

Course Name: Project Management

A Business Workflow Approach

Based on the book: Project Workflow Management©
by Dan Epstein and Rich Maltzman

Chapter #02 – Introduction to Project Analysis

The course developed by Dan Epstein, 2013

Requirements Frame Definitions

The main objective of the Requirements Frame is to ensure that the project scope and/or scope change requirements is agreed and documented.

- Project scope is the scope of work required to deliver the solution to the client.
- Product scope is the scope of the business solution, based on business requirements.
- Any change in product scope will lead to the project scope change.

Requirements Frame Definitions - cont

- **Requirements Management (RM)** controls the flow of customer requirements through the lifecycle of the project and provides traceability of changes to the project scope.
- The RM includes gathering and documenting business requirements, reviewing for completeness, clarity, understanding, prioritization, testability and approval of requirements.
- Changes to the product scope or requirements are only executed through the project scope change request.

Requirement Management (RM) Process

1. Receive initial project requirements and a project benefit statement from a client.
2. Perform cost-benefit analysis and justify the project investment.
3. Create Project Control Book to establish guidelines and tools for documenting requirements and project events.
4. Identify project stakeholders and establish communications channels with them.
5. Elicit detailed business requirements for the project.

Requirement Management Process (cont)

6. Conduct Business Requirements Analysis.
7. Create Business Requirements Document
8. Analyze project scope change requests.
9. Create / Update Traceability Matrix for requirements, which allows monitoring requirements changes throughout the project lifecycle.
10. Obtain authorization to start the project
11. Obtain project funding.

Roles and Responsibilities

The **Project Manager (PM)** - responsible for ensuring that all processes of the workflow are adhered to and documented in the Project Control Book (PCB). A PM signature is required on the Business Requirements Document (BRD). The PM tracks the implementation of the Requirement Management activities and reviews the status of the Requirements Frame execution on a weekly basis with the Lead Client.

The **Delivery Team** is the group of project team members. They participate in the requirements review sessions to make sure that the requirement is clear and technically feasible to implement and test. They will be responsible for producing documentation in the Planning Frame, and outlining how the approved requirements will be implemented.

Roles and Responsibilities - cont

Requirements Manager (RM) is a person who has responsibility for documenting and managing the requirements throughout the Requirements Frame of the project.

- may be a Project Manager or a Senior Business Analyst.
- signature is required on the Business Requirements Document.

Roles and Responsibilities - cont

Lead Client is a client responsible for presenting business needs to the PM, reviewing requirements documentation and assuring that Senior Business Managers and the Project Sponsor are in a full agreement with the proposed requirements.

- is assigned to work with the Requirements Manager as planned by the PM and participate in all relevant business requirements gathering sessions.
- sometimes is referred to as the Business Project Manager or the Business Area Lead.
- usually reports to the Senior Business Manager.

Roles and Responsibilities - cont

Business Expert is a business user from one or more business areas on whose behalf the specific business requirements are presented. The Business Expert is a consultant to the Lead Client and to the PM / RM for that business area.

Senior Business Manager is a person whose signature is required on the Business Requirements Document. The Senior Business Manager ensures that business requirements are aligned with the corporate business goals and corporate strategy. The Senior Business Manager usually reports to the Project Sponsor.

Roles and Responsibilities - cont

Senior Delivery Manager is the person who owns a delivery budget, and whose signature is required on the Business Requirements Document. The Project Manager usually reports to the Senior Delivery Manager, at least for the duration of the project.

Project Sponsor is a major stakeholder. A Project Sponsor is responsible for the business success of the project, specifically, ensuring that the business objectives for which the project has been undertaken are met. The Project Sponsor is the owner of the overall project.

Roles and Responsibilities - cont

Quality Assurance Analyst is responsible for running Requirements Reviews, documenting results of reviews and monitoring follow-ups when needed. The QA Analyst should be a person with QA training, who is ideally not directly associated with the project. However, for smaller projects, the PM may play this role.

Requirements Frame Inputs/Outputs

- Requirements frame has five entry points and seven exit points, which will be reviewed in the process flow diagram.
- Each entry point is either request to the Requirements frame by other frames to do the requirement analysis, including scope change request analysis or return of the requested estimates or plans for requirements, scope change and Planning frame.
- Each exit point is either requests by the Requirements frame to other frames for plans or estimates.

Requirements Frame Inputs

1. From the Planning Frame after completion of the ballpark or initial estimates (Estimates made after the initial project request).
2. From the Planning Frame to request scope change requirements analysis.
3. From the Planning Frame after the requirements analysis plan is finished and the information is send back.
4. From the Planning Frame with Planning/HL Design Frame plan.
5. From the Planning Frame with preliminary estimates. (Those are the first estimates made after the Business Requirements Document is complete).

Requirements Frame Outputs

1. To the Planning Frame requesting the requirements analysis plan.
2. To the Planning Frame requesting the scope change plan.
3. To the Planning Frame requesting the Planning/HL Design and the overall project plan.
4. To the Planning Frame requesting the preliminary estimates of the project cost.
5. To the Planning Frame requesting the ballpark estimates
6. To the Closing Frame requesting the project termination.
7. To the Construction Frame requesting the Planning/HL Design Frame implementation and tracking.

Requirements Frame Processes

Requirements frame process flow consists of 12 processes, which ensure that requirements are complete, agreed with clients and properly documented.

1.Receive Initial Project Request and Benefit Statement (R1).

This process will provide the delivery team with a general idea about the project and it will outline expected benefits from the project.

2.Create Project Control Book (R2)

This process will create a tool for keeping all project documentation in one place.

Requirements Frame Processes - cont

3. Perform/Update Cost Benefit Analysis (R3A and R3B)
Cost Benefits Analysis (CBA) calculates whether benefits from the project justify expenses.
4. Business Requirements Analysis (R4)
This process will elicit detailed project requirements and analyze them.
5. Create/Update Traceability Matrix (R5A and R5B)
The Requirements Traceability Matrix is a tool for documenting, updating and tracing all requirements and changes to the project scope throughout the life of the project.

Requirements Frame Processes - cont

6. Create Business Requirements Document (R6)
This process will create a document outlining baseline for all project requirements.
7. Conduct Requirements Review (R7)
This process will ensure the quality of business requirements and verify correctness of the Business Requirements Document.
8. Approve Requirements (R8)
This process will approve requirements and authorize funds for the Planning Frame.
9. Conduct Kick Off Meeting (R9)
Kick Off Meeting is the official project initiation.

Requirements Frame Processes - cont

10. Review Planning Frame Milestones with Client (R10)

This process will review the Planning/HL Design and the Overall Project plan or milestones with the client before requesting the project authorization. Plans may be later changed as result of the review.

11. Update Planning Milestones (R11)

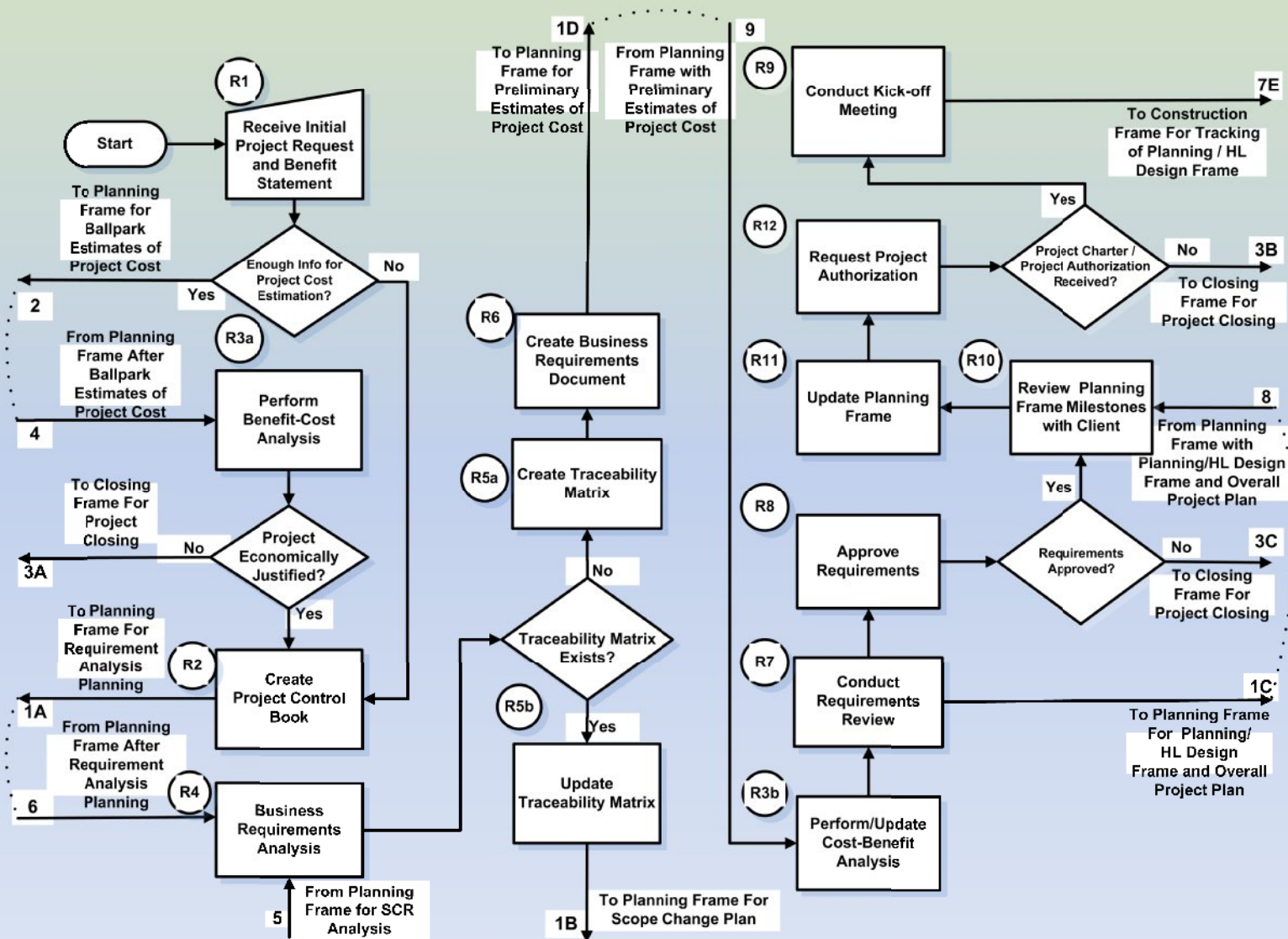
This process will update plans or milestones with changes requested at the review before beginning H/L Design and Planning Frame implementation in the Construction/Tracking Frame.

Requirements Frame Processes - cont

12. Request project authorization (R12)

This process will request project approval and the Project Charter from the project sponsor. Receiving a signed Project Charter confirms that the sponsor agrees with the project scope, including the cost and schedule of at least the Planning / HL Design activities for the remaining frames of the project.

Requirements Frame Processes - cont



Requirements Frame Plan

The Requirements Frame plan includes the following:

1. Analysis of all requirements.
2. Identification of all deliverables.
3. Documentation of the Requirements Frame team structure.
4. Documentation of assumptions, dependencies and constraints.
5. Analysis and documentation of the user environment factors, like physical work environment, technology used, user's levels of computer literacy, level of business expertise, training needs and their impact on requirements.

Requirements Frame Plan - cont

6. Development of the Risk Management plan in accordance with the Risk Management procedure described in the Planning Frame section. The Risk Management Plan will include, along with the planning of standard risks assessments and risk handling, the following:
 - a) Developing a plan to minimize risk of pressure by management or client to limit analysis and start development as soon as possible.
 - b) Developing a plan to minimize risk of neglecting nonfunctional requirements, like usability, training etc. This is relevant mostly in projects developing machinery and software.
 - c) Developing a plan to minimize risk of technical specialists' bias to a specific product, service or process.

Requirements Frame Plan - cont

7. Developing a communications plan, which identifies stakeholders, reporting, distribution, etc.
8. Developing a detailed list of tasks (Work Breakdown Structure or WBS) and dependencies between tasks first for the Requirements Frame and later in the frame for the Planning Frame.
9. Estimating efforts required to complete each task.
10. Identifying the resources required to complete Requirements Frame tasks and the requirements related to the Planning Frame tasks and assigning resource to every task.

Requirements Frame Plan - cont

11. Developing a Quality Assurance plan.
12. Calculating the cost and producing the schedule of the Requirements Frame.
13. Combining all plans and the schedule into one Requirements Frame plan package.
14. Getting to know clients, business users and project sponsors.

Receive Initial Project Request (R1)

- Process R1 (Receive Initial Project Request and Benefit Statement) will provide the delivery team with a general idea about the project and it will outline expected benefits from the project.
- The process needs to establish whether it is possible to perform the ballpark cost estimates (-25% +75%) without having detailed project requirements beyond the initial project request.
- If the project is in an unfamiliar business or a different or brand new technology, then the detailed project requirements must be established first in order to perform preliminary estimates (-10%+25%).

Receive Initial Project Request (R1) - cont

The PM receives the initial project request and the benefit statement from clients. The RM documents them in sufficient detail to ensure their unambiguous understanding. A unique identifier is assigned, which consists of three parts separated by dashes:

- 1.A Project Identifier, assigned to the project when the project is initiated. This can be in a format chosen as appropriate for your particular enterprise.
- 2.A Requirement Identifier, consisting of three digits, which identify the requirement number from 001 through 999, usually sequential within the project.

Receive Initial Project Request (R1) - cont

3. A Revision Identifier, consisting of two digits identifying the requirement revision number. At the time when the requirement is approved and baselined, those two digits are always 00. Each subsequent approved change request will increment this number by one.

Examples of a unique identifier: **CLI00253-001-02**,
RET00229-011-00

This identifier will be used throughout the life of the project to ensure that all project scope changes are identified.

The requirements will be documented in the Requirements Form on the next slide.

Requirements Template

Project Identifier:		Project Name:				
Project Manager:		Client:		Date:		
Re q. #	Req. Unique Identifier	Req. Group	Functionality or Explanation	Rationale for Requirement	Priority	Impact Analysis Results
		<input type="checkbox"/> Functional <input type="checkbox"/> Non-funct. <input type="checkbox"/> Bus. level			<input type="checkbox"/> Must have <input type="checkbox"/> Should have <input type="checkbox"/> Nice to have	
		<input type="checkbox"/> Functional <input type="checkbox"/> Non-funct. <input type="checkbox"/> Bus. level			<input type="checkbox"/> Must have <input type="checkbox"/> Should have <input type="checkbox"/> Nice to have	
		<input type="checkbox"/> Functional <input type="checkbox"/> Non-funct. <input type="checkbox"/> Bus. level			<input type="checkbox"/> Must have <input type="checkbox"/> Should have <input type="checkbox"/> Nice to have	

Create Project Control Book - R2

- Project Control Book or PCB is a tool for storage of all project documentation and keeping it in one place.
- The tool is set up at the Requirements Frame and extensively used throughout all project frames.
- The purpose of this process is to define required content for Project Control Book as well as to define methods of classification and documentation of all project related events in a way which allows efficient and straightforward access to the stored PCB information.

Create Project Control Book - R2

- Process R2 (Create Project Control Book) will create a PCB tool for keeping all project documentation in one place.
- The golden rule for the project documentation is that if anything during the project lifecycle is not documented, it is the same as if it does not exist or never happened.
- Phone conversations, verbal agreements and promises do not substitute documentation, since the management or clients will never remember their undocumented requests or their consent for doing something.

Create Project Control Book - R2

The following is one example of overall PCB content:

- Project standards, practices and methods
- Agreements and Contracts
- Project deliverables and milestones
- Project delivery team members information
- Plans
 - Project Schedule
 - Communications Management Plan
 - Project Risk Plan
 - Quality Assurance Plan
 - Configuration Management Plan
 - Project Training Plan
 - Staffing Plan
 - Other plans as created

Create Project Control Book - R2

- Meeting minutes
- Project status reports
- Project scope changes
- Risk assessment
- Project estimates
- Project issues and issue tracking
- Project financials and tracking information
- Metrics
- Approvals
- Project tools
- Quality assurance reports
- Contents of emails
- Contents of verbal communications
- Other project documentation

Create Project Control Book - R2

For the Requirements Frame, there should be documented, as minimum:

- Initial Project Request and Benefit Statement
- Cost Benefits Analysis
- Initial Project Estimates
- Requirements Frame plans and schedule
- Meeting minutes with clients to define Project Requirements Document (BRD)
- Issues
- Approved BRD
- Traceability Matrix
- Project Charter
- Scope Change Requests
- Project Status Reports
- Quality Assurance Reports

Create Project Control Book - R2

- The simplest way to build the PCB is using the MS Windows file structure.
- The top level folder is “*Project Name* ” with further breakdown by project frames, by months etc.
- Within the Requirements Frame there will be other folders, such as the Traceability Matrix, Project Plans etc.
- The Project Plans folder will have subfolders such as Project Schedule, Communication Plan, Quality Assurance plan, Risk Management Plan, Staffing Plan etc.

Create Project Control Book - R2

- The Project Plans folder will have subfolders such as Project Schedule, Communication Plan, Quality Assurance plan, Risk Management Plan, Staffing Plan etc.
- It is recommended to have the date as the first part of the document name within the above structure, such as “2013-01-12 Team Status Meeting” or “2013-02-03 Risk Assessment” in order to have all documents in each folder sorted by date.
- The above PCB structure allows easy access and easy retrieval of documents.

Perform/Update CBA - R3a, R3b

- Processes R3a and R3b (Perform/Update Cost-Benefit Analysis) calculate whether benefits from the project justify expenses.
- The general rule is that if the revenues generated by the project do not cover the cost of the project in 2.5 years after the project completion, a commercial project is not justified.
- Sometimes project is justified *even if there is no profit expected*. (Taxation, strategic planning for future business improvement, etc.)

Perform/Update CBA - R3a, R3b - cont

- The process R3a is executed after the initial estimates are made; while the process R3b is used after the preliminary estimates are made following completion of the Business Requirements Document.

Benefit Statement

- The Benefits Statement must be provided by the client when the initial project request is submitted.
- If the project is the development of a new marketable product (or service), then the marketing (or product/service management) department must have an answer as to how many products or services may be sold and at what price.
- If the project is to redesign a section of highway to reduce accidents there, the benefit can't be immediately calculated.

Cost of a Project

The cost of a project consists of several types of costs.

Project Cost= Direct Cost+ Indirect Cost+ Fixed Cost+ Variable Cost+ Sunk Cost

Direct Cost is the cost incurred due to the work performed on the specific project. It includes wages, bonuses, work travel, materials, etc.

Indirect Cost is the cost of running the organization, which is split between all company projects, such as cost of facilities, power, accounting, security etc.

Cost of a Project - cont

Fixed Cost is the cost that does not change with the size of the project or its duration. This is a non-recurring cost.

Examples of fixed cost include machinery setup cost, a one-time cost of advertising for a special resource, and so on.

Variable Cost is the cost which grows in direct relationship to the size and length of the project, such as cost of material, equipment amortization, etc.

Sunk Cost is the cost which has already occurred, and over which we no longer have any control. Sunk cost is a loss, which should not play any role in determining the future of the project. However, Sunk Cost is indeed a part of the overall project cost.

Major Formulas used for CBA

Net Profit after Taxes:

$$\text{Profit} = \text{Revenue} - \text{Cost} - \text{Expense} - \text{Project Cost}$$

Revenue is the company income as a result of a business initiated due to the project.

Cost is the money spent to organize the business.

Expense is what it spent to obtain benefits from the project.

Profit is the value of benefits less the money spent to get benefits. Profit is also called Net Earnings Before Taxes (**NEBT**), or gross profit.

Net profit is called Net Earnings After Taxes (**NEAT**).

Major Formulas used for CBA - cont

Return on Investment (ROI)

$$\text{ROI} = \text{NEAT} / (\text{Cost} + \text{Expense} + \text{Project Cost})$$

(Cost + Expense + Project Cost) is called **Total Investment**

Major Formulas used for CBA - cont

Present Value (PV)

$$PV = FV / (1+r)^t$$

PV – Present Value of money

FV - Future Value of money

r - Interest rate. It is also called Value Discount Rate

t - Time period in years

Today's money is worth more than the same amount later.

Present Value (PV) is today's value of future cash flows.

Major Formulas used for CBA - cont

If the project cost today is \$1,000,000, two years from now, when money for the project is received by the project developer, the money value may be worth \$800,000 due to inflation, rising costs, etc. In this case, the project developer is losing \$200,000, but the client, who pays for the project, gains \$200,000. This is called **PV Cost** (for project developers point of view).

If a buyer paid cash for the project in advance, by the time the project is done two years later, the value of the paid cash will be less, because they will not get interest on the money paid, but developers will. After they start receiving project benefits, this lost revenue must be taken into the overall revenue calculation. This is called **PV Revenue** (for project developer).

Major Formulas used for CBA - cont

- Practically, Revenues, Expenses and Project Costs do not occur at one specific moment, but rather distributed over a time, which makes accurate calculations difficult.
- Considering the low accuracy of initial project estimates and the estimated revenues, for the sake of calculations, it can be safely assumed that all revenues and costs happen at one specific moment at the end of each year.
- Calculate CBA separately for each year.

Major Formulas used for CBA - cont

Benefit-Cost Ratio (BCR)

BCR is the expected profitability of a project.

$$\text{BCR} = \text{PV}_{\text{REVENUE}} / \text{PV}_{\text{COSTS}}$$

BCR of 1.0: breakeven project, no profit

BCR < 1.0: Costs exceed benefits. This means a project is not financially attractive.

BCR > 1.0: Profitable project.

Major Formulas used for CBA - cont

Payback Period

The payback period is defined as the number of months up to the point where cumulative revenues exceed the cumulative costs and the project pays for itself.

**Payback Period= Project Cost / ((Project Cost + NEAT_{1-ST}
YEAR) / 12)**

Please note that if revenue for the first year is less than all expenses, NEAT will be negative.

Major Formulas used for CBA - cont

- When calculating CBA, it is very important to avoid double counting of costs or benefits.
- For example, if the first year CBA includes the cost of the project, it is not counted again in the second year CBA.
- However, if the project does not pay for itself the first year, the unpaid part is counted as the project cost of the second year. In this case, for the second year calculation, the time period in years is 1 for PV Cost calculation part related to project cost.

Major Formulas used for CBA - cont

If revenues are received each year, rather than at the end a period of several years, then the time period in *years* for PV Revenue calculation is always 0, because it was agreed to count costs and revenues at the end of each *year*.

The general guideline is that the expected payback should not exceed 24 months. If it is found that the project financially does not justify itself, the decision is made by the project manager to reject the initial project request. *It is wise to consult with your management prior to notifying the client so as to be aware of other reasons which could take priority over financial considerations of the project (for example – compliance with regulations).*

Example of CBA Calculation

		Formula	1-st year	2-nd year	3-rd years
1	Vacations Sold per year (Units Sold)		6000	6000	6000
2	Price for one vacations holiday (Unit Price)		\$2,000	\$2,000	\$2,000
3	Expenses of one vacations holiday (Unit Expenses)		\$1,700	\$1,700	\$1,700
4	Gross Revenue	Units Sold * Unit Price	\$12,000,000	\$12,000,000	\$12,000,000
5	Expenses	Units Sold * Unit Expenses	\$10,200,000	\$10,200,000	\$10,200,000
6	Revenue	Gross Revenue - Expenses	\$1,800,000	\$1,800,000	\$1,800,000
7	Operating Cost		\$75,000	\$75,000	\$75,000
8	Project Development Cost		\$1,500,000	\$0	\$0
9	Total Investment	Project Cost + Operating Cost	\$1,575,000	\$75,000	\$75,000
10	Net earnings before taxes - NEBT	Revenue-Op Cost-Project Cost	\$225,000	\$1,725,000	\$1,725,000
11	Tax Rate		20%	20%	20%

Example of CBA Calculation - cont

12	Taxes	$\text{Taxes} = \text{NEBT} * \text{Tax Rate}$	\$45,000	\$345,000	\$345,000
13	Net Earnings after taxes - NEAT (revenues)	$\text{FV Net Earnings} = \text{NEBT} - \text{Taxes}$	\$180,000	\$1,380,000	\$1,380,000
14	Return on Investment - ROI	$\text{ROI} = \text{NEAT} / \text{Total Investment}$	11.43%	1840.00%	1840.00%
15	Time Period "t" in Years from payment of Project Development Cost		1	2	3
16	Time Period "t" in Years from Maintenance Cost Payment		0	0	0
17	Time Period "t" in Years from receiving annual revenues		0	0	0
18	Interest Rate r		5%	5%	5%
19	Present Value (PV Project Costs)	$\text{PV1} = \text{FV Project Cost} / (1+r)^t$	\$1,428,571	\$0	\$0
20	Present Value (PV Operating Costs)	$\text{PV2} = \text{FV Oper Cost} / (1+r)^t$	\$75,000	\$75,000	\$75,000

Example of CBA Calculation - cont

Present Value (PV All Costs)	$PV \text{ All Costs} = PV1 + PV2$	\$1,503,571	\$75,000	\$75,000
Present Value (PV Revenues)	$PV = FV \text{ Net Earnings} / (1+r)^t$	\$180,000	\$1,380,000	\$1,380,000
Benefit Cost Ratio BCR	$BCR = PV_{\text{Revenue}} / PV_{\text{All Costs}}$	0.12	18.40	18.40
Payback Period (months)	$\text{Payback Period} = \text{Proj Cost} / ((\text{Proj Cost} + \text{NEAT}) / 12)$			10.7

Quiz Ch02

1. What is the purpose of the Requirements frame?
2. What is the difference between the product scope and project scope?
3. Is the scope change request related to the product or project scope change?
4. Who do you receive the Cost-Benefit Analysis from?
5. What is the purpose of the Traceability Matrix?
6. What is the purpose of the Project Control Book (PCB)?
7. What is PM role in managing requirements?
8. What is the RM role?
9. What is the Lead Client role?
10. What is the QA Analyst role?
11. What data is coming in through entry points?
12. What data is going out through exit points?

Quiz Ch02 - cont

13. What is the purpose of the Kick-off meeting?
14. Who can authorize your project?
15. Why all inputs and outputs of flow diagrams are numbered?
16. At what point the project closing is required in this frame?
17. What is the purpose of the Project Control Book (PCB)?
18. How often the Business Requirements Document (BRD) modified?
19. Why do we perform Benefit-Cost Analysis at the beginning of the frame process flow (R3a), when much later we have to do it again (R3b)?
20. What is the difference between Traceability Matrix and BRD?
21. Name few components of the Requirements Frame plan.

Quiz Ch02 - cont

22. Why the project may be undertaken when no profits are expected?
23. What is the Requirements Identifier?
24. What is BCA?
25. What is the direct cost?
26. What is the indirect cost?
27. What is the fixed cost?
28. What is the variable cost?
29. What is the sunk cost?
30. What is NEAT?
31. What is ROI?
32. What is Present Value?
33. What is BCR?
34. What is the Payback Period?
35. What is the maximum acceptable Payback Period?