

## Chapter III

# Project Selection and Initiation

*If everyone is thinking alike, then somebody isn't thinking.*

(George Patton)

Careful selection of which projects to initiate is vital to the success of an organization. Project initiation represents a future commitment of both human and financial resources as well as of management attention. If a choice is careless or inappropriate, then the consequences may be severe and long lasting. In this chapter, methods for the proper selection and initiation of projects are discussed with regard to overall organizational goals and business justification.

## Organizational Planning

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Organizational planning and the associated decision processes occur at several levels of the company, including the operational level, the tactical level, and the strategic level. This is illustrated in Figure 3.1. The operational level is concerned with day-to-day activities in operating the business, including running the ongoing projects. The management focus at this level is on efficiency, productivity, and quality: managers make sure that things are done right. The tactical level is concerned with short-term planning (i.e., annually). The management focus at this level is on effectiveness, consistency, and accuracy; here, managers make sure the right things are being done. The strategic level is concerned with long-term planning (i.e., 5 to 10 years), and the focus is on competi-

tiveness and the value of the organization’s service and/or products as perceived by the customers and other stakeholders.

Most of this book is focused on the operational level, which concerns the planning, execution, and control of approved projects, thus addressing the question, “Are we doing our projects right?” Project managers play the leading role in this level of management. Chapter XVI examines the strategic level in regard to IT projects, including overall IT governance issues as they relate to project management, the management of broad issues that span multiple projects, and the adoption of special management structures for projects.

Chapter III, however, focuses on the tactical level of an organization and addresses the question, “Are we doing the right projects?” For those types of decisions, although project managers should be involved, business analysts and upper IT management play

Figure 3.1. Organizational management levels

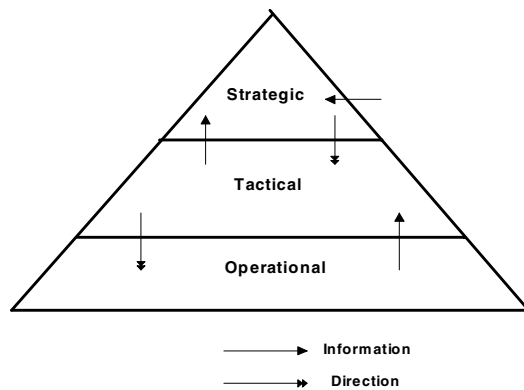
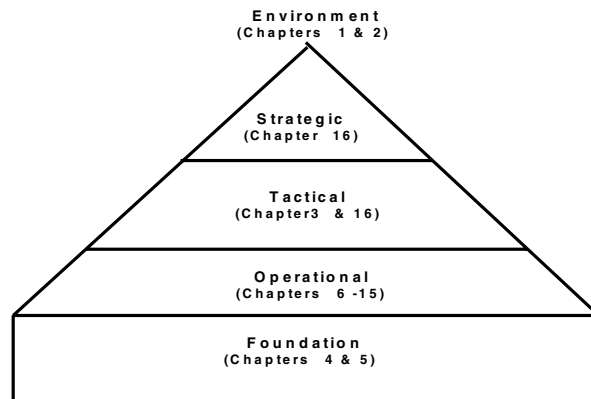


Figure 3.2. Book content vs. organizational levels



the lead role. The layout of this decision-rights-based content by book chapter is illustrated in Figure 3.2.

## Project Initiation

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Projects are initiated from the recognition that (a) there is a problem (or a specific need) to be addressed, and (b) that this problem can be addressed through a project to implement some solution. Problem needs must be quantified (eventually, in terms of requirements for IT projects) for a project to be formally initiated. The general process of refining “needs” into a problem statement is shown in Figure 3.3.

The party that recognizes the problem, the party that articulates the problem, the party that proposes the problem solution, and the party that performs the project may be different parties, either individually or organizationally. Project proposals are developed in the organization(s) in response to requests from managers (top down), from workers (bottom up), and from customers or other stakeholders (external). Proposals are generally reviewed by line management (which may request a detailed business plan), and if approved result in a project charter, which is the official go-ahead document. Project management (when selected and empowered) generally develops a scope statement, which eventually leads to functional requirements (what the proposed system will do), interface requirements, and technical requirements (how it will work). This is illustrated in Figure 3.4.

All the documents shown in Figure 3.4 contain a great deal of uncertainty. The problems and needs that are identified, and then articulated, are inherently fuzzy due to several common circumstances:

*Figure 3.3. Project initiation*

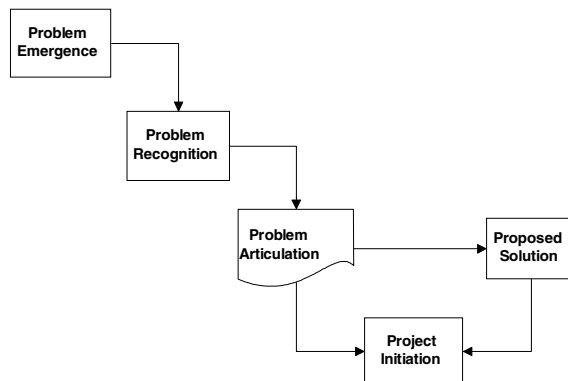
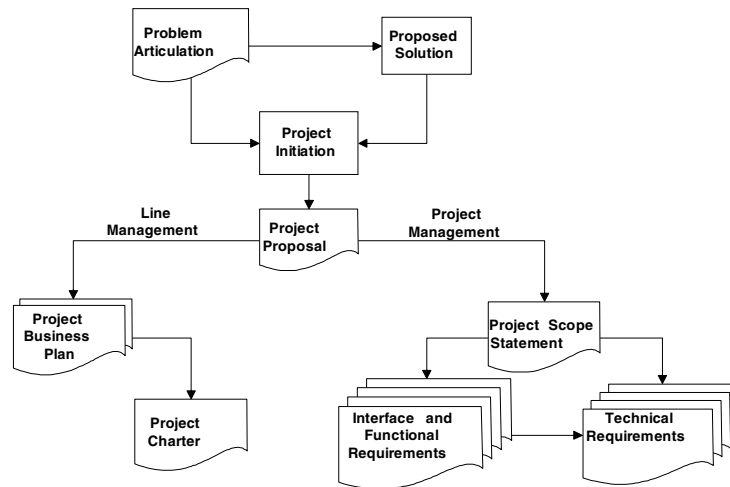


Figure 3.4. Scope and requirement development



- The entire problem is like an iceberg; only a portion of it can be seen
- Customers (end users or benefiting organizations) may be somewhat ignorant or unclear about their true needs
- The needs change in time

In addition, the proposed solution (that is the subject of the project) may be identified prematurely. An end user cannot usually relate the problem to the proposed solution in abstract terms. Customers usually know what they do not want or need much better than they know what they do want or need, or how to best articulate the same. Customers needs to “see” the solution (or a manifestation thereof) before they can verify an effective match between their problem and the proposed solution. In addition, for large benefiting organizations, there may be multiple (and possibly conflicting) views of the problem and alternative solutions thereof. *Effective project management involves a recognition of uncertainty in all the initial documents and plans, and also involves methods and tools that adequately address these uncertainties.* In addition to initial uncertainty and uncertainty that develops as a project proceeds and takes on tangible forms, the end users may see new possibilities, and they may pressure the performing organization for changes and enhancements.

## Project Proposals

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Historically, IT projects have been justified on one or more of the three F’s: fear, faith, or facts. The fear approach uses rational such as:

Our competitors are already developing such a system!

Upper management and shareholders will consider us behind the technology curve if we do not do this!

The faith approach uses rational such as:

Our competitors have done this and it is working for them!

This type of system is part of our IT infrastructure, and we cannot quantitatively justify it like we could an additional factory capital equipment item!

A facts-based project proposal would identify the specific benefits of such a project, the rough costs for developing the project's associated product, some information about the scope of the project, project and product risks and uncertainties, and the key stakeholders that may be involved. Benefits typically involve improving or solidifying an organization's financial position (additional revenue and/or reduced costs) through

Figure 3.5. Project proposal

<u>Project Proposal</u>		
Project Name: _____		Date: _____
Proposing Organization: _____		
Benefiting Organization: _____		
Performing Organization: _____		
Proposed By: _____		
Project Description: _____ _____		
Rough Proposals: Start Date: _____ End Date: _____ Cost: _____		
Measurable Benefits:		
1. _____		
2. _____		
N. _____		
Cost Benefit Analysis: _____ _____		
Major Risks: _____ _____		
Organizational Impact: _____ _____		
Customer Impact: _____ _____		
Key Stakeholders:		
Person	Role/Responsibility	Contact Info
1. _____		
2. _____		
N. _____		
Notes: _____ _____		
Approval for Further Evaluation		
Benefiting Organization		Performing Organization
By: _____		By: _____
Date: _____		Date: _____

improvements to products and/or processes or new products (or services). Sometimes the benefit is not of a direct financial nature but is due to a compliance requirement of some external governing body. IT “benefits assessment” is neither specifically nor fully covered directly in this book; it is a very broad topic and part of the realm of general IT governance and management as opposed to IT project management. Finally, proposals should be formalized, and forms such as that shown in Figure 3.5 may be used.

## **Project Business Plan**

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After a proposal has been approved for further evaluation, a formal business plan should be required that elaborates (via extended research and analysis) all of the items shown in Figure 3.5, including a feasibility analysis and reviewing of alternative methods (and even alternative related project proposals). We say “should be required” because, in reality, many IT projects are funded without a further detail analysis due to organization issues including egos, power/politics, and who controls the purse strings.

With a more formal approach, IT projects would typically undergo feasibility analyses from at least three perspectives: technical feasibility, operational feasibility, and economic feasibility—in other words, Can we build it? Can we maintain it? and Can we make money on it? Economic feasibility typically involves numerical financial techniques. Other dimensions of feasibility may also need investigation for certain types of projects, such as schedule feasibility for a time critical contracting situation, legal feasibility for projects involving multiple companies and jurisdictions, and political feasibility when conflicting interests prevail within an organization or within stakeholders, or where the “balance of power” may change in an organization as a result of the project. The following is an example of the contents for a project business plan:

<b>Project Business Plan</b>
<b>Table of Contents</b>
I. Opportunity
Background
Problem Description/Customer Needs
Market Window
Proposed Solution
Alternative Solutions
Consistency with Organizational Strategy
Critical Success Factors
II. Benefits
Description of Benefits
Mapping of Benefits to Problem Specifics
Quantification of Benefits
Measurement and Verification of Benefits
III. Resources (Schedule, Cost, People, other)
IV. Financial Analysis
Benefit Cost Ratio
Payback Period
Internal Rate of Return

<b>Project Business Plan</b>	
<b>Table of Contents (cont.)</b>	
V. Technical Feasibility	
VI. Operational Feasibility	
Operation	
Maintenance	
Total Cost of Ownership	
VII. Economic Feasibility	
VIII. Organization of Effort/Attention	
Benefiting Organization	
Performing Organization	
Key Stakeholders	
Project Organizational Framework	
IX. Project Impacts	
Performing Organization	
Benefiting Organization	
Other	
X. Initial Risk Assessment	
Internal	
External	
Risk of not Doing Project	
XI. Security	
XII. Other Issues	
Organizational	
Socio-Political	
Legal, Ethical, Environmental, Health, Safety	

## **Financial Evaluation and Selection Methods**

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There are many numerical techniques used to evaluate the net benefit of a project. Most of these are financial in nature and rely on future estimates of revenues and costs. The most elementary technique is the simple *cost-benefit analysis*, which compares the cost to implement a project versus the benefit to be realized. For example, if we build a software system at a cost of \$100,000 and it will save us \$400,000 over the projected program's useful system lifetime of 10 years, the benefit-to-cost ratio would be 4 to 1. A simple return on investment (ROI) calculation can also be made as the ratio of the benefit minus cost over the cost; in this case 300% (300,000/100,000). Payback periods can also be similarly determined. For this example the payback period would be determined by dividing the cost (\$100,000) by the annual benefit of \$40,000 (\$400,000 divided by 10 years) for 2.5 years. *Information Week* (D'Antoni, 2005) recently performed a study of payback periods on IT projects for U.S. companies, and results were as follows:

Less than 6 months—about 30% of projects

Within 1 year—about 35% of projects

Within 2 years—about 20% of projects

Within 3 years—about 15% of projects

The aforementioned financial metrics do not consider the absolute size of the investment or the benefit. Simple cost-benefit analysis is also problematic because it ignores the time value of money. When interest rates are low and short projects are under consideration, this may not be a serious shortcoming. However when interest rates are high (i.e., over 8%) and the projects under consideration are long (over several years), then *net present value* (NPV) techniques should be used. The formula for NPV (or discounted cash flow) is:

$$NPV = \sum (B - C)_t / (1+i)^t$$

Where  $(B - C)_t$  is the benefit minus the cost for period  $t$ , and  $i$  is the interest rate (cost of borrowing money or opportunity cost for other uses of cash). For NPV, benefit minus cost is more formally revenue (cash in) minus expenditures (cash out). Figure 3.6 is an example of a NPV calculation done in a spreadsheet program. The cost column includes development and long-term total cost of ownership (TCO) values. TCO includes the incremental ongoing cost of support, operations, and maintenance (above the status quo). The column for discounted benefit minus cost is calculated from the application of the above formula. Even though the total benefit minus the total cost is \$305,000, the NPV is only about \$44,000 at an interest rate of 10%.

Another similar project financial evaluation technique is called the *internal rate of return* (IRR). This metric is better than NPV because it is not as sensitive to the uncertainties of future benefits and costs and to the future interest rates. The internal rate of return is the value of the interest rate that yields a zero value for NPV; this is sometimes called the return on investment. This can be calculated in spreadsheet programs by using built-in solver tools. Because, in reality, a quadratic equation is being solved, multiple IRR values could be found. Thus one must impose additional constraints on the solution (such as IRR is positive, or in a given range). Figure 3.7 shows the spreadsheet calculation for IRR on the previous example; the IRR here is about 13%.

Projects with the same net present value may have different internal rates of return. Consider the two cases shown in the spreadsheet of Figure 3.8. This is another reason that the IRR is a better way to compare competing projects.

Figure 3.6. NPV cost/benefit analysis

Year	Benefit	Cost	B-C	Discounted B-C
1	\$0.00	\$175,000.00	-\$175,000.00	-\$159,090.91
2	\$0.00	\$175,000.00	-\$175,000.00	-\$144,628.10
3	\$50,000.00	\$25,000.00	\$25,000.00	\$18,782.87
4	\$100,000.00	\$10,000.00	\$90,000.00	\$61,471.21
5	\$100,000.00	\$10,000.00	\$90,000.00	\$55,882.92
6	\$100,000.00	\$10,000.00	\$90,000.00	\$50,802.65
7	\$100,000.00	\$10,000.00	\$90,000.00	\$46,184.23
8	\$100,000.00	\$10,000.00	\$90,000.00	\$41,985.66
9	\$100,000.00	\$10,000.00	\$90,000.00	\$38,168.79
10	\$100,000.00	\$10,000.00	\$90,000.00	\$34,698.90
Total	\$750,000.00	\$445,000.00	\$305,000.00	\$44,258.22
			Interest = 0.1	



Figure 3.7. IRR calculation

Year	Benefit	Cost	B-C	Discounted B-C
1	\$0.00	\$175,000.00	-\$175,000.00	-\$154,728.74
2	\$0.00	\$175,000.00	-\$175,000.00	-\$136,805.61
3	\$50,000.00	\$25,000.00	\$25,000.00	\$17,279.80
4	\$100,000.00	\$10,000.00	\$90,000.00	\$55,001.46
5	\$100,000.00	\$10,000.00	\$90,000.00	\$48,630.33
6	\$100,000.00	\$10,000.00	\$90,000.00	\$42,997.19
7	\$100,000.00	\$10,000.00	\$90,000.00	\$38,016.58
8	\$100,000.00	\$10,000.00	\$90,000.00	\$33,612.90
9	\$100,000.00	\$10,000.00	\$90,000.00	\$29,719.32
10	\$100,000.00	\$10,000.00	\$90,000.00	\$26,276.76
Total	\$750,000.00	\$445,000.00	\$305,000.00	\$0.00
Interest = 0.131011619				

Figure 3.8. IRR vs. NPV

Case 1				
Period	Benefit	Cost	B-C	Discounted B-C
1	0	70	.70	-\$60.87
2	0	50	-50	-\$37.81
3	20	30	-10	-\$6.58
4	90	0	90	\$51.46
5	120	0	120	\$59.66
				NPV: \$5.87
				Interest: 0.15
				IRR: 0.17
Case 2				
Period	Benefit	Cost	B-C	Discounted B-C
1	0	20	.20	-\$17.39
2	0	40	-40	-\$30.25
3	20	50	-30	-\$19.73
4	90	55	35	\$20.01
5	120	12.95	107.05	\$53.22
				NPV: \$5.87
				Interest: 0.15
				IRR: 0.19

## Decision Trees

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The financial aforementioned evaluation methods rely on future estimates of revenues and costs. As the uncertainty in these future estimates increases, the utility of these methods decreases. Decision trees are another project selection technique that considers the impact of uncertainty in the decision process. Decision trees are based on the Bayes (1763) rules of conditional probability, and they are typically implemented in a graphical and/or spreadsheet model.

The basis for decision trees goes back hundreds of years. In the early 18<sup>th</sup> century, an English philosopher and clergyman, Thomas Bayes, devoted his attention to a perplexing problem. Suppose there is a set of events, one of which must happen. It is possible to compute the chance that each will occur through the normal rules of probability. Now suppose that two or more of these events could give rise to the same observation. What is the probability that the observation came from a particular one of the events?

Bayes (1763) was so unsure of his rules that he did not publish them. His results were published by a friend, Richard Price, in 1763. The same results were later verified by the famous French mathematician Marquis de Pierre Simom LaPlace in 1774. His definition for *conditional probability* was:

$$P(AB) = P(B)P(A|B),$$

where P is probability, A and B are events, and | means “conditional.” If A can occur if B does or does not (B' is not B):

$$P(AB') = P(B')P(A|B').$$

Then, because A can occur either way:

$$P(A) = P(AB) + P(AB')$$

$$P(A) = P(A|B) * P(B) + P(A|B') * P(B').$$

For example, there may be a severe winter. Let severe winter be event B, and the probability of B is 0.7. Let event A be the selling of over X units of product. If the winter is severe, the probability of selling more than X units of product is 0.8. If the winter is not severe, the probability of selling more than X units of product is 0.5. What is the probability of selling more than X units, that is what is P(A).

$$P(A) = P(A|B) * P(B) + P(A|B') * P(B')$$

$$\text{Now } P(A|B') = 1 - P(A|B)$$

$$\text{And } P(B') = 1 - P(B)$$

$$P(A) = (0.8 * 0.7) + (0.5 * 0.3) = 0.71$$

This analysis can also be represented graphically, as shown in Figure 3.9.

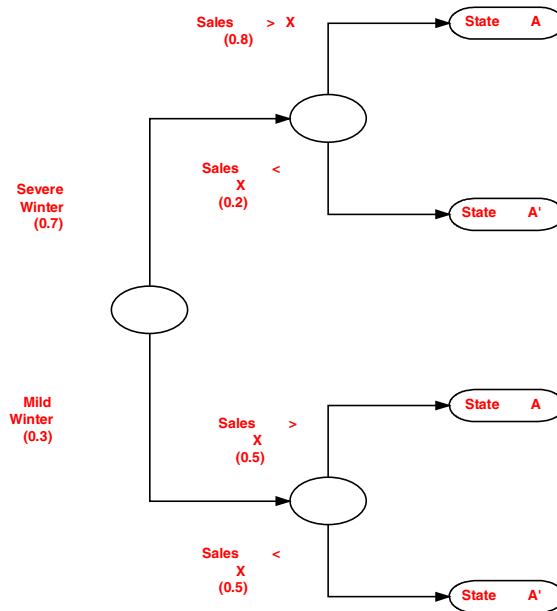
Decision trees are a form of graphical analysis used to select a decision based upon alternatives and their outcomes. The trees can also be implemented via spreadsheets as well as graphs. Each outcome has a probabilistic value. The components of a decision tree are:

“decision nodes”—represented by squares

“alternatives”—represented by circles

“states”—represented by ovals

Figure 3.9. Graphical representation of conditional probability



The states are known in the sense of their likelihood to occur or not to occur, and each state has an outcome measured in dollars of benefit. The alternatives have costs associated with them, as is illustrated in Figure 3.10. The  $P_s$  are the probability of occurrence of each state/outcome for each alternative, and the  $B_s$  are the benefit of each state for each alternative, and the  $C_s$  are the cost of each alternative. The sum of the  $P_s$  for each alternative is unity. The decision on which alternative to choose is based on the calculated EMV (expected monetary value) of each alternative. The EMV of each alternative is calculated by summing each benefit multiplied by its probability:

$$EMV_j = \sum P_{ji} * B_{ji} \text{ (where } i \text{ is the state and } j \text{ is the alternative).}$$

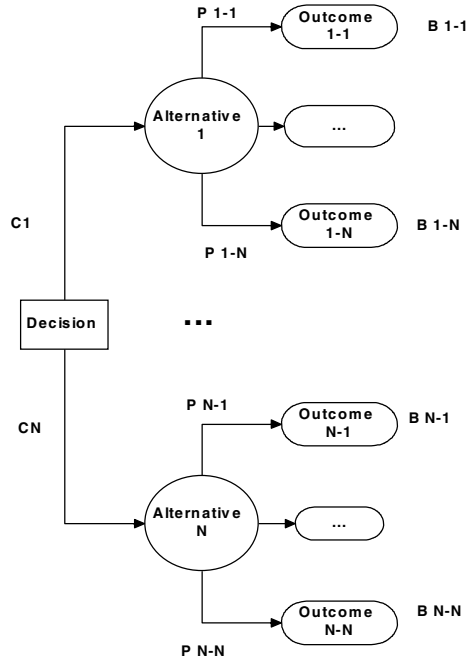
The overall EMV is the greatest  $EMV_j$  of each of the alternatives.

As we add additional layers to the decision tree, the overall EMV is “conditional” upon moving forward to the next level in the tree; here, the next phase of the project. As an example, consider the two-level tree in Figure 3.11 representing a two-phase project. The first phase is to develop a new software application and the second phase is to market that application. In that figure:

$C_d$  = cost to develop

$C_m$  = cost to market

Figure 3.10. Decision tree



- Pts = probability of technical success
- Pbs = probability of market success
- Bbs = benefit of business success
- Bbf = benefit of business failure

The EMV of launching the new application *conditional* to the technical success of developing it is:

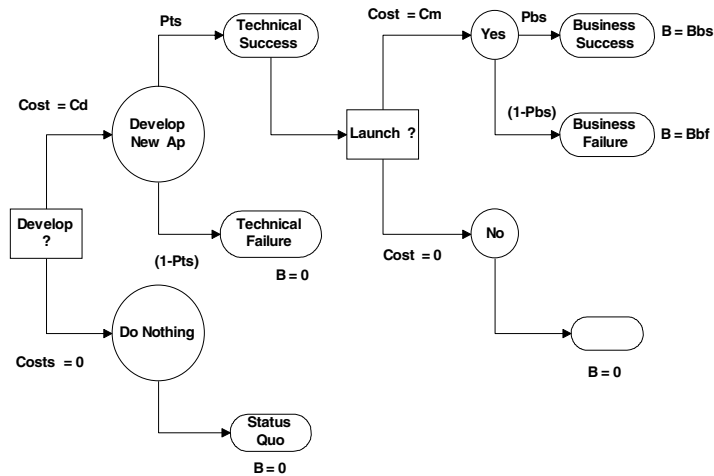
$$EMVb = Bbs * Pbs + Bbf * (1-Pbs) - Cm.$$

The overall EMV is:

$$EMV = EMVb * Pts + 0 * (1-Pts) - Cd = Pts * (Bbs * Pbs + Bbf * (1-Pbs) - Cm) - Cd.$$

For example, if the probability of technical success is .80 and the probability of market success is .70, and the development cost is \$300,000 and the marketing cost is \$100,000, and the benefit is \$1,000,000 over the life of the application for a business success and \$200,000 for a business failure, then the EMV is only

Figure 3.11. Project decision tree



$$EMV = .8 * ((1000000*.7 + 200000*.3) - 100000) - 3000000 = \$228,000$$

as compared to a simple benefit minus cost of \$600,000.

If the development time plus the time to market was several years and the interest rate was high, then one should use NPV in these formulas instead of simple benefit dollars. This is illustrated in the spreadsheet shown in Figure 3.12. Notice that now the EMV for this project has become negative.

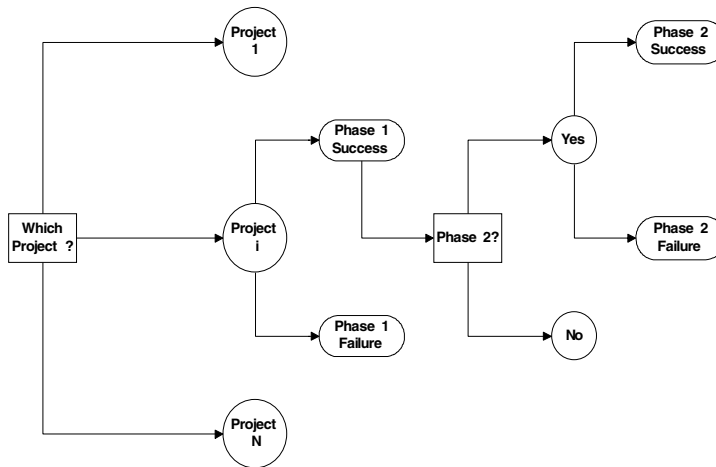
The decision tree depicted in Figure 3.11 and Figure 3.12 could be extended both vertically to add other alternatives and horizontally to add additional phases. This is depicted in Figure 3.13. Here the project with the greatest EMV would be chosen (unless there are other factors to consider as discussed later).

The choice of which project (or projects) to initiate in Figure 3.13 is based upon the calculated EMV, which is based upon estimated costs, benefits, and probabilities of success in each phase. Other approaches can be used which do not rely on probabilities, but on a best case and worst case analysis for the benefit minus cost, or NPV. Here one employs a maximax, maximin, or equally likely approach. The maximax approach picks the maximum of the best case scenario; it is the most risky approach and would be used when the stakeholders were not adverse to risk (speculative). The maximin approach picks the maximum of the worst cases and this would be used with very risk adverse (timid) stakeholders. The equally likely approach averages the best and worst case scenarios. This is illustrated in Figure 3.14. Here we get three different choices based upon which strategy we follow.

Figure 3.12. EMV calculation

Year	Phase	Benefit		Cost		EMV	Discounted EMV
		Business Success	Business Failure	Develop Cost	Market Cost		
1	Develop	0	0	150000	0	-150000	-\$136,363.64
2	Develop	0	0	150000	0	-150000	-\$123,966.94
3	Market	100000	20000	0	50000	20800	\$15,627.35
4	Market	100000	20000	0	10000	52800	\$36,063.11
5	Market	100000	20000	0	5000	56800	\$35,268.33
6	Market	100000	20000	0	5000	56800	\$32,062.12
7	Market	100000	20000	0	5000	56800	\$29,147.30
8	Market	100000	20000	0	5000	56800	\$26,497.62
9	Market	100000	20000	0	5000	56800	\$24,088.74
10	Market	100000	20000	0	5000	56800	\$21,898.86
11	Market	100000	20000	0	5000	56800	\$19,908.05
12	Market	100000	20000	0	5000	56800	\$18,098.23
Totals:		1000000	200000	300000	100000	228000	-\$1,670.70
Probability of Technical Success: 0.8							
Probability of Business Success: 0.7							
Interest: 0.1							

Figure 3.13. Multiphase project decision tree



## Project Scoring Methods

The aforementioned financial evaluation methods rely on future estimates of revenues and costs, either including uncertainty or not including uncertainty. Other methods of scoring that do not rely on entirely future financial estimates can be used in addition to or in replacement of the financial models. These other methods may consider purely strategic considerations or may involve a number of criteria including risk factors, environmental factors, sociological factors, and so forth. Stix and Reiner (2004) classified a number of IT project selection methods, as are represented in Figure 3.15:

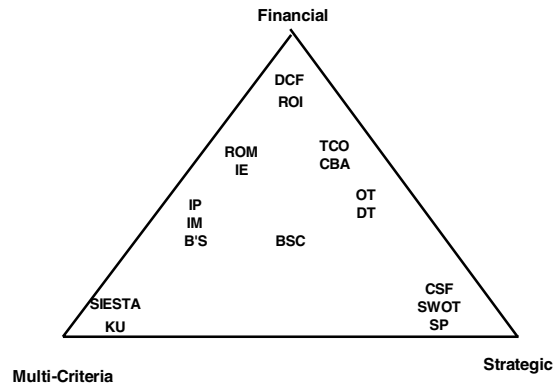
B's—Bedell's Method

BSC—Balanced Scorecard

Figure 3.14. Maximax and minimax calculation

Alternatives	Best Case NPV	Worst Case NPV	Maximax	Maximin	Equally Likely
Project 1	1000000	-600000	1000000	-600000	200000
Project 2	600000	-100000	600000	-100000	250000
Project 3	500000	-50000	500000	-50000	225000
Project 4	700000	-300000	500000	-300000	200000
			Choice: Project 1	Project 3	Project 2

Figure 3.15. Project scoring methods



- CBA—Cost Benefit Analysis
- CSF—Critical Success Factors
- DCF—Discounted Cash Flow
- DT—Decision Trees
- IE—Information Economics
- IM—Investment Mapping
- IP—Investment Portfolio
- KU—Kobler Unit Framework
- OT—Option Theory
- ROI—Return on Investment
- ROM—Return on Margin
- SIESTA—“Siesta” Method
- SP—Scenario Planning
- SWOT—Strengths/Weaknesses
- TCO—Total Cost of Ownership

Although less than 20 methods are illustrated in Figure 3.15, over 100 such methods currently exists (Stix & Reiner, 2004). Each of these methods has pros and cons, and each

method is more applicable for certain types of IT projects and less applicable for other types of projects.

In an attempt to develop more holistic methods, many different scoring and ranking methods have been proposed that include less quantitative and more qualitative metrics for evaluating proposed projects. Most of these methods define a list of metrics with a corporate weighting assigned to each metric; the weightings sum to 100%. Then a score is given to each metric such as a value between 1 and 10 (not all methods use a linear scale). The definition of each metric is usually worded so that a high score is good and a low score is bad. As part of the definition of each metric, examples of the meaning of high and low scores should be specified. For example, in considering technical feasibility, a score of 10 may mean that “this type of project has been done in this organization successfully in the recent past,” a score of 5 may mean that “this type of project has been done in similar types of organizations with success,” and a score of 1 may mean that “we have not seen it done successfully anywhere yet.” Statistically, it is best if the metrics do not interact too much, however in reality many metrics are going to indirectly affect other metrics. Typical metrics include:

- Consistency with Organizational Mission and Goals (1 = *low*, 10 = *high*)
- Technical Feasibility (1 = *low*, 10 = *high*)
- Operational Feasibility (1 = *low*, 10 = *high*)
- Economic Feasibility (1 = *low*, 10 = *high*)
- External Risk (1 = *high*, 10 = *negligible*)
- Internal Risk (1 = *high*, 10 = *negligible*)
- Risk of Not Doing this Project (1 = *high*, 10 = *low*)
- Internal Rate of Return (1 = *low*, 10 = *high*)
- Capital Investment (1 = *very significant*, 10 = *little*)
- Payback Period (1 = *long*, 10 = *short*)
- Degree of Contracting/Outsourcing (1 = *much*, 10 = *little*)
- Development Time (1 = *long*, 10 = *short*)
- Geographical Dispersion of Team (1 = *much*, 10 = *little*)
- Impact on Customer Base (1 = *little*, 10 = *much*)
- Impact on Organization (1 = *little*, 10 = *much*)
- Sociopolitical Impact (1 = *little*, 10 = *much*)
- Environmental & Safety Considerations (1 = *very significant*, 10 = *little*)
- Increase in Organizational Knowledge (1 = *little*, 10 = *much*)
- Increase in Organizational Competitiveness (1 = *little*, 10 = *much*)

In this list, external risks involve factors outside of the performing organization such as market factors, regulatory factors, and the risk of working with a particular customer or benefiting organization (including the risks that the project is inappropriate for the



customer's desired business objective). Internal risks involve the project team, the chosen technology, and other factors inside of the performing organization. These risks are itemized and analyzed later in the book. If a number of projects are being evaluated at one time, one can also use a forced ranking instead of a scale.

In older days, informal versions of this scoring and ranking were often called *murder boards* to eliminated projects from consideration which scored very low in one or more categories. Today, many organizations use modern group decision support software (groupware) to allow a number of stakeholders to come together in a virtual meeting room to score and rank projects. The groupware allows the stakeholders to voice opinions and to score each factor for each project in an anonymous manner. Many organizations today also have a project management office (PMO), which carries out project scoring and ranking directly or facilitates that process for stakeholders and/or line management. PMOs, managing multiple projects, and project portfolio management are discussed further in Chapter XVI.

## Project Stage Gates

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*Project benefit analysis and scoring/ranking also needs to take place as a project proceeds as well as when a project is proposed. As a project proceeds, particularly for long projects, many factors may change, which could make this project less beneficial or make other projects more beneficial.* Factors that may change include organizational factors, customer factors, or environmental factors. In Chapter II, project success factors were discussed and the dual stage gate notion was introduced (a dual gating process was shown in Figure 2.6). Management stage gates are place at regular time intervals (i.e., monthly or quarterly), and quality stage gates are placed at key delivery points for preliminary product manifestations (i.e., requirements documentation, use cases, paper prototypes, working prototypes, test results, etc.). There may be multiple quality stage gates within a management stage gate time interval, or vice versa.

The chosen project benefit metric(s) would be recalculated at each management stage gate using the earned value analysis (EVA) based estimate for the cost at completion; earned value is discussed in detail later in this book. The chosen benefit metrics might be any of those discussed previous such as IRR or scoring methods. It is important that these management reviews do not use sunk cost (how much has already been invested/spent) in determining whether a project should proceed or not; the only cost consideration should be the estimated cost at completion versus the benefit. Keeping a badly performing project alive by consideration of sunk cost is a trap into which many organizations have fallen.

In analyzing the chosen benefit metric(s), the satisfaction criteria needed would be those reported at the previous quality stage gate. Here the customer and other stakeholders have input into the decision as to whether a project should continue, be canceled, or be placed on hold. Canceling a project (as well as normal project close out) are discussed in detail later in the book. The customer's continued support for the project in terms of the overall benefit can be recalculated in light of the latest estimate for the total cost at

Figure 3.16. Stage gate evaluation

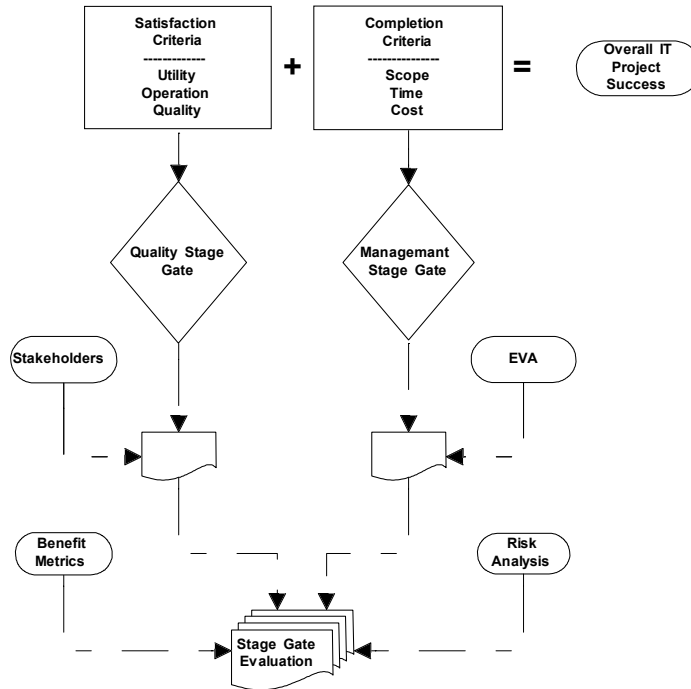


Figure 3.17. Stage Gate Review Form

### Stage Gate Review

Project : \_\_\_\_\_ Period: \_\_\_\_\_

Completion Factors (EVA):  
 Estimated Time to Complete: \_\_\_\_\_  
 Estimated Cost To Complete: \_\_\_\_\_  
 Percent Complete: \_\_\_\_\_  
 Critical Ratio: \_\_\_\_\_

Satisfaction Factors: \_\_\_\_\_ Evaluated By (title, name): \_\_\_\_\_  
 Basis: \_\_\_\_\_ Benefiting Org. \_\_\_\_\_ Performing Org. \_\_\_\_\_  
 Business Justification  
 Validation  
 Workflow & Content  
 Standards  
 Maintain & Support  
 Adaptability  
 Trust/Security

Financial Metrics (recalculated):  
 Benefit/Cost Ratio: \_\_\_\_\_  
 Payback Period: \_\_\_\_\_  
 Internal Rate of Return: \_\_\_\_\_

Risk Status: \_\_\_\_\_ Changes (down, same, up)  
 Probability \_\_\_\_\_ Impact \_\_\_\_\_

Risk 1  
 Risk 2  
 ...  
 Risk N

Issues/Comments: \_\_\_\_\_

completion (EAC). Figure 3.16 illustrate this dual gating review process in regard to benefit metrics.

Figure 3.17 is an example of a stage gate review form. On this form the metrics from the earned value analysis as of a certain time period are recorded which indicate how the project is going from a progress and cost perspective. The next portion of the form concerns the satisfaction factors that are qualitatively evaluated by both the benefiting organization (typically users) and the performing organization (typically business analysts). The basis of the satisfaction scoring is also specified, which would be the last quality stage gate where a product manifestation was available, such as a prototype. Financial metrics are then recalculated based upon the current estimated cost to complete the project and the latest benefit projections. The risks that were identified and quantified at the start of the project are also reevaluated; risk analysis is covered in detail later in the book.

## Chapter Summary

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In this chapter, project initiation and the processes and documents involved with project evaluation from a business perspective were discussed and illustrated. Chapter VI continues with the life of a project after the organization has committed to perform said project. However, before getting to Chapter VI, Chapters IV and V discuss *project management* and *software engineering* from a disciplinary perspective, as these concepts and terms will be used throughout the remainder of this book.

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