Topic 5
Project Scope Management

Reading
• Schwalbe Chapter 5

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. It defines what is, or is not, to be done.
• **Deliverables** are products/processes produced as part of a project, such as hardware or software, planning documents, or meeting minutes.
• The project team and stakeholders must have the same understanding of what products will be produced as a result of a project and how they’ll be produced.

Question
• What is the relationship between scope and requirements?

Scope vs. Requirements Management
• **Project Scope**: the work that must be done to deliver a product or service.
• **Product Requirements**: the features and functions that characterise a product or service.

Project Scope Management Processes
• **Initiation**: beginning a project or continuing to the next phase.
• **Scope planning**: developing documents to provide the basis for future project decisions.
• **Scope definition**: subdividing the major project deliverables into smaller, more manageable components.
• **Scope verification**: formalizing acceptance of the project scope.
• **Scope change control**: controlling changes to project scope.
Project Initiation

- **Initiation**: The first step in initiating projects is to look at the big picture or strategic plan of an organization
  - Holistic view

- **Strategic planning**: involves determining long-term business objectives

- **Support business**: IT projects should support strategic & financial business objectives

Why Firms Invest in Information Technology

- **Results Produced**
  - Select information technology projects. Assign resources.
  - Define potential projects. Set project priorities.
  - Document key business processes that could benefit from information technology.
  - Information technology planning stages.
  - The information technology strategy must support and align with organization’s overall strategy.

Identifying Potential Projects

Many organizations follow a planning process for selecting IT projects

- Step 1. Develop an IT strategic plan based on the organization’s overall strategic plan
- Step 2. Perform a business area analysis
- Step 3. Define potential projects
- Step 4. Select IT projects & assign resources

Methods for Selecting Projects

- There are usually more projects than available time and resources to implement them
- It is important to follow a logical process for selecting IT projects to work on
- Methods include:
  - focusing on broad needs
  - categorizing projects
  - performing financial analyses
  - using a weighted scoring model
  - implementing a balanced scorecard

Focusing on Broad Organizational Needs

- **Justification**: It is often difficult to provide strong justification for many IT projects, but everyone agrees they have a high value
  - “It is better to measure gold roughly than to count pennies precisely”
- Three important criteria for projects:
  - There is a need for the project
  - There are funds available
  - There’s a strong will to make the project succeed
Categorizing IT Projects

- **Project type**: One categorization is whether the project addresses
  - a problem
  - an opportunity
  - a directive
- **Time**: Another categorization is how long it will take to do and when it is needed
- **Priority**: Another is the overall priority of the project

Question

- Categorise these projects by project type:
  - Bringing a new product to market
  - Improving an existing product
  - Redoing a website
  - Designing a new type of game
  - Make website comply to accessibility guidelines

Types:
- problem
- opportunity
- directive

Financial Analysis of Projects

- Financial considerations are often an important consideration in selecting projects
- Three 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

- Net present value (NPV) analysis is a 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
- The higher the NPV, the better

Net Present Value Example

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Discount rate</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>PROJECT 1</td>
<td>YEAR 1</td>
<td>YEAR 2</td>
<td>YEAR 3</td>
<td>YEAR 4</td>
<td>YEAR 5</td>
</tr>
<tr>
<td>4</td>
<td>Benefits</td>
<td>$9</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>5</td>
<td>Costs</td>
<td>$1,000</td>
<td>$2,000</td>
<td>$3,000</td>
<td>$4,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>6</td>
<td>Cash Flow</td>
<td>$(1,000)</td>
<td>$1,000</td>
<td>$3,000</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td>7</td>
<td>NPV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PROJECT 2</td>
<td>YEAR 1</td>
<td>YEAR 2</td>
<td>YEAR 3</td>
<td>YEAR 4</td>
<td>YEAR 5</td>
</tr>
<tr>
<td>10</td>
<td>Benefits</td>
<td>$2,000</td>
<td>$3,000</td>
<td>$4,000</td>
<td>$5,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>11</td>
<td>Costs</td>
<td>$1,000</td>
<td>$2,000</td>
<td>$3,000</td>
<td>$4,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>12</td>
<td>Cash Flow</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td>13</td>
<td>NPV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that totals are equal, but NPVs are not.

JWD Consulting NPV Example

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Discount rate</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Assume the project is completed in Year 0</td>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Costs</td>
<td>140,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
</tr>
<tr>
<td>5</td>
<td>Discounted costs</td>
<td>140,000</td>
<td>77,200</td>
<td>18,490</td>
<td>4,840</td>
<td>1,200</td>
</tr>
<tr>
<td>6</td>
<td>Benefits</td>
<td>1,000,000</td>
<td>200,000</td>
<td>200,000</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>7</td>
<td>Discounted benefits</td>
<td>1,000,000</td>
<td>778,000</td>
<td>184,900</td>
<td>48,400</td>
<td>12,000</td>
</tr>
<tr>
<td>8</td>
<td>Discount factor</td>
<td>0,925</td>
<td>0,857</td>
<td>0,800</td>
<td>0,750</td>
<td>0,708</td>
</tr>
</tbody>
</table>
| 9 | Payback before Year 1 | 12,000

Figure 1-2: Net Present Value Example

Figure 5-1: JWD Consulting Net Present Value Example
NPV Calculations

• Determine estimated costs and benefits for the life of the project and the products it produces
• Determine the discount rate (check with your organization on what to use)
• Calculate the NPV (see text for details)
• Notes: Some organizations consider the investment year as year 0, while others start in year 1. Some people enter costs as negative numbers, while others do not. Check with your organization for their preferences.

Return on Investment

• Return on investment (ROI) is calculated by subtracting the project costs from the benefits and then dividing by the costs

\[
ROI = \frac{\text{total discounted benefits} - \text{total discounted costs}}{\text{discounted costs}}
\]

• The higher the ROI, the better
• Many organizations have a required rate of return or minimum acceptable rate of return on an investment
• Internal rate of return (IRR) can be calculated by setting the NPV to zero

Payback Analysis

• Another important financial consideration is payback analysis
• The payback period is the amount of time it will take to recoup, in the form of net cash inflows, the net dollars invested in a project
• Payback occurs when the cumulative discounted benefits and costs are greater than zero
• Many organizations want IT projects to have a fairly short payback period

Charting the Payback Period

Weighted Scoring Model

• A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria
• First identify criteria important to the project selection process
• Then assign weights (percentages) to each criterion so they add up to 100%
• Then assign scores to each criterion for each project
• Multiply the scores by the weights and get the total weighted scores
• The higher the weighted score, the better

Sample Weighted Scoring Model for Project Selection

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
<th>Project 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits for intangible outcomes</td>
<td>10%</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Cost of implementation</td>
<td>15%</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Intangible benefits</td>
<td>20%</td>
<td>25</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Benefits for intangible outcomes</td>
<td>25%</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Internal rate of return (IRR)</td>
<td>20%</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Total Weighted Score</td>
<td></td>
<td>75</td>
<td>85</td>
<td>85</td>
<td>75</td>
</tr>
</tbody>
</table>

Weighted Project Score: 75.2, 85.5, 85.5, 75.2

Sample Weighted Scoring Model for Project Selection
Implementing a Balanced Scorecard

- Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy.
- A balanced scorecard converts an organization's value drivers, such as customer service, innovation, operational efficiency, and financial performance to a series of defined metrics.
- See www.balancedscorecard.org for more information.

Project Charters

- After deciding what project to work on, it is important to formalize projects.
- A project charter is a document that formally recognizes the existence of a project and provides direction on the project's objectives and management.
- Key project stakeholders should sign a project charter to acknowledge agreement on the need and intent of the project.

Sample Project Charter

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>Project Manager</td>
<td>Manage project scope and deliverables.</td>
</tr>
<tr>
<td>Jane Doe</td>
<td>Team Member</td>
<td>Contribute to project tasks and deliverables.</td>
</tr>
</tbody>
</table>

Sample Project Charter (continued)

<table>
<thead>
<tr>
<th>Signed: (signatures of all the above stakeholders)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tim Brown</td>
</tr>
<tr>
<td>Jane Doe</td>
</tr>
</tbody>
</table>

Comments: (Printed or handwritten comments from above stakeholders, if applicable)

"This project must be done within ten months of the absolute latest," Mike Jones, CEO. "We are assuming our key team will be available and committed to supporting this project. Some work must be done after hours to avoid weekend disruptions, and everyone will be provided." Jill Johnson and Kim Nguyen, Information Technology Department.

Project Scope Management Processes

- Initiation: beginning a project or continuing to the next phase.
- Scope planning: developing documents to provide the basis for future project decisions.
- Scope definition: subdividing the major project deliverables into smaller, more manageable components.
- Scope verification: formalizing acceptance of the project scope.
- Scope change control: controlling changes to the project scope.
Scope Planning & the Scope Statement

- A scope statement is a document used to develop and confirm a common understanding of the project scope. It should include:
  - a project justification
  - a brief description of the project’s products
  - a summary of all project deliverables
  - a statement of what determines project success
- See the example scope statement in Chapter 3, pages 83-85

Project Scope Management Processes

- **Initiation**: beginning a project or continuing to the next phase
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- **Scope change control**: controlling changes to project scope

Scope Definition

- After completing scope planning, the next step is to further define the work by breaking it into manageable pieces
- Good scope definition helps improve the accuracy of time, cost, and resource estimates
- defines a baseline for performance measurement and project control
- aids in communicating clear work responsibilities

The Work Breakdown Structure

- A work breakdown structure (WBS) is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
- It is a foundation document in project management because it provides the basis for planning and managing project schedules, costs, and changes
Intranet WBS in Tabular Form (Table 5-3.)

1.0 Concept
   1.1 Evaluate current systems
   1.2 Define Requirements
      1.2.1 Define user requirements
      1.2.2 Define content requirements
      1.2.3 Define system requirements
      1.2.4 Define server owner requirements
   1.3 Define specific functionality
   1.4 Define risks and risk management approach
   1.5 Develop project plan
   1.6 Brief Web development team

2.0 Web Site Design
3.0 Web Site Development
4.0 Roll Out
5.0 Support

Table 5-3.

Intranet WBS and Gantt Chart in MS Project 2000

Intranet WBS and Gantt Chart Organized by Project Management Process Groups

Executing Tasks for JWD Consulting’s WBS

Table 5-4: Executing Tasks for JWD Consulting’s WBS

Approaches to Developing WBSs

• Using guidelines: Some organizations, like the 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 detailed tasks and roll them up
• Mind-mapping approach: Write down tasks in a non-linear format and then create the WBS structure

Sample Mind-Mapping Approach
Task

- Develop the WBS for assignments 1 & 2
  - Assignment 1 – Proposal for research paper
  - Assignment 2 – Research paper
- Use the Top down approach
- Use the mind-map approach
- Are the results different?

Basic Principles for Creating WBSs*

1. A unit of work should appear at only one place in the WBS.
2. The work content of a WBS item is the sum of the WBS items below it.
3. A WBS item is the responsibility of only one individual, even though many people may be working on it.
4. The WBS must be consistent with the way in which work is actually going to be performed; it should serve the project team first and other purposes only if practical.

Basic Principles (cont.)

5. Project team members should be involved in developing the WBS to ensure consistency and buy-in.
6. Each WBS item must be documented to ensure accurate understanding of the scope of work included and not included in that item.
7. The WBS must be a flexible tool to accommodate inevitable changes while properly maintaining control of the work content in the project according to the scope statement.

Project Scope Management Processes

- **Initiation**: beginning a project or continuing to the next phase
- **Scope planning**: developing documents to provide the basis for future project decisions
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Scope Verification and Scope Change Control

- It is very difficult to create a good scope statement and WBS for a project
- It is even more difficult to verify project scope and minimize scope changes
- Many IT projects suffer from scope creep and poor scope verification
  - FoxMeyer Drug filed for bankruptcy after scope creep on a robotic warehouse
  - Engineers at Grumman called a system “Naziware” and refused to use it
  - 21st Century Insurance Group wasted a lot of time and money on a project that could have used off-the-shelf components

Question

- Factors Causing IT Project Problems
  - Name and rank them

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*Cleland, David I. Project Management: Strategic Design and Implementation, 1994*
Suggestions for Improving User Input

- Develop a good project selection process and insist that sponsors are from the user organization
- Have users on the project team in important roles
- Have regular meetings
- Deliver something to users and sponsors on a regular basis
- Co-locate users with developers

Suggestions for Reducing Incomplete & Changing Requirements

- Develop & follow a requirements management process
- Use techniques like prototyping, use case modeling, and Joint Application Design (JAD) to get more user involvement
- Put requirements in writing and keep them current
- Provide adequate testing and conduct testing throughout the project life cycle
- Review changes from a systems perspective
- Emphasize completion dates to help focus on what’s most important
- Allocate resources specifically for handling change requests/enhancements

Using Software to Assist in Project Scope Management

- Word-processors help create several scope-related documents
- Spreadsheets help to perform financial calculations, create weighted scoring models, and develop charts and graphs
- Communication software like e-mail and the Web help clarify and communicate scope information
- Project management software helps in creating a WBS, the basis for tasks on a Gantt chart
- Specialized software is available for applying the balanced scorecard, creating mind maps, managing requirements, and so on