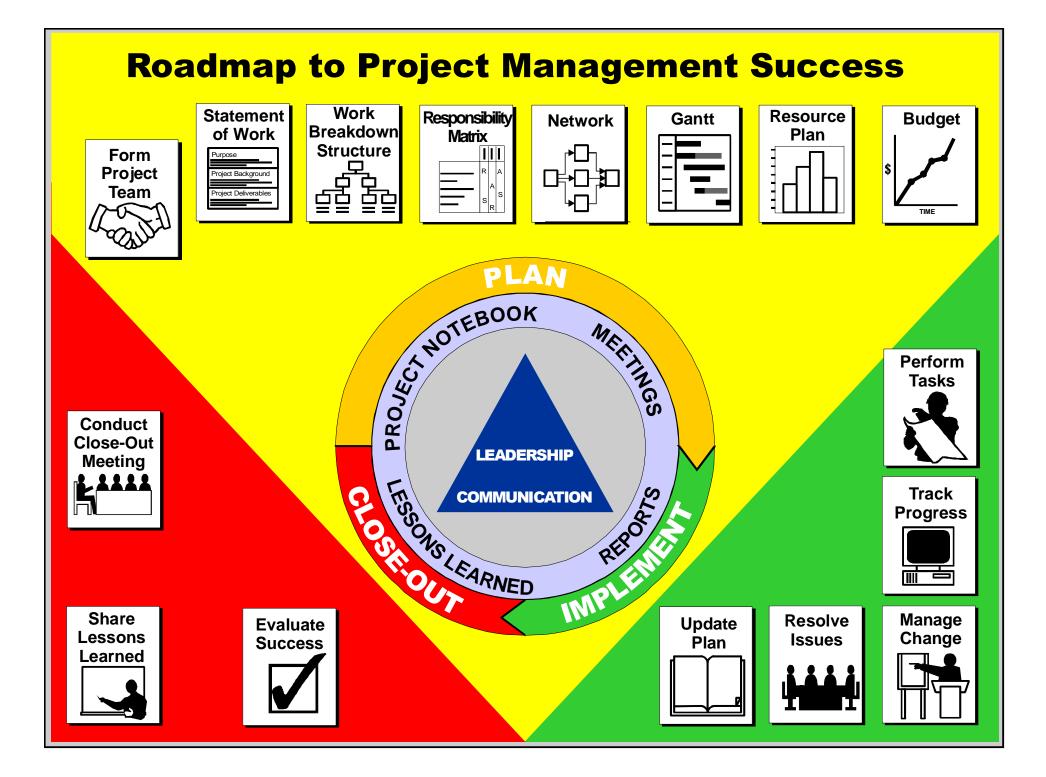




Closeout

Break Timer



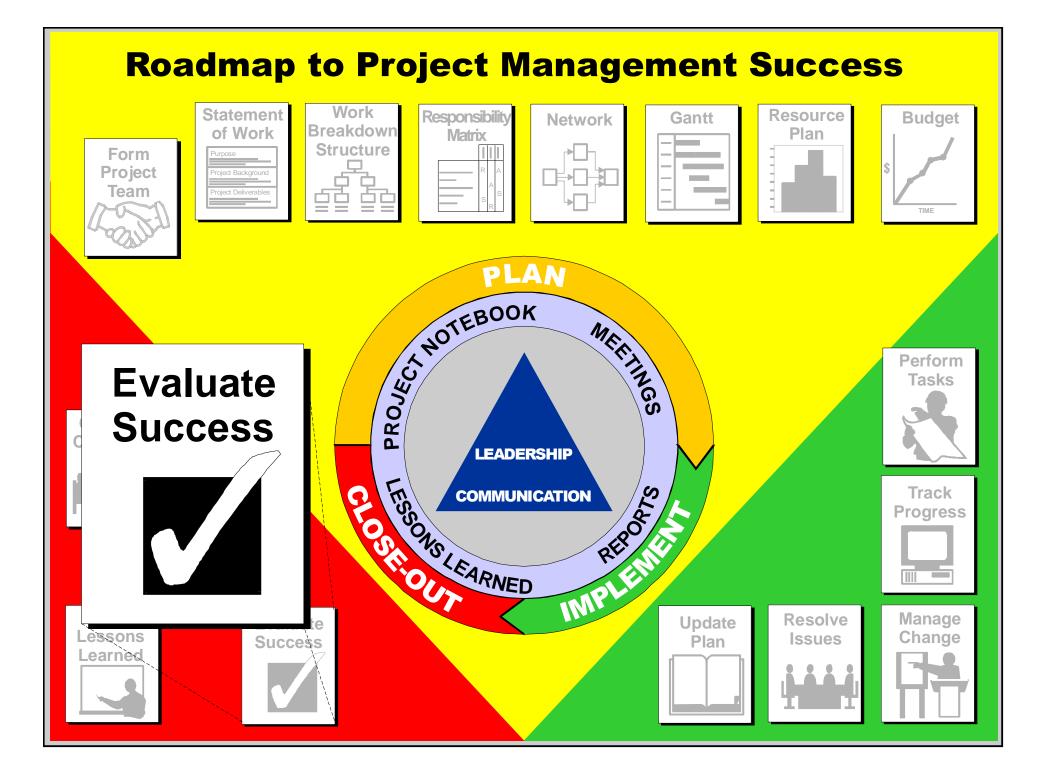


Project Manager's Role During Project Close-Out

- Ensure that all project deliverables have been completed and formally accepted by the customer.
- Determine if the measurable success indicators were achieved.
- Conduct project close-out meetings, both internal and external.
- Write the final project report.
- Document and share lessons learned.





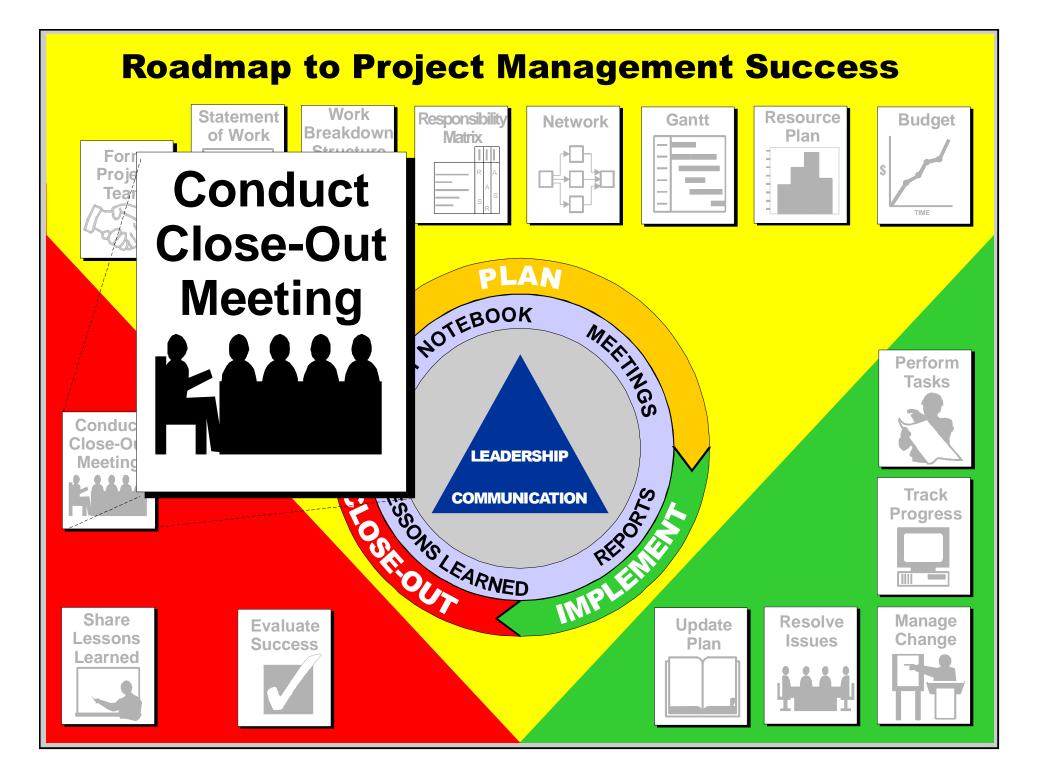


Evaluating Project Success

- Project purpose
- Deliverables
- Measurable success indicators
 - Quality
 - Schedule
 - Cost







Informal Project Team Close-Out Meeting

- Brainstorm to identify what went right with the project.
- Brainstorm to identify what went wrong with the project.
- List ideas for improvements.
- List ideas for ensuring that what went right happens again.
- Recognize the accomplishments of individuals.





Close-Out Meeting Agenda

- Review project statement of work.
- Review actual deliverables and show how project met its measurable success indicators.
- Summarize what was done well.
- Identify areas for improvement.
- Request recommendations for improvement.
- Determine if any additional tasks are required to complete the project.



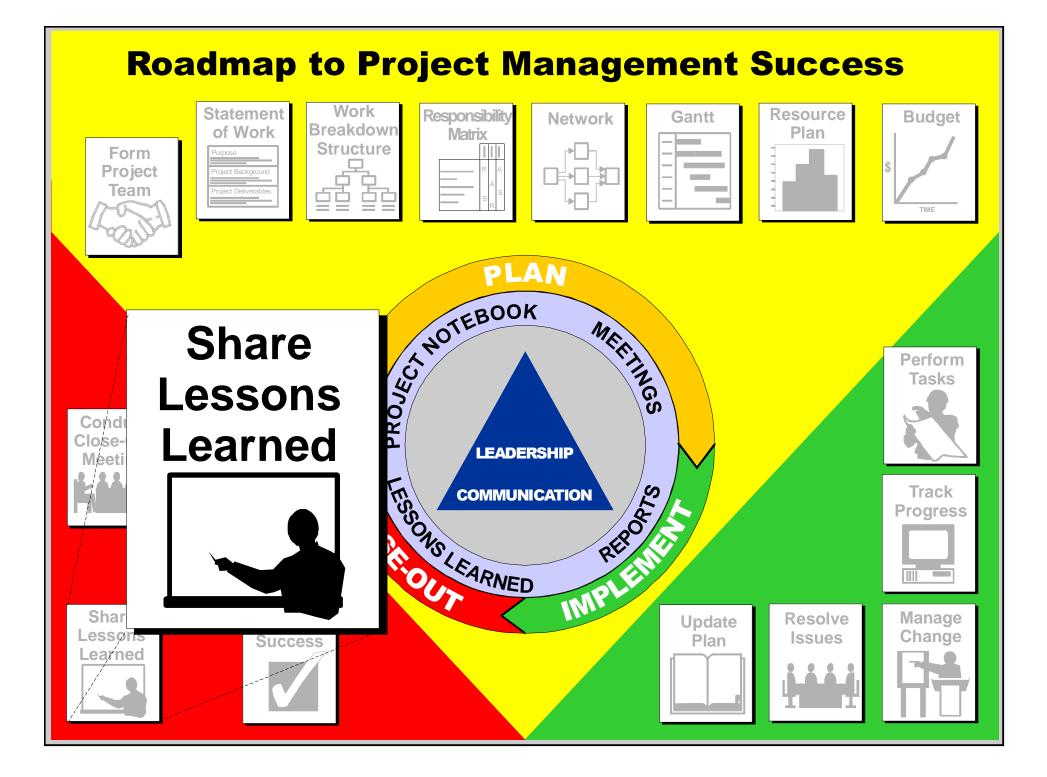


Close-Out Meeting Agenda (continued)

- List additional tasks, responsible persons, and due date.
- Document lessons learned for the project notebook.
- Discuss the project notebook availability to appropriate personnel for future projects.
- Evaluate subcontractor performance.







Sharing Lessons Learned

- Lessons Learned Database
 - Categorized electronic project information database
- Continuous Improvement Recommendations
 - Project Management Process
 - Forms
 - Standards





