Chapter 4: Project Integration Management

Information Technology Project Management, Eighth Edition

Note: See the text itself for full citations.

What is Project Integration Management? (1 of 3)

- Project managers must coordinate all of the other knowledge areas throughout a project's life cycle
- Many new project managers have trouble looking at the "big picture" and want to focus on too many details (See opening case for a real example)
- Project integration management is not the same thing as software integration

What is Project Integration Management? (2 of 3)

- Main processes
  - Developing the project charter
  - Developing the project management plan
  - Directing and managing project work
  - Monitoring and controlling project work
  - Performing integrated change control
  - Closing the project or phase

Strategic Planning and Project Selection (1 of 3)

- Strategic planning involves determining long-term objectives
  - Analyzing the strengths and weaknesses of an organization
  - Studying opportunities and threats in the business environment
  - Predicting future trends
  - Projecting the need for new products and services
- SWOT analysis
  - Strengths, Weaknesses, Opportunities, and Threats
- Identifying potential projects
  - Start of project initiation
- Aligning IT with business strategy
  - Organization must develop a strategy for using IT to define how it will support the organization's objectives

Methods for Selecting Projects

- Potential projects must be narrowed down
  - Methods for selecting projects
    - Focusing on broad organizational needs
    - Categorizing information technology projects
    - Performing net present value or other financial analyses
    - Using a weighted scoring model
    - Implementing a balanced scorecard

Focusing on Broad Organizational Needs

- Projects that address broad organizational needs are much more likely to be successful because they will be important to the organization
  - Examples: improve safety or increase morale
- Important criteria for selecting projects
  - Need
  - Funding
  - Will

Categorizing IT Projects

- Categorizations
  - Respond to a problem, opportunity, or directive
  - How long it will take to do and when it is needed
  - Overall priority of the project

Performing Financial Analyses

- Financial considerations are often an important consideration in selecting projects
  - Regardless of current economics
- Primary methods for determining the projected financial value of projects
  - Net present value (NPV) analysis
  - Return on investment (ROI)
  - Payback analysis

Net Present Value Analysis (1 of 4)

- Method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time
  - Projects with a positive NPV should be considered if financial value is a key criterion
  - Projects with higher NPVs are preferred

Net Present Value Analysis (2 of 4)

	A	B	C	D	E	F	G
1	Discount rate	10%					
2							
3	PROJECT 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
4	Benefits	$0	$2,000	$3,000	$4,000	$5,000	$14,000
5	Costs	$5,000	$1,000	$1,000	$1,000	$1,000	$9,000
6	Cash flow	($5,000)	$1,000	$2,000	$3,000	$4,000	$5,000
7	NPV →	$2,316					
8		Formula =npv(b1,b6:f6)					
9							
10	PROJECT 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
11	Benefits	$1,000	$2,000	$4,000	$4,000	$4,000	$15,000
12	Costs	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
13	Cash flow	($1,000)	$0	$2,000	$2,000	$2,000	$5,000
14	NPV →	$3,201					
15		Formula =npv(b1,b13:f13)					
16							
17							

Note that totals are equal, but NPVs are not because of the time value of money

FIGURE 4-4 Net present value example

Net Present Value Analysis (3 of 4)

Discount rate	**8%**					
Assume the project is completed in Year 0			**Year**			
	0	**1**	**2**	**3**	**Total**	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	**140,000**	**37,200**	**34,400**	**31,600**	**243,200**	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	**0**	**186,000**	**172,000**	**158,000**	**516,000**	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	**272,800**	←**NPV**
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
		↑				
ROI →	**112%**					
	Payback in Year 1					

FIGURE 4-5 JWD Consulting net present value and return on investment example

The mathematical formula for calculating NPV is

$$\text{NPV} = \sum_{t=0\ldots n} \text{A}_t/(1+r)^t$$

where t equals the year of the cash flow, n is the last year of the cash flow, A is the amount of cash flow each year, and r is the discount rate.

Net Present Value Analysis (4 of 4)

- NPV calculations
  - Determine estimated costs and benefits for the life of the project and the products it produces
  - Determine the discount rate
  - Calculate the net present value
- Important considerations
  - Some organizations refer to the investment year or years for project costs as Year 0 and do not discount costs in Year 0
  - Discount rate can vary, often based on the prime rate and other economic considerations
  - Costs can be entered as negative numbers and can be listed first (and then benefits)

Return on Investment

- Calculated by subtracting the project costs from the benefits and then dividing by the costs
  - ROI = (total discounted benefits - total discounted costs) / discounted costs
- The higher the ROI, the better
- Many organizations have a required rate of return
  - Minimum acceptable rate of return on investment for projects
- Internal rate of return (IRR) can by calculated by finding the discount rate that makes the NPV equal to zero

Payback Analysis (1 of 2)

- Payback period is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project
  - Determines how much time will elapse before accrued benefits overtake accrued and continuing costs
  - Payback occurs when the net cumulative discounted benefits equals the costs
  - Many organizations have requirements for the length of the payback period of an investment

Payback Analysis (2 of 2)

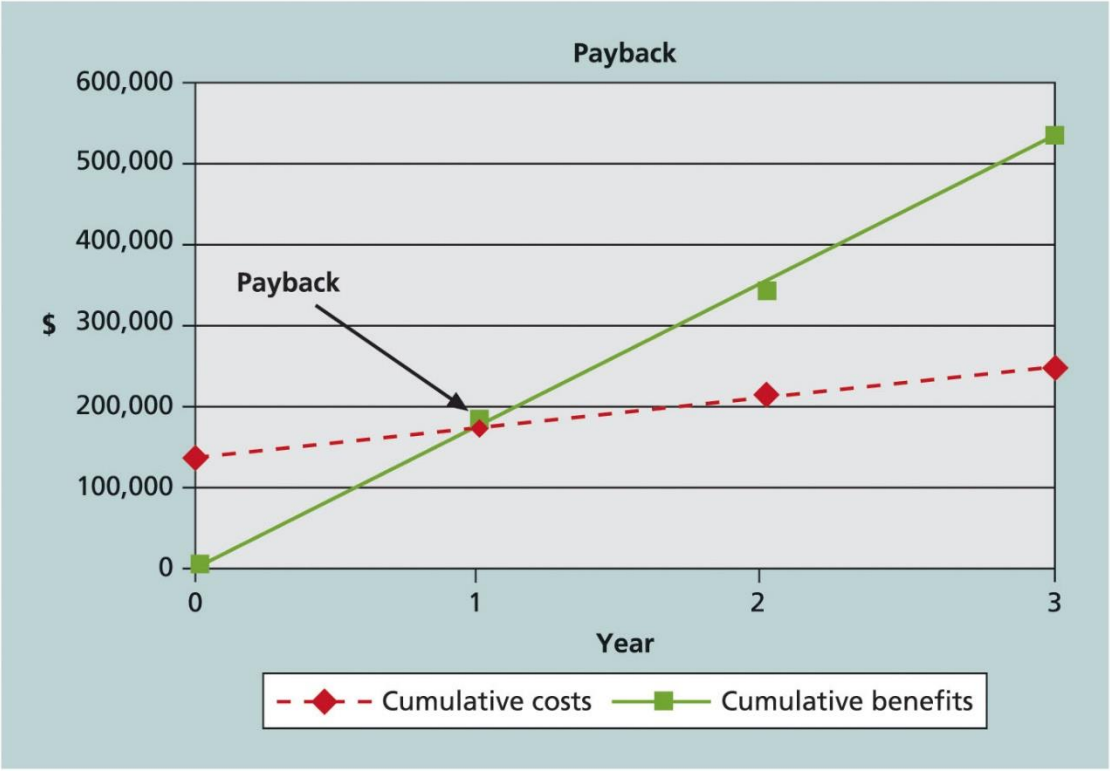


FIGURE 4-6 Charting the payback period for the JWD Consulting project

Using a Weighted Scoring Model (1 of 2)

- Provides a systematic process for selecting projects based on many criteria
  - Identify criteria important to the project selection process
  - Assign weights (percentages) to each criterion so they add up to 100%
  - Assign scores to each criterion for each project
  - Multiply the scores by the weights and get the total weighted scores

Using a Weighted Scoring Model (2 of 2)

	A	B	C	D	E	F
1	**Criteria**	**Weight**	**Project 1**	**Project 2**	**Project 3**	**Project 4**
2	Supports key business objectives	25%	90	90	50	20
3	Has strong internal sponsor	15%	70	90	50	20
4	Has strong customer support	15%	50	90	50	20
5	Uses realistic level of technology	10%	25	90	50	70
6	Can be implemented in one year or less	5%	20	20	50	90
7	Provides positive NPV	20%	50	70	50	50
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90
9	**Weighted Project Scores**	**100%**	**56**	**78.5**	**50**	**41.5**

FIGURE 4-7 Sample weighted scoring model for project selection

Monitoring and Controlling Project Work

- Changes are inevitable on most projects, so it's important to develop and follow a process to monitor and control changes
  - Monitoring project work includes collecting, measuring, and disseminating performance information
  - The project management plan provides the baseline for identifying and controlling project changes
    - A baseline is a starting point, a measurement, or an observation that is documented so that it can be used for future comparison.

Performing Integrated Change Control

- Main objectives
  - Influencing the factors that create changes to ensure that changes are beneficial
  - Determining that a change has occurred
  - Managing actual changes as they occur

Closing Projects or Phases

- To close a project or phase, you must finalize all activities and transfer the completed or cancelled work to the appropriate people
  - Main inputs are the project charter, project management plan, project documents, accepted deliverables, business documents, agreements, procurement documentation, and organizational process assets
  - Main tools and techniques are expert judgment, data analysis, and meetings

Chapter 5: Project Scope Management

Information Technology Project Management, Ninth Edition

Note: See the text itself for full citations

What is Project Scope Management?

- Scope refers to all the work involved in creating the products of the project and the processes used to create them
  - A deliverable is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes
- Project scope management includes the processes involved in defining and controlling what is or is not included In a project
  - Ensures that the project team and stakeholders have the same understanding of what products the project will produce and what processes the project team will use to produce them

Project Scope Management Processes (1 of 2)

- Main processes
  - Planning scope management: determining how the project's scope and requirements will be managed
  - Collecting requirements: defining and documenting the features and functions of the products produced during the project as well as the processes used for creating them
  - Defining scope: reviewing the project charter, requirements documents, and organizational process assets to create a scope statement
  - Creating the WBS: subdividing the major project deliverables into smaller, more manageable components
  - Validating scope: formalizing acceptance of the project deliverables
  - Controlling scope: controlling changes to project scope throughout the life of the project

Planning Scope Management (1 of 2)

- The project team uses expert judgment, data analysis, and meetings to develop two important outputs
  - Scope management plan (subsidiary part of the project management plan)
  - Requirements management plan
- Scope management plan contents
  - Prepare a detailed project scope statement
  - Create a WBS
  - Maintain and approve the WBS
  - Obtain formal acceptance of the completed project deliverables
  - Control requests for changes to the project scope

Collecting Requirements (1 of 3)

- Several ways to collect requirements
  - Interviewing stakeholders
  - Holding focus groups and facilitated workshops
  - Using group creativity and decision-making techniques
  - Utilizing questionnaires and surveys
  - Conducting observation studies
  - Generating ideas by comparing specific project practices or product characteristics (i.e., benchmarking)

Collecting Requirements (3 of 3)

- Requirements traceability matrix (RTM): a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed

Requirement No.	Name	Category	Source	Status
R32	Laptop memory	Hardware	Project charter and corporate laptop specifications	Complete. Laptops ordered meet memory requirement.

Table 5-1 Sample entry in a requirements traceability matrix

Defining Scope (1 of 2)

- Important elements of a project scope statement
  - Product scope description
  - Product user acceptance criteria
  - Detailed information on all project deliverables
- It is also helpful to document other scope-related information
  - Project boundaries, constraints, and assumptions
  - Supporting document references (e.g., product specifications)
- As time progresses, the scope of a project should become more clear and specific

Creating the Work Breakdown Structure (1 of 9)

- Work Breakdown Structure (WBS) is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
  - Foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes
- Decomposition is the main tool or technique for creating a WBS
  - Subdividing project deliverables into smaller pieces
  - A work package is a task at the lowest level of the WBS
- Outputs of creating the WBS are the scope baseline and project documents updates
  - Scope baseline includes the approved project scope statement and its associated WBS and WBS dictionary

Creating the Work Breakdown Structure (7 of 9)

- Approaches to developing work breakdown structures
  - Using guidelines: some organizations, like the U.S. Department of Defense (DOD), provide guidelines for preparing WBSs
  - Analogy approach: review WBSs of similar projects and tailor to your project
  - Top-down approach: start with the largest items of the project and break them down
  - Bottom-up approach: start with the specific tasks
  - Mind mapping: uses branches radiating out from a core idea to structure thoughts and ideas

Validating Scope

- It is difficult to create a good project scope statement and WBS for a project
  - Even more difficult, especially on IT projects, to verify the project scope and minimize scope changes
- Even when the project scope is fairly well defined, many IT projects suffer from scope creep
  - Tendency for project scope to keep getting bigger and bigger
- Scope validation involves formal acceptance of the completed project deliverables
  - Acceptance is often achieved by a customer inspection and then sign-off on key deliverables

Controlling Scope (1 of 3)

- Scope control involves controlling changes to the project scope
  - Keeping project goals and business strategy in mind
- Goals of scope control
  - Influence the factors that cause scope changes
  - Ensure changes are processed according to procedures developed as part of integrated change control
  - Manage changes when they occur
- Variance is the difference between planned and actual performance

Chapter 6: Project Schedule Management

Information Technology Project Management, Ninth Edition

Note: See the text itself for full citations

The Importance of Project Schedules (1 of 3)

- Managers often cite delivering projects on time as one of their biggest challenges
  - Time has the least amount of flexibility; it passes no matter what happens on a project
- Individual work styles and cultural differences may also cause schedule conflicts
  - Different cultures and even entire countries have different attitudes about schedules

The Importance of Project Schedules (2 of 3)

- Project time management processes
  - Planning schedule management
  - Defining activities
  - Sequencing activities
  - Estimating activity resources
  - Estimating activity durations
  - Developing the schedule
  - Controlling the schedule

Planning Schedule Management

- Elements of a schedule management plan
  - Project schedule model development
  - Scheduling methodology
  - Level of accuracy and units of measure
  - Control thresholds
  - Rules of performance measurement
  - Reporting formats
  - Process descriptions

Defining Activities (2 of 2)

- A milestone is a significant event that normally has no duration
  - It often takes several activities and a lot of work to complete a milestone
  - They’re useful tools for setting schedule goals and monitoring progress
    - Examples: obtaining customer sign-off on key documents or completion of specific products

Sequencing Activities (1 of 6)

- Sequencing process involves evaluating the reasons for dependencies and the different types of dependencies
  - A dependency or relationship is the sequencing of project activities or tasks
    - Mandatory dependencies: inherent in the nature of the work being performed on a project, sometimes referred to as hard logic
    - Discretionary dependencies: defined by the project team, sometimes referred to as soft logic. and should be used with care since they may limit later scheduling options
    - External dependencies: involve relationships between project and non-project activities

Sequencing Activities (2 of 6)

- Network diagrams are the preferred technique for showing activity sequencing
  - Schematic display of the logical relationships among, or sequencing of, project activities
  - Two main formats are the arrow and precedence diagramming methods

Sequencing Activities (3 of 6)

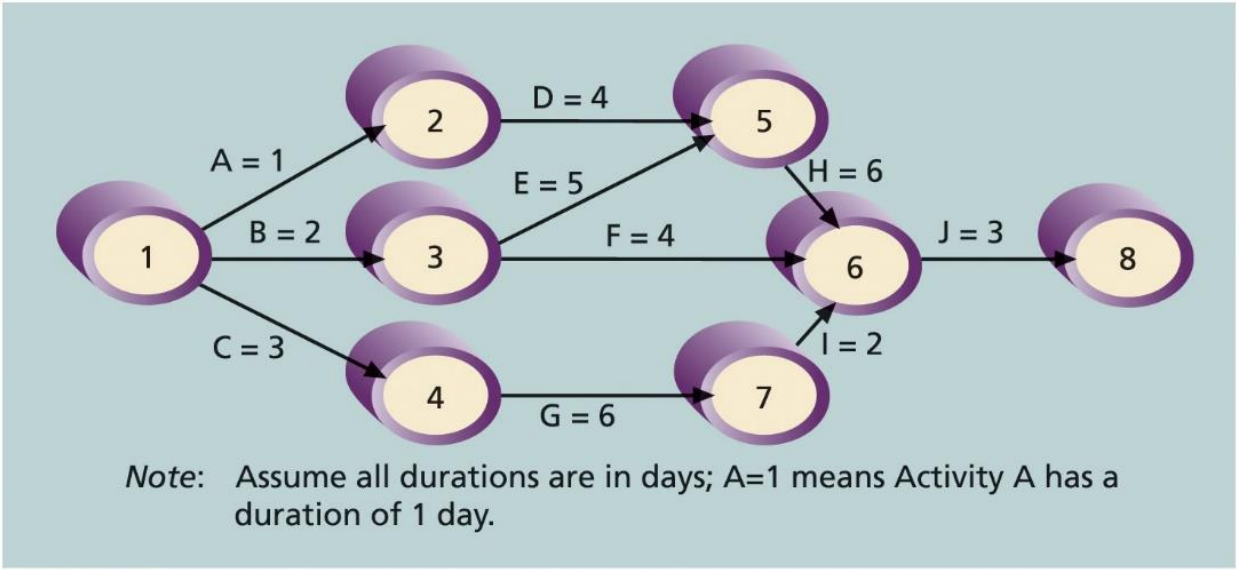


FIGURE 6-2 Network diagram for project X

Sequencing Activities (4 of 6)

- Arrow diagramming method (ADM) (i.e., activity-on-arrow network diagrams)
  - Activities are represented by arrows
  - Nodes or circles are the starting and ending points of activities
  - Only show finish-to-start dependencies
  - Refer to the text for the step-by-step process of creating AOA diagrams
- Precedence diagramming method (PDM)
  - Network diagramming technique in which boxes represent activities
- Types of dependencies or relationships between activities
  - Finish-to-start
  - Start-to-start
  - Finish-to-finish
  - Start-to-finish

Sequencing Activities (5 of 6)

Task dependencies

The nature of the relationship between two linked tasks. You link tasks by defining a dependency between their finish and start dates. For example, the "Contact caterers" task must finish before the start of the "Determine menus" task. There are four kinds of task dependencies in Microsoft Project.

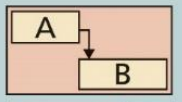
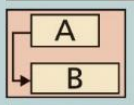
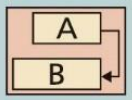
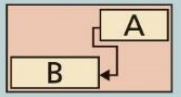
Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A) starts.

FIGURE 6-3 Task dependency types

Estimating Activity Durations

- Duration includes the actual amount of time worked on an activity plus elapsed time
  - Effort is the number of workdays or work hours required to complete a task and does not normally equal duration
- People doing the work should help create estimates
  - An expert should review them
- A three-point estimate is an estimate that includes an optimistic, most likely, and pessimistic estimate
  - Three-point estimates are needed for PERT and Monte Carlo simulations

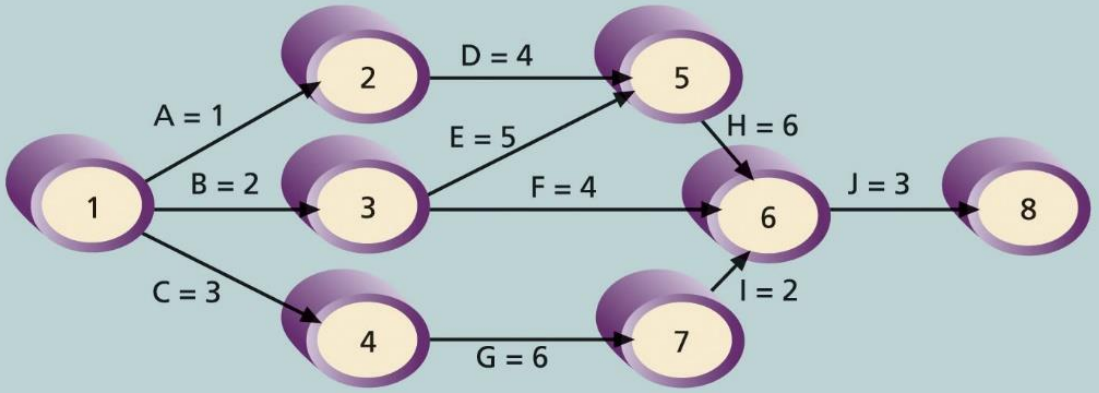
Gantt Charts (4 of 5)

- Adding milestones to Gantt charts
  - Many people like to focus on meeting milestones, especially for large projects
    - Milestones emphasize important events or accomplishments on projects
- SMART Criteria for milestones
  - Specific
  - Measurable
  - Assignable
  - Realistic
  - Time-framed

Critical Path Method (CPM) (1 of 2)

- Network diagramming technique used to predict total project duration
  - Critical path: series of activities that determine the earliest time by which the project can be completed
    - The longest path through the network diagram and has the least amount of slack or float; amount of time an activity may be delayed without delaying a succeeding activity or the project finish date
- Calculating the critical path
  - Develop a good network diagram and add the duration estimates for all activities on each path through the network diagram
    - Longest path is the critical path
  - If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip unless the project manager takes corrective action

Critical Path Method (CPM) (2 of 2)



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	B-E-H-J	Length = 2+5+6+3 = 16 days
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

FIGURE 6-8 Determining the critical path for project X

Growing Grass Can Be on the Critical Path

- The fact that its name includes the word critical does not mean that it includes all critical activities
  - Only accounts for time
    - Example: growing grass for Disney's Animal Kingdom
- There can be more than one critical path if the lengths of two or more paths are the same
  - Project managers should closely monitor performance of activities on the critical path to avoid late project completion
  - Critical path can change as the project progresses

Program Evaluation and Review Technique (PERT)

- Network analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity duration estimates
  - Uses probabilistic time estimates: duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations
  - By using the PERT weighted average for each activity duration estimate, total project duration estimate takes into account the risk or uncertainty in the individual activity estimates

Agile and Schedule Management

- Core values of the Manifesto for Agile Software Development
  - Customer collaboration over contract negotiation
  - Responding to change over following a plan
- Example: product owner defines and prioritizes the work to be done within a sprint
  - Collaboration and time management are designed into the process

Controlling the Schedule

- Goals of schedule control
  - Know the status of the schedule
  - Influence the factors that cause schedule changes
  - Determine that the schedule has changed
  - Manage changes when they occur
- Main inputs to schedule control
  - Project management plan
  - Project documents
  - Work performance data
  - Organizational process assets

Chapter 7: Project Cost Management

Information Technology Project Management, Ninth Edition

Note: See the text itself for full citations

What is Cost?

- **Cost** is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange
  - Usually measured in monetary units like dollars that must be paid to acquire goods and services

What is Project Cost Management? (1 of 2)

- Project cost management includes the processes required to ensure that the project is completed within an approved budget
  - **Planning cost management:** determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost
  - **Estimating costs:** developing an approximation or estimate of the costs of the resources needed to complete a project
  - **Determining the budget:** allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
  - **Controlling costs:** controlling changes to the project budget

Basic Principles of Cost Management (1 of 3)

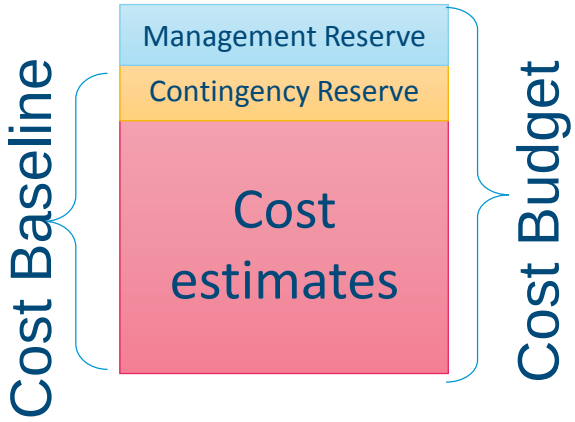
- Most members of an executive board better understand and are more interested in financial terms than IT terms; they need to be able to present and discuss project information in both
  - **Profits:** revenues minus expenditures
  - **Profit margin:** ratio of profits to revenues
  - **Life cycle costing:** considers total cost of ownership, or development plus support costs, for a project
  - **Cash flow analysis:** determines estimated annual costs and benefits for a project and resulting annual cash flow

Basic Principles of Cost Management (2 of 3)

- Types of costs and benefits
  - **Tangible costs or benefits** are those costs or benefits that an organization can easily measure in dollars
  - **Intangible costs or benefits** are costs or benefits that are difficult to measure in monetary terms
  - **Direct costs** are costs that can be directly related to producing the products and services of the project
  - **Indirect costs** are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project
  - Sunk cost is money that has been spent in the past; when deciding what projects to invest in or continue, you should not include sunk costs

Basic Principles of Cost Management (3 of 3)

- Additional concepts



  - **Contingency reserves** allow for future situations that may be partially planned for (sometimes called known unknowns) and are included in the project cost baseline.
    (Allowances for unplanned changes result from identified risks.)

  - **Management reserves** allow for future situations that are unpredictable (sometimes called unknown unknowns)
    (Budgets reserved for unplanned changes to scope and cost.)

Planning Cost Management

- **Plan Cost Management**

- **Inputs :**
  - Project Management Plan
  - Project Charter
  - Enterprise Environmental Factors
  - Organizational Process Assets

- **Tools and Techniques :**
  - Expert Judgment
  - **Analytical Techniques**
  - Meetings

- **Outputs :**
  - Cost Management Plan

Planning Cost Management

- **Analytical Techniques**
  - **Strategic options to fund the project**
    - Self-funding,
    - Funding with equity, (Ex: Stocks)
    - Funding with debt (Ex: Bonds)
  - **Project resources Finance**
    - Making,
    - Purchasing,
    - Renting (Short Term),
    - Leasing (Long Term).
  - **Financial analysis techniques:**
    - Payback period,
    - Return on investment (value),
    - Internal rate of return,
    - Net present value.

Planning Cost Management

- **Cost Management Plan :**
  - Establish the criteria for planning, structuring, estimating, budgeting, and control project cost.
  - Cost management plan may includes:
    1. Units of measure (ex: staff hours)
    2. Level of Precision (rounding up or down, ex: $125.3 → $125)
    3. Level of Accuracy (ex: ± 5%)
    4. Organizational Links (with accounting systems)
    5. Control thresholds (level at which an action needs to be taken)
    6. Rules of performance measurement (Procedures)
    7. Reporting formats

Estimating Costs

- Project managers must take cost estimates seriously if they want to complete projects within budget constraints
  - Types of cost estimates
  - Tools and techniques for estimating costs
  - Typical problems associated with IT cost estimates

Estimating Costs

- **Estimate Costs**

- **Inputs :**
  - Cost Management Plan
  - Human Resource Management Plan
  - Risk Register
  - Organizational Process Assets
  - Scope Baseline
  - Project Schedule
  - Enterprise Environmental Factors
- **Tools and Techniques :**
  - Expert Judgment
  - Parametric Estimating
  - Three-Point Estimates
  - Cost of Quality
  - Group Decision-Making Techniques
  - Analogous Estimating
  - Bottom-Up Estimating
  - Reserve Analysis
  - Project Management Software
  - Vendor Bid Analysis
- **Outputs :**
  - Activity Cost Estimates
  - Basis of Estimates
  - Project Document Updates

Estimating Costs

Type of Estimate	When Done	Why Done	Typical Range
Rough order of magnitude (ROM)	Very early in the project life cycle, often 3–5 years before project completion	Provides estimate of cost for selection decisions	-50% to + 100%
Budgetary	Early, 1–2 years out	Puts dollars in the budget plans	-10% to +25%
Definitive	Later in the project, less than 1 year out	Puts dollars in the budget plans	-5% to +10%

Table 7-1 Types of cost estimates

Estimating Costs

- The number and type of cost estimates vary by application area
- Estimates are usually done at various stages of a project
    - Should become more accurate as time progresses
- It is important to provide supporting details for estimates and updates to project documents
- A large percentage of total project costs are often labor costs

Cost Estimation Tools and Techniques

- Analogous or top-down estimates
  - Use the actual cost of a previous, similar project as the basis for estimating the cost of the current project
- Bottom-up estimates
  - Involve estimating individual work items or activities and summing them to get a project total
- Three-point estimates
  - Involve estimating the most likely, optimistic, and pessimistic costs for items
- Parametric estimating
  - Uses project characteristics (parameters) in a mathematical model to estimate project costs

Typical Problems with IT Cost Estimates

- Reasons for inaccuracies
  - Estimates are done too quickly
  - People lack estimating experience
  - Human beings are biased toward underestimation

Determining the Budget

- **Inputs :**
  - Cost Management Plan
  - Activity Cost Estimates
  - Project Schedule
  - Risk Register
  - Organizational Process Assets
  - Scope Baseline
  - Basis of Estimates
  - Resource Calendars
  - Agreements
- **Tools and Techniques :**
  - Cost Aggregation
  - Reserve Analysis
  - Expert Judgment
  - Historical Relationships
  - Funding Limit Reconciliation
- **Outputs :**
  - Cost Baseline
  - Project Funding Requirements
  - Project Document Updates

Determining the Budget

- **Cost Aggregation :**
  - Cost Estimates are aggregated within activities and rolled up to work package then rolled up to control accounts then rolled up to entire project.

- **Reserve Analysis :**
  1. Contingency Reserve : Allowances for unplanned changes result from identified risks.
  2. Management Reserve : Budgets reserved for unplanned changes to scope and cost.

Determining the Budget

- **Historical Relationships:**
  - Historical Relationships involve the use of project characteristics (parameters) to develop mathematical models to predict total project costs.
  - This results in parametric estimates or analogous estimates.

- **Funding Limit Reconciliation :**
  - Sometimes funds are not available when needed and you have to reschedule the activities.
  - Expenses should be reconciled with any funding limits
  - Example : Funds for the project will be available on two batches :

    $50 millions today and $40 millions in the beginning of the next year.

Determining the Budget

- **Cost Baseline :** The planned costs over project time. It's used to control cost performance in the project.

- **Project Funding Requirements :** It can be derived from cost baseline. Funding often occurs in incremental amounts.

Controlling Costs

- **Inputs :**
  - Project Management Plan
  - Project Funding Requirements
  - Work Performance Information Data
  - Organizational Process Assets
- **Tools and Techniques :**
  - Earned Value Management
  - Forecasting
  - To Complete Performance Index (TCPI)
  - Performance Reviews
  - Project Management Software
  - Reserve Analysis
- **Outputs :**
  - Work Performance Information
  - Project Management Plan Updates
  - Organizational Process Assets Updates
  - Cost Forecasts
  - Change Requests
  - Project Document Updates

Chapter 11: Project Risk Management

Information Technology Project Management, Ninth Edition

Note: See the text itself for full citations

The Importance of Project Risk Management (1 of 7)

- Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives
  - Risk management is often overlooked in projects, but it can help improve project success by helping select good projects, determining project scope, and developing realistic estimates

The Importance of Project Risk Management (5 of 7)

- Risk utility is the amount of satisfaction or pleasure received from a potential payoff
  - Utility rises at a decreasing rate for people who are risk-averse
  - Those who are risk-seeking have a higher tolerance for risk and their satisfaction increases when more payoff is at stake
  - Risk-neutral approach achieves a balance between risk and payoff

The Importance of Project Risk Management (7 of 7)

- Project risk management processes
  - Planning risk management: deciding how to approach and plan the risk management activities for the project
  - Identifying risks: determining which risks are likely to affect a project and documenting the characteristics of each
  - Performing qualitative risk analysis: prioritizing risks based on their probability and impact of occurrence
  - Performing quantitative risk analysis: numerically estimating the effects of risks on project objectives
  - Planning risk responses: taking steps to enhance opportunities and reduce threats to meeting project objectives
  - Implementing risk responses: implementing the risk response plans
  - Monitoring risk: monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project

Planning Risk Management (1 of 3)

- Main output of this process is a risk management plan
  - Documents the procedures for managing risk throughout a project
- The project team should review project documents as well as corporate risk management policies, risk categories, lessons-learned reports from past projects, and templates for creating a risk management plan
  - It is also important to review the risk tolerances of various stakeholders

Identifying Risks (1 of 3)

- Understanding what potential events might hurt or enhance a particular project
  - You cannot manage risks if you do not identify them first
- Another consideration is the likelihood of advanced discovery
  - Often viewed at a program level rather than a project level
- Suggestions for identifying risks: tools and techniques
  - Brainstorming
  - The Delphi Technique
  - Interviewing
  - SWOT analysis

Identifying Risks (2 of 3)

- Brainstorming
  - Group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment
  - An experienced facilitator should run the brainstorming session
  - Be careful not to overuse or misuse brainstorming
    - Psychology literature shows that individuals produce a greater number of ideas working alone than they do through brainstorming in small, face-to-face groups
    - Group effects often inhibit idea generation.
- Delphi Technique
  - Used to derive a consensus among a panel of experts who make predictions about future developments
  - Provides independent and anonymous input regarding future events
  - Uses repeated rounds of questioning and written responses and avoids the biasing effects possible in oral methods

Identifying Risks (3 of 3)

- Interviewing
  - Fact-finding technique for collecting information in face-to-face, phone, e-mail, or virtual discussions
  - Interviewing people with similar project experience is an important tool for identifying potential risks.
- SWOT analysis
  - Strengths, weaknesses, opportunities, and threats
  - Helps identify the broad negative and positive risks that apply to a project

The Risk Register (1 of 4)

- Important output of the risk identification process
  - List of identified risks and other information needed to begin creating a risk register
    - Contains the results of various risk management processes and that is often displayed in a table or spreadsheet format
    - Tool for documenting potential risk events and related information
  - Risk events refer to specific, uncertain events that may occur to the detriment or enhancement of the project

The Risk Register (2 of 4)

- Risk register contents
  - Identification number for each risk event
  - Rank for each risk event
  - Name of each risk event
  - Description of each risk event
  - Category under which each risk event falls
  - Root cause of each risk
  - Triggers for each risk; indicators or symptoms of actual risk events
  - Potential responses to each risk
  - Risk owner or person who will own or take responsibility for each risk
  - Probability and impact of each risk occurring
  - Status of each risk

The Risk Register (3 of 4)

No.	Rank	Risk	Description	Category	Root Cause	Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

Table 11-4 Sample risk register

Decision Trees and Expected Monetary Value (EMV) (1 of 2)

- A decision tree is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain
  - Estimated monetary value (EMV) is the product of a risk event probability and the risk event's monetary value
    - You can draw a decision tree to help find the EMV

Decision Trees and Expected Monetary Value (EMV) (2 of 2)

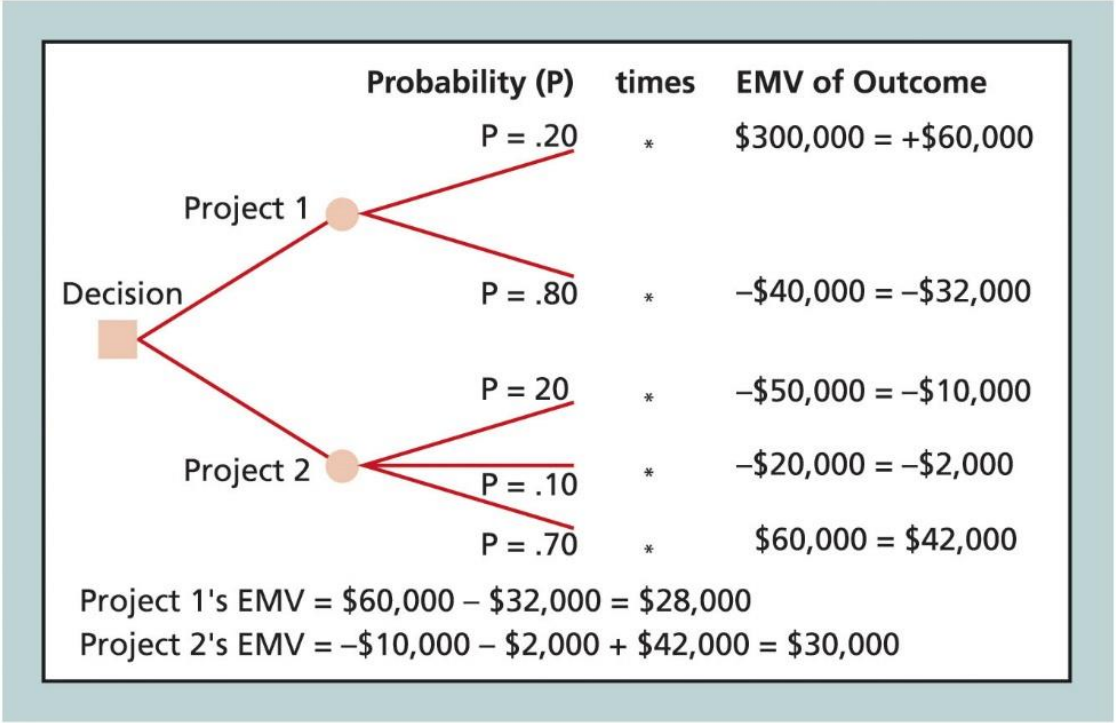


FIGURE 11-7 Expected monetary value (EMV) example

Monitoring Risks

- Involves ensuring the appropriate risk responses are performed, tracking identified risks, identifying and analyzing new risk, and evaluating effectiveness of risk management throughout the entire project
  - Project risk management does not stop with the initial risk analysis
- Carrying out individual risk management plans involves monitoring risks based on defined milestones and making decisions regarding risks and their response strategies
  - Project teams sometimes use workarounds—unplanned responses to risk events—when they do not have contingency plans in place