INTRODUCTION

*"The key to every man is his thought. Sturdy and defying
though he look, he has a helm which he obeys, which is
the idea after which all his facts are classified.
He can only be reformed by showing him a new
idea which commands his own."*

—Ralph Waldo Emerson

TRAILHEAD—WHY THIS BOOK?

In this book, we focus on the interplay between business needs and technology capabilities. Our belief in the following premises has motivated its topic and contents:

- Clarity of the business problem is central to getting results from technology projects. Strong functional fit of business solutions happens when the decision processes are value-driven.

- Innovative solutions emerge from understanding needs and appreciating technology capabilities. Because technology options continue to expand, this is not a simple task.

- Creativity rarely happens on its own. For ideas to flow, they need a supportive environment and skillful techniques to bring real people together to dialogue differently and more productively.

- Capabilities serve as a unifying construct across the lifecycle. A capability-based approach can span from the design of new business capabilities and the envisioning of solution capabilities to the specification of software capabilities.

We present two innovations that work together to better connect business challenges to technology enablers for successfully delivering value:

- **Solution Envisioning** is a business, value-driven approach to designing a system that uses *Capability Cases* and scenarios to foster innovation and to validate and increase confidence in the solution.

- **Capability Case** is a solution idea pattern that makes the "*business case for a capability*." By anchoring solution concepts in a language for business situations and using stories, Capability Cases communicate value. Each Capability Case includes applicable technologies and architecture ideas for realizing the capability.

Central to the effort of formulating solutions is the need to envision a desired future. Forging a shared vision becomes possible when the interplay of technology capabilities and business ideas is encouraged and facilitated. For these reasons, we named our process *Solution Envisioning with Capability Cases*.

Each Capability Case can be seen as a best practice for achieving business results. The Solution Envisioning process provides a way to connect these solution concepts to the business situation. Business objectives and the overall business context guide the selection of capabilities. In the same way an architect presents building designs for consideration, *Solution Envisioning with Capability Cases* offers "designs by example" for IT systems.

WHAT IS THE SOLUTION ENVISIONING PROCESS?

Solution Envisioning is a problem-discovery, situation-assessment, and solution-planning process. It was designed to improve the chances of solution success by addressing the risks and challenges present in the early stages of the implementation process. Solution Envisioning embraces a business-centric approach to designing and realizing technology-enabled business capabilities. It *bridges the gap* between Business and IT through the integration of concepts and techniques from both best-of-breed business strategy methods and software development methods.

Solution Envisioning with Capability Cases is designed for use at the front-end of

the software development lifecycle.[1] The process has three phases, with the use of Capability Cases occurring throughout. Figure I.1 illustrates the iterative nature and flow of the Solution Envisioning process. The main deliverable of each phase is shown as the output needed for the subsequent phase. The three phases of Solution Envisioning are

1. **Business Capability Exploration**—Creating the Solution Vision and an initial Business Case
2. **Solution Capability Envisioning**—Creating the Solution Concept
3. **Software Capability Design**—Elaborating and confirming the Business Case and delivering the Solution Implementation Roadmap.
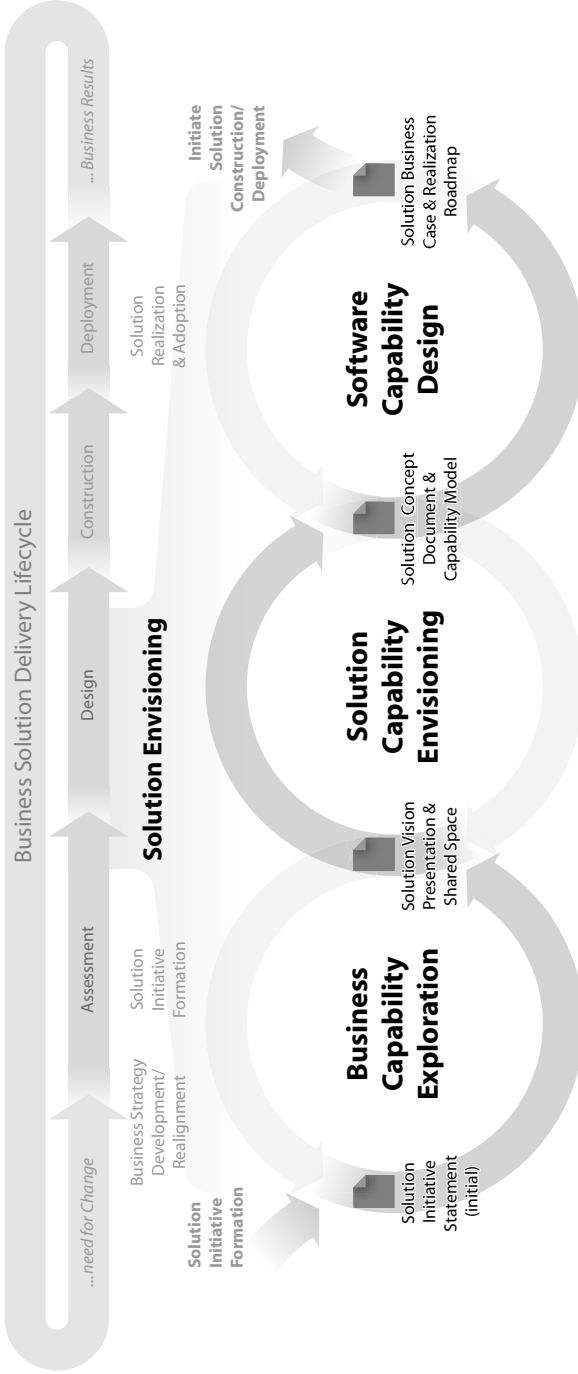
The process supports a consistent, repeatable, and rapid way of progressing from a business-problem understanding to a solution concept. What is often regarded as a mysterious process composed of hit-or-miss activities is transformed into a reliable practice.

Solution Envisioning with Capability Cases has been applied in a number of projects. For example:

- Planning a system to manage engineering designs
- Determining requirements and the technology adoption process for long-term digital archives
- Implementing expertise location and intelligent search for a large services company
- Architecting a wealth management system
- Designing a help desk for a major electronics manufacturer
- Providing citizens with improved access to local and state services

Examples of using Solution Envisioning and Capability Cases in different situations are featured throughout this book. What Solution Envisioning delivers is an agreed solution concept and realization roadmap. These serve as a starting point for building a system using one or more of the well-established software development practices.

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[1] Leading software development processes and methods call this the *Inception* or *Envisioning* phase.

Business Solution Delivery Lifecycle

...need for Change

Business Strategy Development/ Realignment

Solution Initiative Formation

Assessment

Solution Initiative Formation

Design

Solution Envisioning

Construction

Deployment

Solution Realization & Adoption

Initiate Solution Construction/ Deployment

...Business Results

Business Capability Exploration

Solution Initiative Statement (initial)

Solution Capability Envisioning

Solution Vision Presentation & Shared Space

Solution Concept Document & Capability Model

Software Capability Design

Solution Business Case & Realization Roadmap

The overall flow of a complete Solution Envisioning (SE) process can be informally described in terms of these main movements:

Before SE

Pre-a. Formulating a Solution Initiative

Pre-b. Clarifying the business goals and ROI objectives

During SE

1. Confirming business goals and objectives

2. Analyzing the current business situation to understand who is hurting and how

3. Reaching out for someting new – identifying an initial portfolio of capabilities

4. Consolidating an initial solution vision for sharing with a larger set of stakeholders

5. Preparing for and planning a workshop

6. Conducting envisioning workshop to review a solution vision, touring a gallery of capability cases, evaluating and prioritizing capabilities identified for solution

7. Consolidating a Solution Concept as an integrated set of capabilities

8. Determining infrastructure impact; selecting technologies, vendors and products

9. Developing the technical capability architecture for the solution

10. Confirming the business case; producing an implementation roadmap

After SE

Post-a. Constructing, deploying and adopting the solution

Post-b. Realizing ROI; utilizing foundation established for future enhancements

FIGURE 1.1.   SOLUTION ENVISIONING PROCESS: MAIN PHASES AND OUTCOMES.

WHAT ARE CAPABILITY CASES?

A Capability Case definitively identifies an IT Solution Concept as a cohesive group of software functions that deliver business value. Each solution concept is expressed by using a well-chosen name along with a concise intent statement.

An example is shown in Figure I.2 (a color rendition is included in this book's color insert). The *cases* of the capability are provided as one or more short stories of the capability in action.

Example stories of the capability in use are what warrant our use of the word "case" in "Capability Case." These *solution stories* are presented in a standard template that we have found effective for communicating Capability Cases in a summary form. The template has a short statement of intent, a headline of solution stories, and a featured story. A featured story is illustrated by a graphic along with an explanation, a list of business benefits, products used to build the capability, as well as other applicable products and technology options.

The *Visual Navigator* example is about the potential use of information maps in different situations. The additional solution stories listed illustrate how the same capability takes different forms in different business contexts. What is common is the value of presenting complex information in a visual metaphor. Within a single Capability Case, all stories share the same essential capability or generalized concept. The relevance of Capability Cases is critically dependent on having solution stories, real or envisioned, that adequately communicate the value of software functionality to stakeholders. They help to stimulate interest in how technology capabilities can be used innovatively to generate business value.

Systems are rarely created by one person. They result from the collaboration of several people. Quality systems come from convergent collaboration. A shared vision of the system serves to align the decision making of several people across different disciplines. Capability Cases provide the necessary vocabulary.

When Capability Cases are adopted in an organization, they become a vocabulary for talking about future systems. Like any common language, they provide a means for overcoming barriers between different stakeholders. For example, the "Instant Messenger" capability is immediately understood by everyone. The power of Capability Cases lies in establishing a common vocabulary for all components of the *future system*.

They also provide insight into problems by showing how related problems and solutions have worked. "Instant Helper," "Answer Engine," "Concept-based Search," and Semantic Form Generator" are additional examples of such capabilities. This book includes several collections or galleries of Capability Cases.
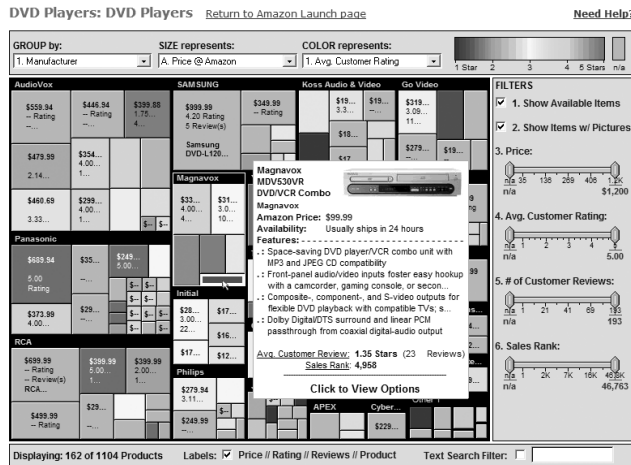
Capability Case:	# Visual Navigator

Intent: Effectively present and summarize large amounts of information by using visualization technologies. Includes ability to navigate and drill-down for more detail.

Solution Stories: map.net, **The Hive Group's Amazon Product Map**, Smart Money Stock Market Map, Visual Navigation at HighWire Stanford, Infoscape Webmap.

The Hive Group's visual map of Amazon products.

Amazon offers a large number of products. Having to make sense of them all when selecting the right one can be overwhelming. Text browsing of categories and product listings does not produce a pleasant shopping experience. The Hive Group solved this problem by allowing shoppers to use visual maps for exploring product categories using visual cues such as group, size, and color. Shoppers are able to change what group, size, and color represent, thereby selecting the criteria that are important to them. In the example, products are categorized (grouped) by being organized according to manufacturer. The size of the product rectangle corresponds to its price. Colors indicate the popularity of the product as reflected by the number of sales. Maps can be filtered on how good the deal is that's being offered (% of discount), product price, and other attributes. Positioning a cursor over a product displays detailed information.

Business Benefits: Improved user experience, ability to find the right product among a large number of offerings, increased sales, shortens the discovery process, ability to intuitively guide users to relevant information.

Featured Products: Honeycomb from The Hive Group

Other Applicable Products: BrainEKP from The Brain Technologies Corporation, DataVista Spectrum from Visualize, Inc., Inxight Star Tree SDK from Inxight Software, Inc., KartOO from KartOO SA, Metis from Computas, WebMap Server from WebMap Technologies.

FIGURE I.2.   Visual Navigator.

Preview of Important Terms for Modeling the Business Situation

To facilitate the process of communicating the nature of the situation and to enable root cause analysis, Solution Envisioning requires a business situation to be expressed in terms of core, characterizing elements. These include *business forces* (or drivers), *challenges*, and desired *results* as seen by multiple stakeholders. Another important element is *essential business activity scenarios*.

Together, with Capability Cases, these concepts form the main vocabulary of terms we use for Solution Envisioning with Capability Cases. Sidebar I.1 gives a brief illustration and explanation of each term.

Forces, results, and solution capabilities become meaningful when connected to the work of the business. It is important that stakeholders are helped in the envisioning and capturing of future business activity scenarios. Forces and results are used to describe and situate the scenario steps they affect and to map to relevant Capability Cases.

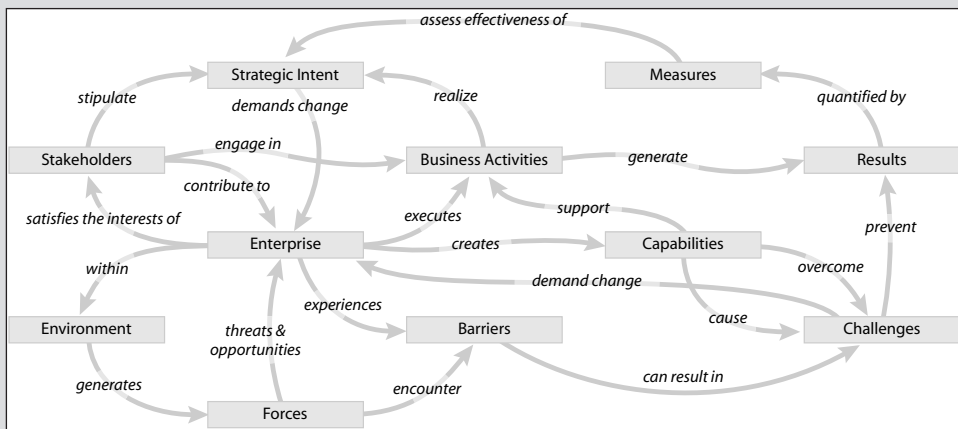## Sidebar I.1   A Vocabulary for Characterizing the Business Context

FIGURE I.3.

An enterprise operates within a business environment. A number of parties populate this environment, including the enterprise's investors, customers, suppliers, partners, solution providers, competitors, regulators, and other influencing bodies. Adding in one more vital group—the employees—this environment is the source of the *forces* that determine the business situation. To counter these forces, the business must have the capabilities and configuration to achieve necessary *outcomes*.

Outcomes derive from the desired *results* the business achieves, but also the contributions that are needed from various stakeholders. The design chosen is the enterprise's *business model*. How the business chooses to bring about these outcomes is its *strategic intent*. To deliver this intent, the business must identify and understand its own *barriers* that stand in the way of certain possibilities for operating. These barriers, together with the new possibilities that the business wants to develop, combine to cause key *challenges* that the business must overcome. The business does this by performing processes that use its *capabilities* and *competencies* in the most optimal ways.

Highlighting the Main Ideas and Threads of the Book

For those who may not read every chapter in order, we hope that the following executive summary, which outlines some of the main ideas and threads, will be useful:

- The role of IT has changed. To fulfill their mission, today's IT departments must become trusted intermediaries between technology providers and business units.
- The failure of business, IT, and users to communicate effectively is responsible for many types of IT project failures, including the failure to realize true business value.
- With the wealth of technology options available to business today, making the right technology selection decisions has become a key challenge.
- Successful solution development using components, packages, and Web Services calls for new methods and new ways of working together.
- Technology decisions are best made by interdisciplinary teams with multiple viewpoints present.
- Effective collaboration requires a common language. Establishing this language between business and IT realizes enormous dividends.
- Capability Cases were designed as a precise communication vehicle between stakeholders. When Solution Envisioning with Capability Cases is adopted in an organization, it establishes a vocabulary for talking about future systems.

- Solution Envisioning is a process for working with Capability Cases to design business solutions. It provides a consistent, repeatable, and rapid way of progressing from a business problem understanding to a solution concept.
- By supporting a dialog on "*What the system could be, and what it could do for the business*," Solution Envisioning becomes an effective enabler of business–IT partnering.
- The deliverable of Solution Envisioning is a conceptual blueprint that serves as a starting point for implementing a business solution using any of the well-established software development practices.

Solution Envisioning with Capability Cases in a Nutshell

The Solution Envisioning process starts with a model of the business situation. Business forces, desired results, and their measures and key business scenarios are identified. Candidate Capability Cases are nominated as a starting point for the solution. Serving as a portfolio of possibilities and solution ideas, Capability Cases encourage creative exploration. Expressed in business terms, the identified solution ideas are mapped to business activities and serve as a shared vocabulary of capabilities, meaningful to all stakeholders. Solution Envisioning continues with the forging of a shared understanding of a solution concept. Technology selection and implementation architecture work then follows.

The Problem Addressed

The business–IT gap is hardly a new topic. Its impact on business and the various approaches for resolving it have been well-chronicled over the last two decades. Many methodologies have come and gone. Structured methods were superseded by object-oriented methods, the waterfall lifecycle by the spiral lifecycle, and informal tools by Computer-Aided Software Engineering (CASE).

Although these approaches to systems analysis and design helped technical people translate requirements into code, they did little to ensure that the right problems were being addressed. Everything rested on the quality of requirements. Verification—"Are we building the system right?"—was more the focus than validation—"Are we building the right system?" Many of these techniques had the reputation of being too cumbersome, slow, and static even at the time they were first introduced. Since then, business expectations of rapid IT solutions have changed by orders of magnitude.

Not surprisingly, a keen interest developed in Rapid Prototyping, Joint Application Development (JAD), and Rapid Application Development (RAD).[2] Each was motivated by the desire to have business people and developers work together to identify what the users really need. These techniques were all designed for custom software development. Today, Agile Methods,[3] in some ways, can be seen as following in the tradition of RAD and JAD [Beck, 1999; Cockburn, 2001b].

Solution Envisioning, having the same motivation for "Rapid Validation" and "Shared Understanding," adopts techniques from JAD and the Agile Methods. What is new is the creative, connective, and expressive power afforded by our use of Capability Cases—*creative* in that they provide a rich space of solution possibilities and stimulate innovative thinking; *connective* because they bridge the worlds of business and IT by using business language to connect solution concepts to business situations; *expressive* because they use solution stories to convey "the case for the capability."

While software development methods were maturing, business strategy and business design methods were also evolving. Porter's Five Forces and Value Chain models gave business people a language for talking about business contexts and for exploring how networks of value could inform business strategy [Porter 1985]. Senge's *systems thinking* work provided techniques for understanding business dynamics [Senge, 1990; 1994]. Kaplan and Norton introduced a business performance measurement approach called the *Balanced Scorecard*, developing their ideas into a method called *Strategy Maps* [Kaplan, 2001; 2004]. Because business today is inseparable from the technology that enables it, these approaches began to enter the world of IT.

In another space, the field of management science, two notable developments for problem understanding and structuring emerged: Checkland's SSM (Soft Systems Methodology) [Checkland, 1981; 1990, Wilson 1984] and Eden's and Ackermann's use of mapping techniques in SODA (Strategic Options Decision Analysis) [Rosenhead, 1989]. SSM has endured well into the present day. Its ideas on conceptual models of the problem and root definitions of viable solutions are used within our Solution Envisioning Method. SODA has evolved into a method for business strategy formulation [Eden, 1998]. We adopt some techniques from these approaches in our work.

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[2]   JAD overcame the slow and faulty communication and feedback that causes a traditional process to fail. Rapid Prototyping uses prototypes to explore what is of interest to the stakeholders. RAD incorporates principles from Tom Gilb's Evolutionary Development [Gilb 1988] with RP and JAD to support fast iterations.

[3]   www.agilealliance.org.

Taken on their own, none of these software development, problem-modeling, and business methods addresses "bridging the gap" between business and IT. We found that we had to combine elements from a number of these approaches along with pattern language ideas and decision support techniques for technology selection to build our Solution Envisioning approach.

Today, the acceleration of business and technology change has made it a challenge to choose and become proficient in a development method that will assure timely business results. Because today's technology offers the ability to quickly deploy very powerful solutions, organizations often elect to jump directly into these solutions rather than go through a traditional business requirements process. Simply stated, businesses cannot justify the benefits and do not have the time to use rigorous methodology.

One response is component-based approaches and Web Services. These have simulated a renewed interest in a dynamic reuse-based approach to constructing IT solutions. We are motivated to bring reuse to the earliest part of the development lifecycle and present *Solution Envisioning with Capability Cases* as a method for the appreciation, reuse, and adaptation of solution concepts. Of particular relevance is the way Capability Cases are useful for component-based strategies for developing solutions, such as Service-Oriented Architectures with Web Services.

When Can Solution Envisioning Be Used?

Simply stated, any project that has to consider how technology can make a difference is a perfect candidate for Solution Envisioning with Capability Cases. The process can be used both to create new solutions and to improve existing solutions. For assembling pre-made (packaged) components, it offers an effective way to identify, select, and establish an integration plan. For defining new capabilities, it invites stakeholders to consider a more comprehensive set of solution possibilities.

The problems that Solution Envisioning addresses are the key to the success of any technology project. However, we note that there are projects where these problems are especially critical—in fact, where they dominate the effort. These are the projects that target the creation of new business capabilities through the adoption of emerging or "breakthrough" technologies. With the increasingly rapid evolution of technology, these cases are becoming more of the norm than the exception. Here,

we find ourselves inventing new names for capabilities, envisioning stories of their potential value, and inviting stakeholders into creative discourse. A current example is Semantic Web Technology,[4] a disruptive technology that is emerging rapidly.[5] This book includes a number of Capability Cases that use Semantic Technology.

A TRAIL MAP FOR THE BOOK: THE JOURNEY AHEAD

Structured as three integrated but separable parts, this book is accessible to readers ranging from business executives to practitioners to change agents and practice leaders:

Part I explains the rationale for and business value of using Solution Envisioning. The intended audience includes C-level executives, IT managers, business analysts, and solution architects responsible for making decisions about technology investments.

Part II is a practitioner's handbook that provides a step-by-step guide in three progressive phases: *Business Capability Exploration*, *Solution Capability Envisioning*, and *Software Capability Design*. Practitioners include those responsible for organizing, conducting, and participating in solution envisioning engagements: business decision makers and analysts, enterprise architects, project managers, technology specialists, and software developers.

Part III answers the question: "How do we set up, tailor, and implement Solution Envisioning as a practice?" Through example cases, it shows how Solution Envisioning can be adapted to the needs of different situations. For change agents, champions, and others charged with implementing best practices, it provides additional guidance for planning, setting up, tailoring, and implementing Solution Envisioning.

The chapters in Part II of this book include a collection of techniques that are part of the Solution Envisioning method. These include critical thinking, root cause analysis, and exploration of known solution examples. We have also included a number of templates to assist the reader in developing key work products, such as a business case, concept of operations, architectural decisions, and non-functional requirements.

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[4]   Key W3C standards, OWL and RDF/S, that support the Semantic Web became official recommendations on 2/10/2004.

[5]   One of the authors, Ralph Hodgson, co-authored a book with Jeff Pollock that featured many Capability Cases for Semantic Technology [Pollock, 2004].
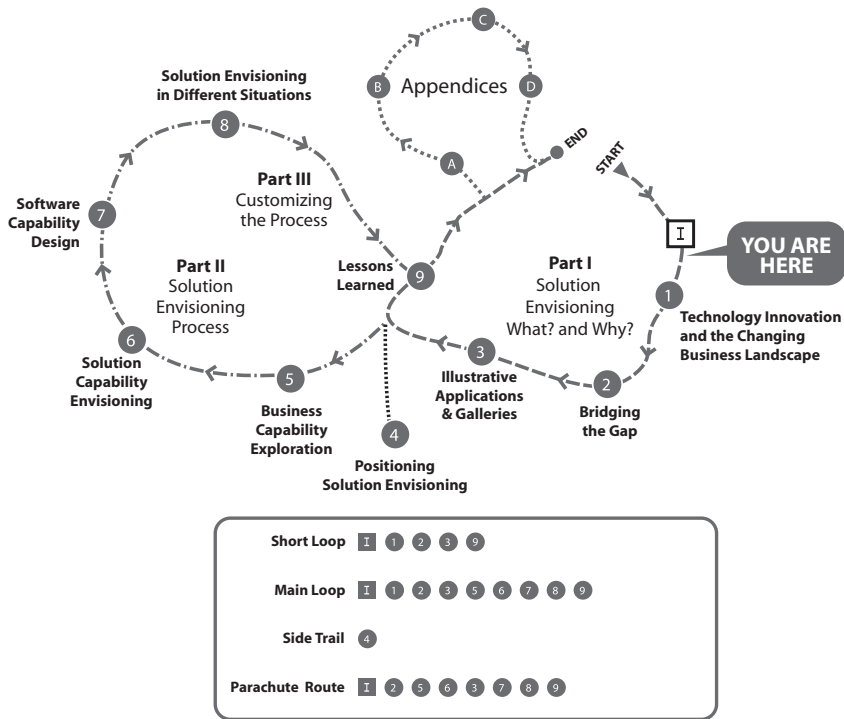
FIGURE I.4.

The end of this book provides indexes for techniques and templates. Although these techniques are an integral part of Solution Envisioning method, they can be (and have been) used productively on their own.

There are a number of ways to approach this book. Some suggested routes are depicted in the following trail map:

The core sequence of chapters is represented in the trail map as the "Main Loop."

Senior IT managers and business people may want to focus on the Introduction, Chapters 1, 2, 3, and 9—a "short loop." For a more a comprehensive overview, we recommend also reading Chapters 4 and 8. Some readers may also want to consult Appendix A.

Some readers may want to quickly jump into a more in-depth exposure to the process and techniques. They are likely to be experienced practitioners very familiar with the issues surrounding the business–IT gap and the recent changes in the world of business technology. We recognize these readers could become frustrated by the fact that we do not get into the details of Solution Envisioning and step-by-

step instructions of applying it until Chapter 5. We suggest these readers take the "parachute route." This covers Chapters 2, 5, 6, 3, and 7, in that order, and, optionally, Chapters 8 and 9 for tips on getting started. Many of these readers may also want to consult the extra material in Appendices B and C.

Chapter 4 is an optional side excursion that may provide useful insights to many readers, whether taken in order or revisited. It explores the intent and design of Solution Envisioning, examining what makes it different and where it fits in the overall solution delivery process.