

FIGURE 1.11 Transformation of Human-Readable Java Source Code into Machine Code

1.7.1 **Caveats and Complexities**

This subsection describes areas that may require special attention or are especially obtuse or confusing, at least to some readers and practitioners. We also include topics which are potentially controversial or which may require more study outside the scope of this book.

In this chapter, we identify the following areas:

- *Object-oriented life-cycle perspective*—discussed in more detail throughout the book.
- *Translating requirements into scenarios and from there into functions*—arguably the most difficult aspect of software engineering—discussed in more detail in Chapter 3.
- *The nine phases of the Extended Unified Process Model*—these disciplines reappear throughout the book; they warrant your detailed understanding and knowledge as a guide to consistent software development.
- *Effective risk management*—remember that it is important not to just identify risks, but to develop alternative approaches in case they materialize.
- *Project management*—one of the underlying (nonfunctional) workflows that provides control at macro- and micro-levels of project and iterations in terms of time, money, resources, and exceptions.
- *Nonfunctional requirements*—often overlooked, the requirements associated with underlying issues like performance, aesthetics, usability, and availability warrant special attention

1.8 **Example: The Voting Program**

Abstract concepts are often easier to understand when looking at a concrete example. In this section, we examine “the Voting Program,” the case study of a (prototype) software project concept that provides voters with the ability to vote in elections using a simple computer-based interface (electronic voting or “e-voting”).

What information do we have at this starting point in the project life cycle? Only a very brief description of a future project!

This is often how projects get started. Someone somewhere comes up with an idea—in this case developing software for computer-based voting—and has the power to take it the next level of interest within an organization. The next step is to figure out whether the budding project is worth pursuing. This is usually an informal process involving discussion, persuasion, established relationships, and hope.

Once a preliminary, “back-of-the-napkin,” decision is made to investigate the concept further, we embark on the development of the business case and the writing of the Business Plan.²⁶

We suggest that the Business Plan contain at least the following sections:

- 1. Project or System Vision**
- 2. Project Description**
- 3. Stakeholder Analysis**
- 4. Customer Profile**
- 5. Market Analysis**
- 6. Risk Analysis**
- 7. Business Use Case Model and Business Use Cases**
- 8. Competitive Analysis**
- 9. Distribution Plan (Pricing, Packaging, Promotion, Positioning)**
- 10. Financial Plan (Revenue Plan, Budget, Cash Flow Analysis, ROI Analysis)**
- 11. High-Level Project Plan**
- 12. Recommendations**

Next, we examine each of these sections from an overview perspective.

1.8.1 **Project (System) Vision**

The very first element of the Business Plan is the Project (or System) Vision. This statement helps define and delineate the scope of the proposed project:

The Voting Program allows voters to cast their ballots via computer, using a user-friendly, accessible software program.

1.8.2 **Project Description**

The project description provides a paragraph of focused statements about the proposed project in terms of its goals and value.

This program’s purpose is to make voting more accessible to the general public, given the rapid proliferation of PCs around the United States. From the comfort of their home, using the familiar Microsoft® Windows™ interface, voters can securely access ballots and vote for their chosen representative or proposition.

²⁶This also applies, with some modifications, to projects developed for non-profit or public organizations.

1.8.3 Stakeholder Analysis

Now that we have a vision and description that will guide our efforts, we need to figure out who the stakeholders for this project are. Stakeholders are all the people directly or indirectly affected by our project and the implementation of our future IT solution.

A general-purpose voting program has numerous stakeholders, individuals and groups, from voters to politicians to special-interest groups. This analysis may lead us to an early, iterative redefinition of our vision, because we may find that we have to limit the scope of our initial effort to an achievable level. So, instead of listing too many stakeholders and immediately feeling overwhelmed, we redefine our vision as follows:

The initial prototype release of The Voting Program allows the voters of a single district to cast their ballots for one single-candidate election (for example, an election for mayor). (Note that no consideration is given to how to get the voting data off multiple computers for tabulation; the assumption is therefore that for prototype purposes, all the voting will take place on this single computer.)

Now we can envision a reasonably short list of stakeholders:

- Voters in one district (limits the scalability requirements for the program)
- Election officials
- Politicians (mayoral candidates)
- Press
- Designers and programmers, customer support
- Funding source (private individual or group, or public agency)
- Current providers of election materials, equipment, and so on.

1.8.4 Customer Profile

Based on this list, our next step is to develop the customer profile.

In our case, where we will develop this product for use by voters, we will assume that our customer is a public agency and that this agency has agreed to fund the project; we will therefore define the profile of the primary users instead:

Adult eighteen years old or older, registered to vote, with access to a computer with the voting program loaded. The user's skills level will vary from "novice" to "experienced."

1.8.5 Market Analysis

Market analysis provides input based on market research about the project's business environment, including issues of positioning (product characterization), promotion (advertising, naming, etc.), pricing, and packaging/placement (distribution channels).

The market research may consist of user surveys, focus groups, online and publication research, competitive analysis studies, and interviews with industry experts and pundits.

Market analysis provides an important source of project requirements as it studies competitors and determines how to create a product that can be sold profitably.

For the purpose of this example project, we will perform only a limited market analysis by examining some known competing products. In general, we note that this

application can serve a variety of public-service markets, national and international, and that it should be developed to be extensible and support internationalization.

1.8.6 Risk Analysis

The risk analysis section covers potential risks and obstacles and documents planned efforts to address these risks, should they arise.

In developing a system for such potentially widespread use, there are a substantial number of risks. Table 1.1 lists a sampling of them here, limited by the scope of this book example. A real-world project would greatly expand this section.

1.8.7 Business Use Case Model and Use Cases

The Business Use Case section consists of business use cases organized into a Business Use Case Model. This formalized approach allows us to follow a coherent, consistent development process from *concept to deployment*: the Business Use Cases will translate into technical use cases, which in turn will be the source for classes, interfaces, components, packages, and subsystems. All along this development path, we can go back and validate the component functionality against the business and technical requirements captured in the use cases.

The Use Case Model for the Voting Program is shown in Figure 1.12. This model and the business use cases are defined in the subsequent sections. They will be expanded into technical use cases in the next chapter.

The use case model in Figure 1.12 shows the establishment of six business use cases to represent The Voting Program:

- *Authentication*
- *Voter Registration*
- *Ballot Management*
- *Voting Process*
- *System Administration*

TABLE 1.1 Risk Management for the Voting Program

Risk	Risk Management
Data integrity	Use secure transaction-processing data management to ensure data integrity at all points of the process Establish safe data-backup procedures (onsite, offsite storage)
Functional integrity	Use a mission-critical-validated inspection process Perform extensive testing at all levels
Budget, resources	Roll out in controlled environment with parallel operation for beta testing Use object-oriented methodology with careful macro/micro-level planning and iterative development
User acceptance	Validate ease of use with focus groups
Security	Use authentication and transmission security measures (encryption)

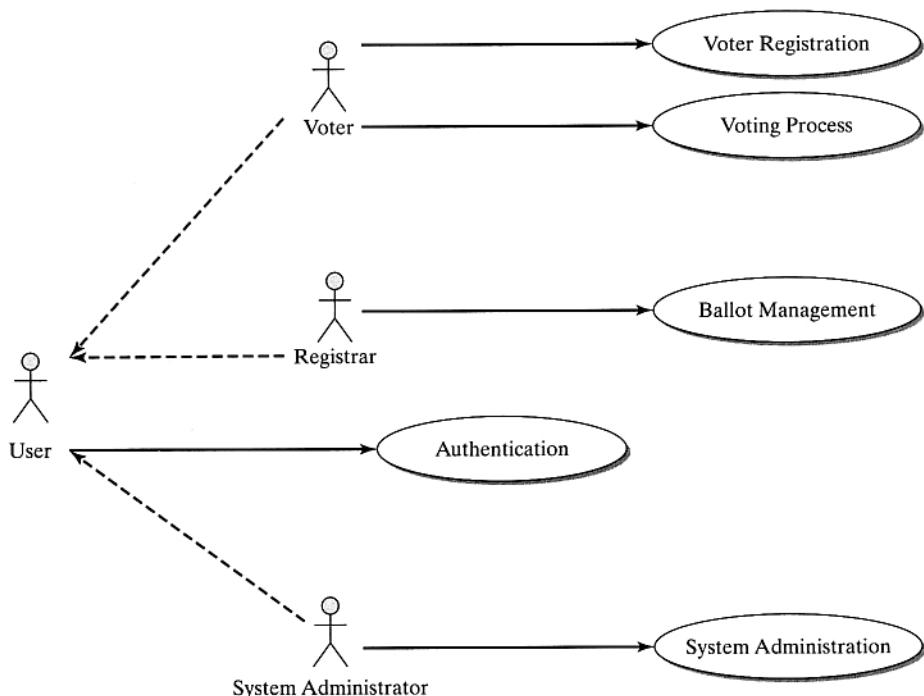


FIGURE 1.12 Business Use Case Model

Business Use Case 1: Voter Authentication

Name:	Voter Authentication
Description:	Allowing voters to log in using an identifier and password while ensuring access only by validated voters. Ensuring that voters cannot vote more than once, but that they can change their vote within a certain period of time.
Actor(s):	End-user: voter
Pre-Conditions:	<ul style="list-style-type: none"> The voter must have an identifier and password, possibly provided by mail The computer must be on, connected to the Internet and a Web browser (program) active
Primary Scenario:	<ol style="list-style-type: none"> Run "The Voting Program" At log-on screen or prompt, log-on with id and password Validate authentication accepted
Secondary Scenarios:	<ol style="list-style-type: none"> Wrong id <ul style="list-style-type: none"> - provide message, allow retry (limit retries?) Wrong password <ul style="list-style-type: none"> - provide message, allow retry (limit retries?) Internal, system, or network error <ul style="list-style-type: none"> - provide message, exit, notify provider - reset database to last committed transaction
Post-Conditions:	<ul style="list-style-type: none"> Arrive on main section screen Provide way to exit or continue

Business Use Case 2: Voter Registration

Name:	Voter Registration
Description:	Accepting new voters into the system. Updating existing voter information. Deleting voters who pass away or move away.
Actor(s):	Registrar—election official
Pre-Conditions:	<ul style="list-style-type: none"> • Administration must be strictly access controlled • Only operators permitted to manipulate voter database may have access • This case assumes that an authorized user has been authenticated
Primary Scenario:	<ol style="list-style-type: none"> 1. Select add, change, or delete 2. Enter information in appropriate fields 3. Validate, confirm, and save changes
Secondary Scenarios:	<ol style="list-style-type: none"> A. Wrong or incomplete entries <ul style="list-style-type: none"> - provide message, allow retry (limit retries?) B. Duplicate record <ul style="list-style-type: none"> - provide message, force resolution (?) C. Internal, system, or network error <ul style="list-style-type: none"> - provide message, exit, notify provider - reset database to last committed transaction
Post-Conditions:	<ul style="list-style-type: none"> • Return to main section screen • Provide way to exit or continue

Business Use Case 3: Ballot Management

Name:	Ballot Management
Description:	Administrative function to seed the program with the appropriate data for a particular election. This includes the ballot itself and the management of the information associated with ballots and votes collected. Also includes the calculation and display of results.
Actor(s):	Registrar—election official
Pre-Conditions:	<ul style="list-style-type: none"> • Administration must be strictly access controlled • Only operators permitted to create or change a ballot or to collect voting information may have access • This case assumes that an authorized user has been authenticated
Primary Scenario:	<ol style="list-style-type: none"> 1. Enter Voting Program Administration Functions 2. a. Create ballot, using input form <ol style="list-style-type: none"> b. Modify ballot, using modify form c. Manage vote tallying and results presentation 3. Provide option to make changes 4. Save ballot
Secondary Scenarios:	<ol style="list-style-type: none"> A. Incomplete ballot <ul style="list-style-type: none"> - save, but mark ‘incomplete’ – do not allow use B. Cannot find previously edited ballot <ul style="list-style-type: none"> - provide message, allow retry C. Internal, system, or network error <ul style="list-style-type: none"> - provide message, exit, notify provider - reset database to last committed transaction
Post-Conditions:	<ul style="list-style-type: none"> • Provide way to exit or continue

Business Use Case 4: Voting Process

Name:	Voting Process
Description:	Allowing voters to complete and submit their ballot.
Actor(s):	End-user—voter
Pre-Conditions:	<ul style="list-style-type: none"> The voter must be logged in and authenticated
Primary Scenario:	<ol style="list-style-type: none"> If more than one active ballot, select appropriate ballot Select candidates/propositions to vote for and select desired button Complete, submit, provide confirmation, and exit
Secondary Scenarios:	<ol style="list-style-type: none"> No ballot <ul style="list-style-type: none"> - provide message and exit No confirmation or internal, system, or network error <ul style="list-style-type: none"> - provide message, exit, notify provider - reset database to last committed transaction
Post-Conditions:	<ul style="list-style-type: none"> Return to main menu, allow user to change ballot and resubmit Provide way to exit or continue

Business Use Case 5: System Administration

Name:	System Administration
Description:	This use case covers the installation program used to first install and then upgrade the program when new versions are available. Given that the program is Web-based, this only affects the server-based components.
Actor(s)	System administrator
Pre-Conditions	The installer must have system privileges to install this program.
Primary Scenario	<ol style="list-style-type: none"> Install or upgrade program, using platform-standard installation procedures Automatic or manual migration of existing data, if needed Validate security on system to ensure no illegitimate access to any functions
Secondary Scenarios	Inability to install, internal, system, or network error <ul style="list-style-type: none"> provide message, exit, notify provider reset database, if necessary
Post-Conditions	System ready to use, existing data accessible

1.8.8 Competitive Analysis

The competitive analysis section examines existing products, providers, market shares, and other aspects of competition.

Especially after the Florida debacle in the 2000 presidential election, a number of existing and new companies embarked on the development of computer-based voting programs.

*Table 1.2 takes a look at some of the competing companies and their products.*²⁷²⁸

²⁷A genuine competitive analysis would include more extensive information in the areas of pricing, positioning, market share, etc.

²⁸From <http://www.cs.uiowa.edu/~jones/voting/>

TABLE 1.2 Voting Program Competitive Analysis

Company	Product	Features/Functions (from product Web sites)*	Comparison to the Voting Program
Danaher Controls (Guardian Voting Systems) http://www.controlsonline.com/gvs/vs.html	ELECTronic 1242® Voting System	<p>In setup and ballot preparation, a single Windows 9x/NT database produces all of your election materials, programs machines and prints ballots—eliminating human errors in design, spelling, and typography.</p>	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support
Diversified Dynamics Inc http://www.divdyn.com/	System 5 DVRS	<p>In the voting process, six redundant memory tables ensure accuracy and security. Each machine continuously monitors its own operation through a self-diagnostic routine performed instantly after each ballot is cast.</p> <p>In tabulating and reporting, vote tallies are completed with the speed and convenience of a PC. Multiple fail-safe audit trails include machine-tables, paper tapes, and final cartridge results.</p>	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support
Election Systems and Software www.essvote.com	iVotronic	<p>Diversified Dynamics' DVRM is a stand-alone paperless electronic voting machine. It is designed to be completely portable, easy to use, secure, and field-upgradeable. The machines have dual power capability, running on either standard A/C power or D-cell batteries. Weighing only 8 pounds, the DVRM is transportable by just about anybody. It is rugged yet stylishly designed and fits snugly in a handsome briefcase style carrier.</p> <p>A single DVRM can store up to 4,000 different ballots with immediate accessibility via a coded smart card. The same ballot can be stored in multiple formats and in various languages and/or visually impaired versions. Ballots from different locations can be stored on a single machine, allowing the vote to be carried to the people—at work, the hospital, nursing home or anywhere where people are immobilized.</p> <p>The DVRM is capable of holding 12,000 individual votes (voted ballots). In cases where more than 12,000 votes are cast on an individual machine, poll workers simply off-load the first 12,000 votes onto a high-capacity smart card and the DVRM is ready to go for another 12,000 votes. This off-loading process takes less than 30 seconds.</p>	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support • Seems to focus on impaired voters

(Continued)

TABLE 1.2 (*Continued*)

Company	Product	Features/Functions (from product Websites)*	Comparison to the Voting Program
Global Election Systems Inc (Diebold) www.diebold.com/ solutions/election/ default.htm	Diebold Election Systems	<p>Ballot feature easily supports voters who are visually impaired, and its portability enables curbside and wheelchair-access voting.</p> <p>Voter intent and ballot correctness are guaranteed prior to ballot casting. Over-votes cannot be accepted by the iVotronic, and the voter is privately alerted to any under-votes during the final ballot-review process. The privacy of all voters—including those visually impaired—is maintained with the iVotronic. Only the voter is informed of the over-vote/under-vote situations, and the involvement of poll officials is not required to replace or correct the ballot.</p> <p>The iVotronic's three independent but redundant memory paths ensure that no votes will ever be lost or altered. Prior to poll opening, one accumulated "zero tape" validates that no votes have been entered into any voter terminal. The precinct level accumulated totals tape provides a double check through verifiable printed documentation of precinct level election results. Also, if an election is ever contested, iVotronic's unique, patented recount system allows replication of the entire election process, including production of all ballot images for re-verification.</p> <p>Each iVotronic unit is, in effect, its own self-contained election system. Thus, any election day malfunction in a single voter terminal has no effect whatsoever on the operation of any other voter terminal in the precinct.</p> <p>The AccuVote-TS system's integrated components are:</p> <p>The AccuVote-TS Ballot Station: The tabulator is a multifunctional interface that counts and tabulates the ballots at precincts on election day and communicates with the host computer at Election Central for accurate and timely jurisdiction-wide results.</p> <p>The Application Software (Global Election Management System or GEMS): GEMS is a powerful multi-user Windows® NT/2000-based software that concurrently and automatically generates:</p> <ul style="list-style-type: none"> • Appropriate ballot styles for each precinct • Postscript ballot files for postal ballots • Precinct-specific media for tabulation • Vote tally files 	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support

(Continued)

TABLE 1.2 (Continued)

Company	Product	Features/Functions (from product Websites)*	Comparison to the Voting Program
Hart InterCivic www.hartic.com/ solutions/eslate. html	eSlate 3000 Judge's Booth Controller™ (JBC 1000)	The Host Computer: The PC-based computer system configured to perform all of the necessary integrated functions of the application software. The eSlate 3000 has a flexible ballot presentation, durable polycarbonate screen, integrated selector, and is secure and affordable. eSlate's JBC 1000s manage the election process in the precinct. The JBC 1000 issues an access code and manages modem transmission to election central headquarters. The JBC 1000 controls up to twelve eSlate 3000s and enables the election judge to know which booths are in use at any given time.	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support
Microvote www. microvote.com	The Infinity Voting Panel MV-464 Voting Machine Internet Ballot Previewing	Has an Internet-based ballot preview-only system Its other system are stand-alone electronic voting machines	<ul style="list-style-type: none"> • Appears to be stand-alone system • Web support limited to ballot previewing
Safevote www.safevote.com	Delta Delta-Net Remote Voting	Delta is a software-DRE that can be used as a stand-alone electronic voting machine. Delta includes the Witness-Voting system, which, without paper and paper costs, is able to prove that every vote counts by verifying whether what the voter sees and confirms on the screen is what is actually recorded and counted. However, paper ballot printouts may be added if desired. Delta-Net: networked DREs, for precinct-based Internet or dial-up voting. Remote Voting: Internet and/or dial-up voting systems.	Only vague information available—no comparison possible
Sequoia Voting Systems www. sequoiavote.com	AVC Advantage AVC Edge Optech Eagle Optech 400C Integrity TeamWork EDS WinEDS	AVC Advantage® (direct record electronic full face ballot voting system). AVC Edge® (direct record electronic touch screen voting system). Optech Eagle® (Optical Scan Precinct Count Voting System) Optech 400C® (Optical Scan Central Count Voting System) Integrity (voter registration and election management system).	<ul style="list-style-type: none"> • Appears to be stand-alone system • No Web support

(Continued)

TABLE 1.2 (*Continued*)

Company	Product	Features/Functions (from product Websites)*	Comparison to the Voting Program
TrueBallot www.trueballot.com/ WebVOTE.htm	WebVote	<p>TeamWork (PC based software package capable of reading DataVote® cards, punch cards, and optical scan ballots).</p> <p>SignaScan (signature verification technology).</p> <p>EDS (election database system).</p> <p>WinEDS (Windows election database system).</p> <p>WebVote®, is TrueBallot's vision of how an on-line Voting system should work. An On Line voting system is only as good as the model on which it is based. TrueBallot designed WebVote® based on its knowledge and experience gained in administering ballots for organized labor and associations. The Internet is another election medium. Whether it is the best one depends on the circumstances. TrueBallot's experience in election administration along with its understanding of election media has led to a flexible, secure, and cost-effective approach for the integration of the Internet into the election process.</p> <p>TrueBallot can provide an entirely new way to participate in the voting process that can be used independently or to supplement and enhance a ScanVote® paper ballot or TeleVote® to ensure security, accuracy and efficiency.</p> <p>With a database of eligible voters, TrueBallot can present variable ballots to different segments of the voter base. Each voter sees only those issues (e.g., national, regional or local) on which he or she is entitled to vote. Depending on the needs of the organization, the same issues may appear on each ballot, but do not necessarily have to WebVote® can be used in combination with any or all of TrueBallot's other systems. The TrueBallot database allows for a multilevel security system to make sure that only eligible voters are permitted to vote and vote only once.</p> <p>Tabulation is virtually instantaneous and reporting is unlimited. TrueBallot ensures the accuracy, safety, reliability and confidentiality of organizational voting. TrueBallot offers an integrated approach to voting, by offering a combination of traditional and electronic balloting methods.</p>	<ul style="list-style-type: none"> • Close competitor
VoteHere.net www.votehere.net	VoteHere Gold	<ul style="list-style-type: none"> • Secure one-time voter access using VoteHere or custom PIN codes 	<ul style="list-style-type: none"> • Close competitor

(Continued)

TABLE 1.2 (Continued)

Company	Product	Features/Functions (from product Websites)*	Comparison to the Voting Program
		<ul style="list-style-type: none"> • Customized ballot support for graphics, biographies, photographs, Web links and organization logos • Support for write-in candidates • Support for multiple ballot styles • Support for multiple precincts • Support for alternate languages • Real-time monitoring of voter turnout and election statistics • Support for alternate authentication methods • Election audit trail produced at the close of each election • Secure communication over the Internet using SSL 	

*All copyrights are those of their respective owners—the products and companies featured here are shown for example purposes only

1.8.9 Distribution Plan

In this section, the Business Plan previews potential product distribution strategies. The four areas typically addressed at this point in the discipline of product marketing are: Pricing, Packaging, Promotion, and Positioning (often referred to as the “Four P’s”). *Pricing* addresses product pricing and requires an understanding of the competitive position of the product and the pricing of competing products, as well as the perceived value of the project in development. *Packaging* addresses how the product is presented to customers: examples would be boxed for retail sale, available on the Internet from download sites, and so on. *Promotion* addresses plans for advertising, public relations, marketing alliances, special introductory pricing, and so on. Finally, *Positioning* complements Packaging in terms of the actual presentation of the product, that is, where specifically the product will be offered for sale, and in relation to what products it will be placed. This also includes a decision on distribution channels, such as direct sales via retail or wholesale channels; or indirect sales through third-party vendors, or via alliance agreements (code licensing).

These considerations taken together allow for a thorough analysis of distribution issues and the creation of a viable product distribution plan.

The Voting Program will be marketed to agencies, public and private, which conduct elections. Software is typically distributed as a **license to use**, not by actually selling the product itself. In this case, election agencies will acquire a general-use license for the product, the size and price of which will depend on the size of the electorate for that agency. Specific pricing will be based on the competitive analysis mentioned earlier. The physical distribution of the product will likely occur on password-protected CD-ROMs with upgrades and updates available over an authentication-protected Web site. Appropriate installation programs for the various supported system platforms and operating systems will be included.

1.8.10 Financial Plan

The Financial Plan section in the Business Plan includes the following subsections:

- **Revenue Plan:** two- to five-year revenue plan includes product sales per product line and per market (direct and indirect channels).
- **Budget:** amount of money needed over time to finance operations, technology acquisitions, marketing and sales, etc.
- **Cash Flow Analysis:** amount of funds available in various forms at any point in time.
- **ROI Analysis:** Return-On-Investment Analysis provides a preview of the profitability of investment capital over time and is directly linked to the “Exit-Strategy” pursued by the company.
- The revenue plan is a critical contributor to the decision-making process, because it allows those who provide funding to the development team to ascertain the key aspects of the financial viability of the project and the likely return on their investment.

It is beyond the scope of this example to provide a detailed financial plan at this point. A summary sample plan (start-up operations) is shown in Table 1.3.

TABLE 1.3 Voting Program Financial Analysis

Revenue Projection	2005	2006	2007	2008	Three-Year Totals
Small licenses (25 seats)		\$ 20,000.00	\$ 40,000.00	\$ 60,000.00	\$ 120,000.00
Large licenses (100 seats)		\$ -	\$ 80,000.00	\$ 240,000.00	\$ 320,000.00
Total license revenue		\$ 20,000.00	\$ 120,000.00	\$ 300,000.00	\$ 440,000.00
Service revenue		\$ 3,000.00	\$ 18,000.00	\$ 45,000.00	\$ 66,000.00
Total Revenue		\$ 23,000.00	\$ 138,000.00	\$ 345,000.00	\$ 506,000.00
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Expenses					
Management	\$ 15,000.00	\$ 30,000.00	\$ 30,000.00	\$ 45,000.00	\$ 120,000.00
Engineering	\$ 30,000.00	\$ 30,000.00	\$ 30,000.00		\$ 90,000.00
Support		\$ 10,000.00	\$ 10,000.00	\$ 15,000.00	\$ 35,000.00
Sales and marketing	\$ 5,000.00	\$ 7,500.00	\$ 7,500.00	\$ 7,500.00	\$ 27,500.00
Equipment	\$ 2,000.00	\$ 2,000.00	\$ 1,000.00	\$ 1,000.00	\$ 6,000.00
Facilities	\$ 12,000.00	\$ 14,000.00	\$ 16,000.00	\$ 16,000.00	\$ 58,000.00
Total Expenses	\$ 64,000.00	\$ 93,500.00	\$ 94,500.00	\$ 84,500.00	\$ 336,500.00
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Gross Profit	\$ (64,000.00)	\$ (70,500.00)	\$ 43,500.00	\$ 260,500.00	\$ 169,500.00

1.8.11 High-Level Project Plan

The macro-level project plan is a first draft, to be populated with greater and more accurate detail later. But it is very important at this early juncture to get an idea of the scope of the project in terms of duration and resources needed, translation into project cost and availability of a finished product. This planning tool will help all parties involved in this project to further develop their contribution and to validate their own predictions and plans.

The sample project plan in Table 1.4 shows how a high-level plan for the Voting Program may look:

Additional charts displaying resources and more detailed milestones would typically be added.

1.8.12 Recommendations

This section summarizes the Business Plan from the perspective of a go/no-go decision. Few Business Plans recommend a no-go decision, as we can assume that such a decision would emerge even before the Business Plan was formally pursued. But if the plan was a commissioned effort for another department or an external organization or customer, a negative recommendation is of course possible. Recommendations state clear and unequivocal next steps and provide a confirmation of the size, scope, and key benefits of the project to its stakeholders.

Given the limited scope of this academically motivated example, a credible recommendation for the Voting Program example is hard to formulate. As the competitive analysis in Table 1.2 shows, there are quite a number of well-established competitors, so this product would have to have compelling technical and/or marketing advantages over products already available from alternative suppliers. For the sake of our ongoing study, we do of course at this point recommend the further development of this project, regardless of its competitive challenges.

1.9 Harmony Design Case Study

1.9.1 Introduction



This case study has been developed to help the reader see the benefit of methodology-based software engineering from the perspective of a practical project. We will examine the **ModelHomeDesigner** project from its earliest, “back-of-the-napkin” concept to its completion and preparation for field deployment.

TABLE 1.4 High-Level Project Plan

ID	Task Name	Duration	Start	Finish	Quarter		3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3rd Quarter		
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	Inception	15 days	Mon 9/1/03	Fri 9/19/03																	
2	Analysis	20 days	Mon 9/22/03	Fri 10/17/03																	
3	Design	25 days	Mon 10/20/03	Fri 11/21/03																	
4	Implementation	90 days	Mon 11/24/03	Fri 3/26/04																	
5	Integration	15 days	Mon 3/29/04	Fri 4/16/04																	
6	Field Test	60 days	Mon 4/19/04	Fri 7/9/04																	
7	Certification	10 days	Mon 7/12/04	Fri 7/23/04																	
8	Deployment	30 days	Mon 7/26/04	Fri 9/3/04																	
9	Start of Support and Maintenance	0 days	Fri 9/3/04	Fri 9/3/04																	