

HOW TO DISSOLVE  
TOMORROW'S CRISIS...  
TODAY

# IDEALIZED DESIGN

>CREATING AN ORGANIZATION'S FUTURE<

*"There is no excuse for any manager not to read about one of the most significant developments in management of and for the 21st century."*

*—Ian Mitroff, The Marshall School of Business, USC*

RUSSELL L. ACKOFF | JASON MAGIDSON | HERBERT J. ADDISON

# Idealized Design

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# IDEALIZED DESIGN

## Creating an Organization's Future

Russell L. Ackoff  
Jason Magidson  
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Prentice Hall

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# DEDICATION

**Russell L. Ackoff**

*In memoriam to Aron Katsenelinboigen*

**Jason Magidson**

*To my parents, who have always encouraged and empowered*

**Herbert J. Addison**

*To Gerry, my wife and life's companion*

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# CONTENTS AT A GLANCE

FOREWORD BY RAY STATA	xxiii
PREFACE	xxix
INTRODUCTION: THE BIRTH OF AN IDEA	xxxiii
<b>PART I: IDEALIZED DESIGN: THE BASICS</b>	<b>1</b>
CHAPTER 1: THE STAGES OF IDEALIZED DESIGN	3
CHAPTER 2: ORGANIZING THE PROCESS	27
CHAPTER 3: PREPARING FOR AN IDEALIZED DESIGN PROCESS	43
<b>PART II: IDEALIZED DESIGN: APPLICATIONS— THE PROCESS IN ACTION</b>	<b>59</b>
CHAPTER 4: BUSINESS ENTERPRISES	61
CHAPTER 5: NOT-FOR-PROFIT AND GOVERNMENT ORGANIZATIONS	87
CHAPTER 6: PROCESS IMPROVEMENT	103
CHAPTER 7: PROBLEM DISSOLVING	117

CHAPTER 8: FACILITIES AND SITES DESIGN	129
CHAPTER 9: TAKE THE PLUNGE	137
<b>PART III: IDEALIZED DESIGN: NO LIMIT— APPLICATIONS TO WORLD CHALLENGES</b>	<b>145</b>
CHAPTER 10: THE URBAN CHALLENGE	147
CHAPTER 11: THE HEALTH-CARE CHALLENGE	159
CHAPTER 12: THE CHALLENGE TO GOVERNMENT	171
<b>PART IV: COMPLETE IDEALIZED DESIGNS</b>	<b>187</b>
CHAPTER 13: ENERGETICS (BUSINESS ENTERPRISE)	189
CHAPTER 14: ACADEMY OF VOCAL ARTS (NOT-FOR-PROFIT)	219
CHAPTER 15: WHITE HOUSE COMMUNICATIONS AGENCY (GOVERNMENT)	235
ENDNOTES	265
ANNOTATED BIBLIOGRAPHY	267
INDEX	277

# CONTENTS

FOREWORD BY RAY STATA xxiii

PREFACE xxix

INTRODUCTION: THE BIRTH OF AN IDEA xxxiii

**PART I IDEALIZED DESIGN: THE BASICS 1**

**CHAPTER 1 THE STAGES OF IDEALIZED DESIGN 3**

The Evolution of Idealized Design 4

The Process of Idealized Design 5

    Idealization 5

    Realization 7

Constraints and Requirement 8

Anticipating the Future 9

Effects of Idealized Design 11

    Promotes Understanding 11

    Transforms Designers' Concept of Feasibility 12

    Simplifies the Planning Process 13

Enhances Creativity	13
Facilitates Implementation	15
Idealized Design at General Motors	15
Idealization	17
Realization	19
The Outcome	23
Summary	25

## CHAPTER 2 ORGANIZING THE PROCESS 27

Who Should Be Involved?	27
Frequency and Duration of Design Sessions	31
Facilitators	32
Recording the Sessions	32
Procedural Rules	33
Constrained and Unconstrained Designs	35
Consensus Design	37
Conference Facilities and Equipment	39
Summary	40

## CHAPTER 3 PREPARING FOR AN IDEALIZED DESIGN PROCESS 43

Formulating the Mess	44
The Mess-Formulating Team	48
Presentation of the Mess	48
Preparing a Mission Statement	51
Specifying the Properties Desired in the Design	54
Summary	57

## PART II IDEALIZED DESIGN: APPLICATIONS— THE PROCESS IN ACTION 59

### CHAPTER 4 BUSINESS ENTERPRISES 61

Common Content of Designs	62
Repetitive Design Features	63
The Internal Political System	63

The Internal Economy	68
Organizational Structure	71
Organizational Learning and Adaptation	75
A Supermarket Chain at the Crossroads	82
Effects of the Super Fresh Design	85
Summary	86

## **CHAPTER 5 NOT-FOR-PROFIT AND GOVERNMENT ORGANIZATIONS 87**

An Opera School Reinvents Itself	88
Attracting the Best Students	89
Expanding and Improving the Facility	90
Increasing the Number and Quality of Performances	90
Raising Money	91
Visiting Nurses Face a Financial Crisis	92
Reorganizing Communications in the White House	96
Summary	101

## **CHAPTER 6 PROCESS IMPROVEMENT 103**

Internal Markets Transform Internal Monopolies	104
Opening a Company's Computing Services to Competition	104
Solving the Perennial Problem of Transfer Pricing	106
Transforming a Procurement Process	107
Facilitating a Joint Venture	112
Summary	115

## **CHAPTER 7 PROBLEM DISSOLVING 117**

The Four Ways of Treating Problems	117
Ending Labor Violence on City Buses	119
Improving Productivity at Coated Papers	122
Preserving an Organization That Preserves Life	126
Issuing Licenses in Mexico City	127
Summary	128

## **CHAPTER 8 FACILITIES AND SITES DESIGN 129**

Improving Sales by Improving the Layout of a Store	130
Improving the Quality of Air Travel	132

General Objectives	133
Entering the Plane	133
Getting Seated	133
In the Air	134
Onboard Lobby and Bar	135
Summary	135

## CHAPTER 9 TAKE THE PLUNGE 137

Overcoming Today's Crisis	138
Making a Good Organization Better	138
Making Work More Satisfying	139
Overcoming Obstacles to Idealized Design	139
Psychological Obstacles	140
Procedural Obstacles	140
Overcoming Psychological Obstacles	141
Overcoming Procedural Obstacles	142
Summary	144

## PART III IDEALIZED DESIGN: NO LIMIT— APPLICATIONS TO WORLD CHALLENGES 145

### CHAPTER 10 THE URBAN CHALLENGE 147

An Urban Automobile	147
A Redesign of Paris and Beyond	153

### CHAPTER 11 THE HEALTH-CARE CHALLENGE 159

A National Health-Care System	159
The Design	161
The Effects of the Design	164
An Application	164
A Health-Care Mall	165

### CHAPTER 12 THE CHALLENGE TO GOVERNMENT 171

A National Election System	172
Ballots	172
The Obligation to Vote	173

Political Parties	173
Platforms	173
Campaigns	174
Terms of Office	174
A New United Nations	175
Introduction	175
Desirable Properties of a New United Nations	176
Governance of the Union	177
Getting into the Union	178
Separation from the Union	180
Conditions of Continued Membership	180
Services Provided by the Union	180
The Rights of Member States	181
A Response to Terrorism	181
Resources	183
Development	183
Democracy	184
Corruption	185
Monitoring	185
Collaborative Development Reduces Terrorism	185

## **PART IV** COMPLETE IDEALIZED DESIGNS 187

### **CHAPTER 13 ENERGETICS (BUSINESS ENTERPRISE) 189**

Introduction	189
The Internal Economy	193
Organizational Structure	197
Organizational Learning and Adaptation	202
Human Resources Development	210
Expectations	211
Feedback on Performance	212
Compensation and Benefits	212
Recruiting and Hiring	213
Job Postings	214
Termination, Resignation, and Retirement	214
Personnel Policies Audit	215
Communications	215
Community Relations	216
Facilities and Equipment	217

**CHAPTER 14 ACADEMY OF VOCAL ARTS (NOT-FOR-PROFIT) 219**

- Introduction 219
- The Organization Involved 220
- The Planning Process 220
- The Application 223
- What Has Been Done 228
- Results 228
- Impact Assessment 229
- Conclusion 232
- References 233

**CHAPTER 15 WHITE HOUSE COMMUNICATIONS AGENCY  
(GOVERNMENT) 235**

- Introduction 235
- Meet WHCA 237
- Setting the Stage 238
- Enter the Change Agent 239
- Understanding the Culture 241
- Key Cultural Influences 244
- Getting Started 245
- Changing the System 246
- Organizational Redesign 248
- Board Structure and Participation 252
- Results 254
- Other Changes 255
- Managing Fear 257
- Role of Leader 258
- Holding the Gains 259
- Further Study 260
  - Organizational Design 261
  - Organizational Psychology 262
- Note 262
- References 262

ENDNOTES 265

ANNOTATED BIBLIOGRAPHY 267

INDEX 277

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# ABOUT THE AUTHORS

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Dr. Ackoff played a key role at the University of Pennsylvania, both in the early history of the Operations Research Group and in establishing the Social Systems Sciences Graduate Group. Since becoming Emeritus, he has been honored by the establishment of the Russell L. Ackoff Endowment in the Wharton School and The Ackoff Center for the Advancement of Systems Approaches in the Engineering School, through which his legacy at the University of Pennsylvania continues.

**Jason Magidson** is currently director of innovation processes at GlaxoSmithKline, where he has engaged employees, suppliers, and customers in developing innovations, new insights, and breakthroughs in a wide range of processes. In the procurement function, he and his team used idealized design to help the company save hundreds of millions of dollars. For more than 20 years, Jason has engaged end users—the source of most innovations—in product, service, system, and organizational design. He has applied innovation methods with numerous Fortune 1000 organizations and nonprofits. Jason has also written

for publications including *Harvard Business Review* and the *Journal of Product Innovation Management*. He received his undergraduate degree in Business Administration from the Wharton School of the University of Pennsylvania and a Ph.D. from the Union Institute & University.

**Herbert J. Addison** has spent his career in book publishing, the past 20 years of which he was a sponsoring editor at Oxford University Press specializing mostly in business and management books for practicing managers, business students, and business academics. In 2000, he formally retired and has continued to work as a consulting editor and writer in business. He has written a brief history of business that appeared in *The New York Times Guide to Essential Knowledge* (2004). That history, together with a glossary of business terms that he also wrote, constituted the entire entry in that subject. He is a member of the Academy of Management and serves on the Advisory Board of the Ackoff Center for Advancement of Systems Approaches at the University of Pennsylvania.

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# FOREWORD

Russell L. Ackoff, no doubt one of the greatest management innovators of our time, has been one of the most important influences in my understanding of management theory and practice, even though I discovered him late in my professional career. His application of systems thinking and his penetrating insights into human and organizational behavior have enriched my thinking about how to radically improve management processes and business results. None of his many contributions to management thinking is more important than the subject of this book, idealized design and interactive planning.

Idealized design has its greatest benefit when an organization or a part thereof finds itself at a crossroad, where incremental improvement of past business models and practices will no longer assure future success, and in fact, may even precipitate a crisis. Historically, the pace of business change was such that a formula for success, once discovered, would, with incremental improvements, endure for many years if not decades. Today, in many industries, disruptions occur at such a rate that there is little momentum to business success. As Andy Grove, former CEO of Intel, said, “Only the paranoid survive.” In an environment of such radical change, a new approach to planning is called for where continuous innovation and breakthroughs in every aspect of business is a way of life. Idealized design is the best approach I’ve found to cope with latent, if not actual, crisis and to respond with radical change. But also in less-dramatic ways, this methodology can be applied to more specific challenges such as redesigning a compensation program, improving the business planning process, or turning around a troubled division.

At my company Analog Devices, in the late 1980s, after two decades of profitable growth that averaged 25 percent per year, we

hit the wall as growth slowed to single digits and profits plummeted. We did not have a systematic way to diagnose why our formula for success was breaking down or how to manage the radical change that would be required. So, as a complex, billion-dollar company, we stumbled for more years than we should have in discovering the source of the impending crisis. That's when I learned about Russ Ackoff and his principles of systems thinking.

Until then, I believed in the KISS theory of management, "Keep It Simple Stupid." Our formula for success was to hire the best and brightest engineers, to focus on technical innovation for competitive advantage, to divide the company into small divisions differentiated by technology, and to give these divisions as much autonomy as possible and require that they stand on their own bottom line. These divisions, except for a shared sales organization, were run almost as independent businesses with their own manufacturing and ways of doing business. Competition between divisions for the best technical approach to designing and manufacturing a similar class of functional integrated circuits was seen as a spur to innovation. This formula worked exceedingly well for low-volume customers, in military, industrial, and scientific markets, who could afford to pay high prices for the very best performance. But as our business shifted to high-volume customers in consumer, communications, and automotive markets, where price and quality were more important, this approach was not working. As we thought about change, our beliefs got in the way. First, we believed that if every part of the organization were optimized for success, then the performance of the corporation as a whole would be optimized. We believed that in a technology-driven business, you couldn't be held accountable for P&Ls unless you owned manufacturing. We believed you couldn't manage engineers unless they were within walking distance from your desk. These beliefs seriously constrained our flexibility to consider other possibilities.

The first lesson I learned from Russ was that the performance of an organization depends more on how the parts work together than on how they work separately; and thus, if you optimize the performance of the parts, as we were doing, you systematically

suboptimize the performance of the whole. I learned that collaboration is a more powerful force than internal competition and that the job of leaders is to manage the interactions of the parts, not their actions. I learned that solving one problem at a time doesn't work when radical transformation is required. The challenge was to dissolve the mess—that is, the system of interrelated problems that were precipitating the crisis.

Following the principles of systems thinking and the process of idealized design, we in fact “blew up” the organization (read Chapter 1, “The Stages of Idealized Design,” and you will see what I mean here) and reassembled the parts and business processes to more effectively compete in markets that were very different from those in which we built our early success.

The changes we made were so dramatic and far reaching that we referred to the process as “Creating the New Analog.” We centralized manufacturing and standardized business processes across the organization. We integrated competing product groups into worldwide, strategically focused, geographically dispersed product teams. It took many years to iron out the wrinkles, to unlearn our beliefs from the past, and to learn new skills, attitudes, and behaviors. But step by step, we restored the growth of analog devices and opened exciting new opportunities for future success. We avoided the crisis that could have destroyed the company.

Systems thinking embedded in idealized design played a powerful role in uncorking the potential synergy and collective energy that had been bottled up by the way we were organized and by the way we thought about value creation. The most important lesson we took from idealized design was learning to focus attention of the key players from product groups and functional disciplines on the purpose and mission of the company as a whole and then freeing and encouraging them to think collectively and creatively about the best way to structure the interaction of the parts to achieve shared goals and objectives. This requires new ways to think about roles in the organization. Implementing interactive planning and idealized design certainly does not mean abandoning the fundamentals of accounting, marketing, engineering, and other disciplines, nor does it mean failing to do the usual financial

assessments of risks and returns for alternatives and initiatives resulting from interactive planning. What it does mean is subjugating these disciplines to the pursuit of broader organizational objectives that are meaningful in systemic terms and that fit with the organizational competencies and opportunities available. This does not happen easily or automatically because vested interests, experience, beliefs, fears, prejudices, and limited understanding and appreciation for how an organization functions outside an individual's sphere of influence get in the way of open, objective dialog about new ways for product groups and functional organizations to work together. So it takes nudging, facilitation, patience, and sometimes a little force to achieve alignment. A sense of crisis, real or envisioned, by the mess formulation process of interactive planning as described in this book helps to reach agreement.

In reflecting on my experience, if I had it to do over again, I would have stuck closer to the script of idealized design. At every step along the way, the framework and principles of idealized design guided my thinking and actions as we "Created the New Analog." But I did not formalize idealized design principles sufficiently in the company's top-to-bottom planning process. Had I done so, a larger number of people in the company today would be more skilled in thinking about the business as a system, more focused on dissolving messes than solving problems, and bolder in shedding shackles and constraints of what is and imagining a more ideal future, even when a looming crisis does not motivate behavior. It is one thing to mount a major idealized design process to address a significant corporate-wide challenge that threatens the underpinnings of the company. It is quite another to make interactive planning an enduring way of life in every aspect of business planning, large and small. Among other things, this requires the development of staff expertise to facilitate ongoing idealized design projects, and it requires an idealized redesign of the business planning process itself.

This book, through many applications, provides rich evidence of the effectiveness of idealized design as well as a guide to implementing the process itself. These case studies and step-by-

step descriptions of how the process works make it possible for you to initiate the interactive planning process even without the benefit of an experienced facilitator. These examples also illustrate just how universal this methodology can be in tackling a very broad range of challenges. As discussed in Chapter 10, “The Urban Challenge,” idealized design points to possible solutions and approaches to dissolving even the most daunting and perplexing messes in which the world finds itself today, such as education, health care, and poverty. The lasting benefit of studying this book is that it enables readers to better understand and improve the world in which we live and work through the lens of systems thinking and the practical, useful approaches embodied in the idealized design process.

Ray Stata

Chairman, Analog Devices

Chairman, Center for Quality of Management

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# PREFACE

No idea has had as much effect on the professional and personal lives of the first two authors of this book as idealized design. It has influenced everything we do in our professional lives—for one of us, as a former professor now emeritus, and the other, head of a staff unit at GlaxoSmithKline. In every case described in this volume, one or the other of us, or both, were directly involved.

What is idealized design? The answer is in the Introduction, in which we explain not only what idealized design is but also describe its extraordinary origin as a powerful tool of management.

The cases presented here constitute only a small sample of the cases on which we have had the opportunity to employ idealized design. We have tried to select as diverse a group of applications as possible to reveal how broad is the applicability of the process. We have never been confronted with a problem or opportunity to which idealized design has not been applicable.

In a sense, idealized design has been much more than a way of doing our work; it has been a way of life. There is little either one of us is called in to do that is not affected by the use of idealized design. There is no limit to its relevance where problems or opportunities are involved.

Idealized design has been described in a number of books but never in as much detail or with as many illustrations as we provide here. Unfortunately, words cannot convey the power of the procedure nearly as well as experiencing it. We hope that the vicarious experiences we provide here will entice the readers to explore the process on their own.

Involvement in the process is a liberating experience. Moreover, it is *fun*. It provides an opportunity to reactivate the creativity we had as children but lost on the “way up.” It is a “soft idea” that lends itself to fashioning to suit specific situations. It is not a process cast in concrete. It involves at least as much art as science.

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## ABOUT THE AUTHORS AND THE “AUTHORS’ VOICE”

This book has three authors who have contributed differently to it. Russell L. Ackoff is the central figure in the development of idealized design. Not only did he initially grasp the potential of the process to revolutionize how organizations can change today to better shape the future, but he has also been the leading thinker in developing the way the process is implemented in the real world of organizations that we describe in this book.

Jason Magidson was a long-time student and colleague of Ackoff’s and participated in many idealized designs before he joined a major pharmaceutical firm. In his present position, he continues to use the process in a variety of applications. He has contributed examples of idealized design to the book, as well as helped to shape the advice we provide to managers about how to begin and implement the process.

Herbert J. Addison has spent his career in book publishing, with the past two decades devoted mainly to publishing books in

business and management for practicing managers, business academics, and business students. His contribution is confined to helping to shape the final book for its intended readership of practicing managers.

Inevitably, when a book has more than one author, there will be a blurring of what is often called the “author’s voice.” The book you hold in your hands does not reflect the distinct voice of any one of its three authors—least of all the voice of Russell L. Ackoff. Thus it can be said to have an “authors’ voice” that is a blend of the three. But there is one exception. In Chapter 1, “The Stages of Idealized Design,” Ackoff steps forward and describes in his own distinctive voice how he first experienced idealized design—including mistakes he made and the amazing outcome of the experience. His co-authors recommend that you read one or more of Ackoff’s books listed in the Annotated Bibliography for a full experience of the authentic Ackoff voice.

Russell L. Ackoff

Jason Magidson

Herbert J. Addison

January 3, 2006

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# INTRODUCTION: THE BIRTH OF AN IDEA

"Gentlemen, the telephone system of the United States was destroyed last night."

—CEO of Bell Laboratories

Idealized design is a way of thinking about change that is deceptively simple to state: In solving problems of virtually any kind, the way to get the best outcome is to imagine what the ideal solution would be and then work backward to where you are today. This ensures that you do not erect imaginary obstacles before you even know what the ideal is.

Nothing better illustrates the power of this idea in action than the experience that one of the authors, Russell L. Ackoff, had many years ago. The experience both enlightened him and proved to him that the idea could facilitate profound change in a major corporation. To relate the experience, this author "steps forward:"

In every life, there are seminal experiences that exert their influence on a great deal of experience that follows. The one that is responsible for this

book took place in 1951. I was then a member of the faculty of Case Institute of Technology in Cleveland, Ohio. (It had not yet merged with Western Reserve University.) On a consulting trip to New York, I drove down to Bell Labs in Murray Hill, New Jersey, to see Peter Meyers, a manager whom I'd met when he had come to Case to recruit promising graduate students for the labs.

It so happened that on the day of my visit he and other managers had been summoned to an important—but last-minute—conference by the vice president of Bell Labs. After some hesitation, Peter Meyers said, “Why don’t you come with me?” I pointed out it was a meeting for section heads and I was not even an employee of the labs. He said that no one would know the difference.

We arrived at a typical classroom that held about forty people and was almost full. The vice president was not there yet. Nor did he appear on time. This was very unusual. He was a big man, extroverted, and voluble. He could not get near someone without punching, pinching, pushing, hugging, or pounding them on the back.

About ten minutes after the hour, the door to the room squeaked open. All eyes turned to it, and there he was. He was obviously very upset. He was a pasty gray and bent over as he slowly shuffled down the aisle without a word to anyone. He mounted the platform, stood behind the podium, put his elbows on it, and held his head in his two hands, looking down.

The room was dead silent. Finally, he looked up and in an uncharacteristically meek voice said, “Gentlemen, the telephone system of the United States was destroyed last night.” Then he looked down again.

The room broke out in a hubbub of whispered conversations saying that his statement was not true. Many in the room had used a phone that morning. The vice president looked up and said, “You don’t believe the system was destroyed last night, do you? Some of you probably used the phone this morning, didn’t you?” Most of the heads in the room shook with assent.

The vice president began to tremble with rage. He shouted, “The telephone system was destroyed last night and you had better believe it. If you don’t by noon, you’ll be fired.”

He then looked down again. “What was wrong with the VP?” everyone was asking each other. But because discretion is the better part of valor where one’s boss is involved, the whispers stopped as all waited for further word from him and an explanation of his erratic behavior.

The vice president looked up and glowered at the group. Then he suddenly straightened up, his normal color seemed to return, and he broke out in a great big belly laugh. All those in the room also began to laugh. They did not know why they were laughing, but it released the tension that his unusual behavior had created. It began to dawn on all of us that his behavior had been a trick.

After the laughter died down, he said in his normal voice with his normal demeanor, “What was that all about? Well, in the last issue of the *Scientific American*,” he said, “there was an article that said that these laboratories are the best industrially based R&D laboratories in the world. I agreed, but it got me thinking.”

He reached into the inside pocket of his jacket and withdrew a piece of paper and said, “I’ve made a list of those contributions to the development of telephonic communications that I believe have earned us this reputation. Before I share my list with you, I’d like your opinions. What do you think are the most important contributions we have ever made to this development?”

Almost every hand in the room went up. He called on one of those with a raised hand. He said, “The *dial*.” “Right,” said the vice president. “This is certainly one of the most important. Do any of you know when we introduced the dial?” One in the room volunteered a date in the 1930s. The vice president agreed. He then asked, “When was it developed?” No one knew.

He said he had not known either but had looked it up before he came to the meeting. He said, “It was before 1900.” We were surprised to say the least. He pressed on, asking for another candidate. The next one offered was *multiplexing*, a way of transmitting multiple conversations simultaneously over one wire. This yielded an enormous increase in the capacity of AT&T’s network. “Right,” the vice president repeated. He once again asked when it has been introduced. Someone knew it had been between the two world wars. The vice president confirmed this and asked, “When was it invented?” No one knew. Again he revealed that it was before 1900.

He asked for one more suggestion. The person he called on said, “The *coaxial cable* that connected the United States and Great Britain.” The vice president agreed and asked when it had been built. Someone knew: 1882.

“Doesn’t it strike you as odd,” he said, “that the three most important contributions this laboratory has ever made to telephonie communications were made before any of you were born? What have you been doing?” he asked. “I’ll tell you,” he said. “You have been improving the parts of the system taken separately, but you have not significantly improved the system as a whole. The deficiency,” he said, “is not yours but mine. We’ve had the wrong research-and-development strategy. We have been focusing on improving parts of the system rather than focusing on the system as a whole. As a result, we have been improving the parts but not the whole. We have got to restart by focusing on designing the whole and then designing parts that fit it rather than vice versa. Therefore, gentlemen, we are going to begin by designing the system with which we would replace the existing system right now if we were free to replace it with whatever system we wanted, subject to only two not-very-restrictive constraints.”

“First,” he continued, “let me explain why we will focus on what we want right now, not out five or ten years. Why? Because we know that where we say today we would like to be five years from now is not where we will want to be when we get there. Things will happen between now and then that will affect our goals and objectives. By focusing on what we want right now, we can eliminate that potential source of error.”

“Second, why remove practically all constraints? Because if we don’t know what we would do now if we could do whatever we wanted, how can we know what to do when we can’t do everything we want? If we knew what we would do with virtually no constraints, we could modify it, if necessary, to become feasible and adapt it to changing internal and external conditions as time goes on.”

“Now, here are the two constraints. First, *technological feasibility*. This means we cannot use any but currently available knowledge. No science fiction. We can’t replace the phone with mental telepathy. The second constraint,” he said, was that “the system we design must be *operationally viable*. What does that mean? Because we are not changing the environment, it means that the system must be able to function and survive in the current environment. For example, it will have to obey current laws and regulations.”

The vice president then said, “This group is too large to operate as a single group. Therefore, I am going to divide you into six subgroups of about six each, each with responsibility for a subsystem. Each group will select a representative to meet with other representatives at least once a week to discuss interactions. Let me explain.

“Each group will be able to design whatever it wants as long as it does not affect any other group’s design. If what a group wants to do does affect one or more other groups’ designs, it must get their agreement before it can be included in their design. I can tell you in advance,” he said, “that the groups will do little that does not affect other groups. At the end of the year,” he said, “I want to see one completely integrated system design, not six subsystem designs. I don’t even want to know what the individual teams came up with. Is that clear?” he asked.

He created a “long lines” (inter-city communication) team, a “short lines” (within city communication) team, a switching stations team, two other teams, and finally the telephone set team, on which I found myself with my friend Peter Meyers.

When the meeting was adjourned, the teams immediately gathered so that their members got to know each other. When

Peter introduced me to the other members of our team, they thought it very funny that an “outsider” had successfully invaded their meeting. But, they said, the vice president had not precluded their use of “outsiders.” Therefore, they invited me to participate in the effort. As a result, I spent a great deal of time in the next year with that team. What a learning experience it was!

The first meeting took place after lunch that day. The seven of us, six from the labs and I, met in a small breakout room. After the amenities, we discussed where we should begin. We decided to list the properties we wanted a telephone to have. We noted suggestions on a pad mounted on an easel. The first few were as follows:

- Every call I receive is intended for me—no wrong numbers.
- I want to know who is calling before I answer the phone so I need not answer it if I don’t want to speak to the caller.
- A phone I can use with no hands.
- A phone that comes with me wherever I am, not one I have to go to in a fixed location.

We continued to add to this list for several weeks, ending with just more than ninety properties we wanted a phone to have. These properties became very complicated near the end. For example, we wanted to be able to talk simultaneously to groups in multiple locations, see all of them, and be able to transmit documents or charts instantaneously.

But we ran dry. We noted, however, that we had designed nothing yet, so decided to try our hands at it. We decided to select the first property on our list—no wrong numbers—and see if we could design a phone that met this requirement.

At this point, I almost destroyed my credibility in the group by pointing out that there were two kinds of wrong numbers. One consisted of having the right number in one’s head but dialing it incorrectly. The other consisted of having the wrong number in one’s head and dialing it correctly. One member of

the group immediately pointed out that if one had the wrong number in one's head and dialed it incorrectly, one might get the right number. Fortunately, the group decided this was too rare to be of concern but that the percentage of wrong numbers of each type was of concern.

Here I was able to save my credibility a bit because I knew the head of the psychology department at the labs. I called him using the phone in the room. After the amenities, I asked him if he had ever done any work on wrong numbers. He exploded on the other end of the line. It was minutes before I could understand him. It turned out that he had been doing work on wrong numbers for a number of years, and I was the first one to ask him about it. He wanted to unload all his results on me. I had to convince him otherwise. After he calmed down, I learned that four out of five wrong numbers were the result of incorrectly dialing the right number in one's head. We decided to go to work on this.

An amazing thing happened; in less than an hour, we found a way, conceptually, to reduce, if not eliminate, such errors. We replaced the dial by—what did not exist at that time—a small handheld calculator. There were ten keys, one for each digit, a register, and a red key in the lower-right corner. The phone was to be used as follows. Leaving the phone “on the hook,” one would put into the phone the number one wanted to call by pressing the appropriate buttons. These numbers would appear on the register. If these numbers, on examination, appear to be correct, one would lift the receiver and the whole number would go through at once. If the number on the register was wrong, one would press the red button in the corner. This would clear the phone, and one would start over.

We were very pleased with ourselves, but nevertheless we recognized that we did not know whether such a phone was technologically feasible. (The handheld calculator was not yet available.) Therefore, we called a department of the lab that worked on miniaturization and asked for technical help. They sent two young men down to our meeting. They appeared to be fresh out of school, still wearing their intellectual diapers.

As we described what we were trying to do, they began to whisper to each other and were soon more absorbed in their private conversation than in what we were saying. This bothered us, but such behavior was not entirely unexpected in an R&D laboratory. However, they suddenly got up and hurried out of the room with no explanation. We were furious but decided to let it pass for the time being. We went on to another property.

Several weeks later, the two young men appeared at one of our sessions looking sheepish and apologetic. They said, "You probably wondered why we ran out on you when we were here last." We told them this was an understatement. They explained, "We were very excited by what you were doing but not for the reasons you were. We did not want to take the time to explain. That wrong-number stuff was not as interesting as the buttons."

They went on, "We went back and built a push-button telephone and tested it on a very large number of people. It turns out to take about twelve seconds less to put in seven digits by pushing buttons than turning a dial, and additional time is saved by not occupying a line until after the number is put in and the receiver is picked up. The combined saving in time is worth millions to AT&T," they said, "so we have started a project to develop that telephone. We have given it a code name that is being kept secret for now." They looked around the room to be sure no one was listening and then told us, "Touch tone."

Before the year was over, the groups had established the technological feasibility of each of our many design features. The group of design teams continued to work after I was no longer a participant, and they anticipated every change in the telephone system, except two, that has appeared since then. Among these are touch-tone phones, consumer ownership of phones, call waiting, call forwarding, voice mail, caller ID, conference calls, speaker phones, speed dialing of numbers in memory, and mobile phones. They did not anticipate photography by the phone or an Internet connection.

The impact of the design we produced was greater than the impact of any other effort to change a system that I had ever seen. As a result, I began to adapt and modify the procedure to fit such other applications that we describe in this book. As you will see, its use has been extensive and is still growing.

This experience is a convincing example of how *idealized design* can literally move mountains of change. However, applying the process involves not only discarding old mindsets that inhibit creative thinking but knowing the steps that we have learned work best in applying it. The book is intended to take you through the process with many examples of different organizations in different industries.

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## THE PLAN OF THE BOOK

The book is organized to give you a roadmap for finding the most valuable sections that match your particular interests and needs. Part I, “Idealized Design: The Basics,” describes the basic ideas of idealized design and the steps that managers need to take to implement it. Chapter 1, “The Stages of Idealized Design,” explains the basic stages of a fully implemented idealized design. Chapter 2, “Organizing the Process,” describes how to organize a successful design. Chapter 3, “Preparing for an Idealized Design Process,” makes the case for the importance of careful preparation and provides essential guidance about how to prepare. The object of these three chapters is to give you a comprehensive understanding of the design process so that in later chapters we can concentrate on the important aspects of each topic without having to repeat all of the steps that led to the outcome.

Part II, “Idealized Design: Applications—The Process in Action,” describes idealized design in action and applied in a variety of organizations and processes. Chapter 4, “Business Enterprise,” looks at entire business organizations that are forced to respond to market conditions and change or lose out to competitors.

Chapter 5, “Not-for-Profit and Government Organizations,” demonstrates that idealized design is as powerful a tool for not-for-profit and government organizations as for business organizations.

Chapter 6, “Process Improvement,” discusses processes and shows how idealized design can be used to improve processes in a widely diverse group of organizations.

Chapter 7, “Problem Dissolving,” describes the four ways of approaching problem solving and demonstrates that the most effective approach is “dissolving” the problem. Dissolving a problem invokes idealized design and results in the problem going away permanently.

Chapter 8, “Facilities and Sites Design,” looks at facilities and sites and combines the factors of function and space that need to be reconciled to produce the optimum arrangement of elements.

Chapter 9, “Take the Plunge,” brings together our accumulated experience in working with idealized designs and provides hands-on practical advice for conducting a successful design.

Part III, “Idealized Design: No Limit—Applications to World Challenges,” takes a wider view of what can be achieved using idealized design by applying it to some of the major challenges facing the world today. Chapter 10, “The Urban Challenge,” addresses the challenge of urbanism and describes a small car that is ideally suited to operating in cities. The chapter then describes how idealized design was applied to a redesign of Paris—and the national system of which it is a part—in a project that has had a continuing impact on France to this day.

Chapter 11, “The Health-Care Challenge,” explores how the seemingly intractable challenge of the health-care system can yield to the power of idealized design. The chapter first describes a national health-care system for the United States that would deliver care equitably to all citizens. It then explains how health-care malls can deliver care at the point of contact between patients and health-care professionals that is both humane and effective.

Chapter 12, “The Challenge to Government,” looks at the challenges that governments face and describes how idealized design can be applied to deal with problems of a national and international nature. The chapter first examines a national

elections system—as a part of a larger redesign of government—that would raise the proportion of eligible voters who turn out in elections and at the same time improve the quality of candidates for public office. It then describes a new international organization that could either replace the present United Nations or be formed in addition to it that would solve many of the problems of international wars and conflict that the U.N. has failed to achieve. Finally, the chapter addresses perhaps the biggest threat to nations today: terrorism. It applies idealized design to one of the root causes of terrorism and explains how if the causes were eliminated, there would be fewer terrorists and terrorist attacks.

Part IV, “Complete Idealized Design,” provides three complete idealized designs. These are actual designs drawn from examples in the applications in Part II. We discuss these examples in the applications chapters but only reprint excerpts from their final idealized designs. Readers should find the details of the complete designs of value if they want to embark on an idealized design of the kind described in one or more of these chapters.

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## A SURPRISING INGREDIENT

If our description of idealized design so far sounds mechanical and dry, our experience with it is exactly the opposite. There is a very important aspect of idealized design that is not normally discussed: Participation in preparing such a design is great fun.

The removal of constraints, allowing the free exercise of imagination, is a liberating and exciting experience. To engage in it is to play god in a limited universe and to enjoy the creative experience that any creator must have. In every design exercise, there is a point, usually fairly early in the process, when an “aha” experience moves the design group through a threshold that takes them out of the existing system into the realm of the newly possible.

Adding to the pleasure, rank is irrelevant within design groups; there is no hierarchy. Rank is deposited at the door. This removes the fear of retribution for what is said in the sessions by

subordinates. This relief is augmented by the fact that the effort is not directed at criticizing the current system or attributing blame for its deficiencies, but in conceptualizing a better one.

Because participation in idealized design is fun and liberating, it is usually easy to obtain and maintain. And because all who are involved, directly or indirectly, share ownership in the output, implementation is greatly facilitated. The plans directed at realization of the design or an approximation to it are not seen as a separate kind of activity but as an integral part of the design process. The fact that aspects of the design are seen as implementable long before the design is completed reinforces the inclusion of implementation as part of the design process.

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## USING THIS BOOK

We encourage readers to read this book from beginning to end. However, we know from our own experience—and through talking to others—that many, perhaps most, readers skip around in books looking for the most interesting parts, or the parts that relate to their immediate concerns.

So to help guide those who want to skip, let us suggest that you read all of Part I to get a firm grasp of the process of idealized design. Then skip to those applications chapters in Part II that are of most interest or importance to you.

We also strongly suggest that you read the chapters in Part III to open your thinking to the possibilities of using idealized design to address major challenges in the world today. We think there is no limit to what can be accomplished in the world using the tool of idealized design.

In Part I that follows, we take you through the process of implementing an idealized design. The emphasis is on the general application of the process, not on specific applications. That is the subject of Part II.

We welcome you to the journey you are about to begin.

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# The Stages of Idealized Design

“It’s tough to make predictions, especially about the future.”

—Yogi Berra

In the Introduction, we saw how the startling declaration by the head of Bell Labs that “the telephone system of the United States was destroyed last night” liberated the creative thinking of an enormous corporation and allowed it to reinvent itself. Of course, the declaration was not true. However, the idea that planning should begin with the assumption that nothing now exists clears the mind to think creatively about the best possible outcome rather than be distracted by finding reasons that “it can’t be done.”

In this chapter, we look at the stages in idealized design because success requires a systematic approach to the process. We begin by briefly explaining how it evolved from organizational planning in general, and conclude by describing how it was applied in the recent past to solve problems of the OnStar system at General Motors.

The chapter, and the two that follow, are intended to give you a comprehensive understanding of how

idealized design works in practice in virtually any kind of organization or institution. Later chapters describe specific applications in less detail—focusing instead on the most important elements—with the assumption that you already understand the full process from these three chapters.

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## THE EVOLUTION OF IDEALIZED DESIGN

Before idealized design was developed, there were three approaches to organizational planning:

- **Reactivism**—Reactive planners find the solution to their organizational problems in solutions that have worked in the past. They are often nostalgic about the past state of their organizations and speak about “the good old days.”
- **Inactivism**—Inactive, or conservative, planners are satisfied with the way things are and hope that their present problems will simply go away if they do nothing. Some observers have compared this mode of thinking to Voltaire’s character, Professor Pangloss in *Candide*, who believed that “this is the best of all possible worlds.”
- **Preactivism**—Preactive planners do not look to the past or present for the solution to their problems but believe that the future can be better than the present. For them, the future is an opportunity for improvement to be exploited.

The weakness in this approach is in predicting what the future will be. Any prediction of the future ensures a poor outcome. As Yogi Berra wisely observed, “It’s tough to make predictions, especially about the future.”

These approaches sometimes worked, but more often they did not. They were especially ill equipped to help organizations adapt to rapid changes in their environment, whether of changes in the market, changes in technology, changes in competitors, or other factors that affect their organizations. Visionary planners began to develop a fourth approach that was to result in the process of idealized design on which this book is based:

- **Interactivism**—Interactive planners reject the approaches of the other three planners. They plan backward from where they want to be to where they are now. They plan not for the future but for what they want their organizations to be at the present time. In so doing, however, interactive managers prepare their organizations for success in the unknowable future.

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## THE PROCESS OF IDEALIZED DESIGN

The process of interactive planning, called *idealized design*, has two parts:

- **Idealization**
  1. Formulating the mess
  2. Ends planning
- **Realization**
  3. Means planning
  4. Resource planning
  5. Design of implementation
  6. Design of controls

Here is how they work.

### IDEALIZATION

#### 1. *Formulating the Mess*

Every organization or institution is faced with a set of interacting threats and opportunities. These form what we call a *mess*. The aim of formulating the mess is to determine how the organization would eventually destroy itself if it were to continue doing what it is doing currently—that is, if it were to fail to adapt to a changing internal and external environment, even if it could predict the course of this change perfectly. This process identifies an organization's Achilles' heel—the seeds of its self-destruction—and provides a focus for the planning that follows by identifying what the organization or institution must avoid at all costs.

There are instances in which an organization or institution is faced with a crisis here and now—not sometime in the future. This present mess needs to be understood (“formulated”) in the same way as a future mess before an idealized design can be undertaken to avert the possible destruction of the organization. In both cases, the process of formulating the mess is essentially the same.

Formulating a mess involves four steps:

1. **Prepare a systems analysis**—A detailed description of how the organization or institution currently operates. This is usually best revealed in a series of flow charts showing how material is acquired and processed through the organization. A similar chart for the flow of money and information is also helpful.
2. **Prepare an obstruction analysis**—Identify those characteristics and properties of the organization or institution that obstruct its progress or resist change (for example, conflicts and customs).
3. **Prepare reference projections**—Describe what the organization’s future would be, assuming no changes in either its current plans, policies, programs, and practices, or changes of what it expects in its environment. This will show how and why the organization or institution would destroy itself unless it makes significant changes. This, of course, is not a forecast but a foresight of how the organization could destroy itself. This projection should reveal how the obstructions described in Step 2 prevent the organization from making adaptive changes to changing conditions.
4. **Prepare a presentation of the mess**—Combine the state of the organization and its reference projections into a scenario of the possible future of the organization, a future it would face if it were to make no changes in its current practices, policies, tactics, and strategies, and the environment changed only in expected ways.

## *2. Ends Planning*

This stage of planning is at the heart of idealized design. It involves determining what planners would like the organization or institution to be now if it could be whatever they wanted. It then identifies the gaps between this idealized design and the organization as it is, thus revealing the gaps to be filled by the rest of the planning process. It is crucial to note here that the design must demonstrably prevent the self-destruction revealed in the formulation of the mess.

# REALIZATION

## *3. Means Planning*

This phase requires planners to determine what should be done to approximate the ideal as closely as possible to avoid the self-destruction projected in the formulation of the mess. Planners must invent and select courses of action, practices, projects, programs, and policies to be implemented.

## *4. Resource Planning*

Implementing idealized design requires planners to identify and marshal the resources needed to accomplish the planned changes, including the following:

1. Determine how much of each type of resource—personnel; money; materials and services; facilities and equipment; and information, knowledge, and understanding and wisdom—are required. Also determine when and where to deploy the resources selected.
2. Determine how much of each type of resource will be available at the desired times and places and determine the difference between what will be available in any event and what will be required.

3. Decide what should be done about the shortages or excesses identified in Step 2.

### *5. Design of Implementation*

Determine who is to do what, when, and where. Create a schedule and allocate resources to the tasks to be carried out.

### *6. Design of Controls*

Determine (1) how to monitor these assignments and schedules, (2) how to adjust for failures to meet or exceed schedules, and (3) how to monitor planning decisions to determine whether they are producing expected results (and, if not, determine what is responsible for the errors and correct them).

These six phases of interactive planning do not need to be carried out in the same order presented here, but they are usually begun in this order. Because they are strongly interdependent, they usually take place simultaneously and interactively. Interactive planning is continuous; no phase is ever completed—that is, all parts of a plan are subject to subsequent revision. Plans are treated, at best, as still frames taken from a motion picture.

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## CONSTRAINTS AND REQUIREMENT

There are two constraints imposed on idealized designs and one important requirement. First, the design must be technologically feasible—no science fiction. This constraint does not preclude innovation, but it does restrict innovations to what we currently know we can develop even if we do not have it now. For example, it would be inappropriate in a design of a communication system to use mental telepathy to replace the telephone or e-mail. But clearly, we could increase the functionality of the mobile phone by having it unlock automobiles, turn on their lights, and turn on the heat or air conditioning in the house we are approaching.

The constraint of technological feasibility ensures the possibility of implementation of the design, but it says nothing about its likelihood. An idealized design, however feasible it might be technologically, may not be implementable for economic, social, or political reasons. For example, if all monetary transactions were electronic, a consumption-based tax system—in contrast to an income-based system—would be possible but very unlikely for political reasons.

The second constraint is that the design, if implemented, must be capable of surviving in the current environment. Therefore, it cannot violate the law and must conform to any relevant regulations and rules. It does not mean that the design must be capable of being implemented now. It does mean that if the design were implemented now, it would be able to survive in the current environment. For example, it would be possible to implement a system of all-electronic voting in elections, but it would not survive in today's world of computer hacking where voters cannot be sure that their votes are being counted. In the future, however, when voters can be confident of the integrity of the system, it will probably be implemented.

Finally, there is the important requirement that the process that is designed must be capable of being improved over time. If that which is designed is an organization or institution, it must be capable of learning and adapting to changing internal and external conditions. It should be designed to be ready, willing, and able to change itself or be changed. Therefore, the product of an idealized design is neither perfect, ideal, nor utopian, precisely because it can be improved. However, it is the best ideal-seeking system its designers can imagine now.

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## ANTICIPATING THE FUTURE

We have pointed out how difficult it is to predict the future. And idealized design stresses the need for planners to concern themselves with what they want now, not at some future time. However, this does not remove the need to take the future into account. It changes the way the account of it should be taken. In conventional planning,

designers forecast the future in which the thing being designed is to exist. Unfortunately, as the rate of change in the environment continually increases, along with its complexity, accurate forecasting becomes more and more difficult and less and less likely. As we have observed, poor forecasts (or predictions) lead to poor outcomes. How then should the future be taken into account?

The future is taken into account in idealized design by the assumptions planners make about it. Contrary to what some forecasters claim, assumptions about the future differ qualitatively from forecasts. Forecasts are about probable futures; assumptions are about possible futures. We carry spare tires in our cars despite the fact that we do not forecast having a flat tire on our next trip. In fact, if anything, we forecast that we will not have a flat tire on the next trip. But we assume a flat tire is possible, however unlikely it may be.

Assumed futures can be taken care of in two different ways. First, there is contingency planning. When there are a relatively few and explicitly describable possible futures, planners can prepare plans for each possibility. This is called *contingency planning*. Then, when the truth about the future is known, the appropriate plan can be invoked. For example, an oil company can develop exploration plans based on the price of oil increasing, staying the same, or declining. When it is apparent how the price is moving, they can quickly move to the appropriate plan already developed.

The way of dealing with more contingencies than can be planned for separately is to design into the organization or institution enough flexibility and responsiveness so that it can change rapidly and effectively to meet whatever it encounters. Automobile manufacturers cannot accurately predict customer demand for all possible models, colors, and accessory packages. However, the best automakers have solved this problem by designing production lines that allow them to build different models and colors on the same production line as customer demand requires. Some manufacturers in a number of industries have created such flexible production facilities that they can customize each individual product based on an order just received. Boeing aircraft and Dell computers are examples. It is obvious that an additional benefit of such a

system is that it allows for a rapid inventory turn and minimum idle capital.

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## EFFECTS OF IDEALIZED DESIGN

So far, we have described the way idealized design is put into practice. However, planners should be aware of an additional dimension to the process. It has a number of beneficial effects on those who engage in it and on their organizations, as follows:

- Promotes understanding of that which is designed
- Transforms the designers' concept of what is feasible
- Simplifies the planning process
- Enhances creativity
- Facilitates implementation

Let's look at each in turn.

### PROMOTES UNDERSTANDING

There is no better way to gain an understanding of something than by designing it. Designing something as simple as a door handle on a car requires the designer to understand how the human hand grasps a handle and then turns (or pulls) so that the design produces a comfortable and functional handle.

Furthermore, in the design process, for example, one is forced to consider the assumptions on which the design is based. This consideration frequently reveals the irrationality of some of the features of the existing object and allows for their replacement. For example, in nearly all men's stores, clothing is arranged by type; a section for suits, another for overcoats, another for shirts, and so on. When a group of male planners engaged in an idealized redesign of a men's store, it became apparent to them that this arrangement was for the convenience of those who run the store, not its customers. They found that a far better arrangement for customers was to arrange the garments by size, not type of clothing, putting all the suits, coats, shirts, and so on in the same place

so that each shopper—small, medium, or large—could find everything he might want in one place. Bookstores have always known this and arrange books by subject (because most browsers know what interests them, even if they do not know which books are available).

## TRANSFORMS DESIGNERS' CONCEPT OF FEASIBILITY

The principal obstruction to what we want most is ourselves. The great American philosopher Pogo recognized this in his classic observation that “We have met the enemy and he is us.” Our tendency, however, when we stand where we are and look toward what we want, is to see all kinds of obstructions imposed from without. When we change our point of view and look backward at where we are from where we want to be, in many cases the obstructions disappear.

Banking is a good example. Years ago, banks employed many tellers who handled transactions with customers. They received deposits and filled out deposit slips, cashed checks, and entered interest in savings passbooks. Bankers had to hire legions of tellers as their business grew. However, a few visionary bankers asked themselves what would be the ideal bank. They concluded that it would have few—perhaps no—tellers and would process all the same transactions. This vision led them to create automatic teller machines that allowed customers to do the work rather than the tellers. In turn, this led to online banking, where customers do not even have to go to the bank to manage their accounts. The obstruction bankers thought they faced—how to find and pay all those tellers—disappeared when they realized that banks could operate just as well with a decreasing number of tellers. Although some customers complained about this change, many more were pleased at not having to stand in line waiting to be helped by a human being.

## SIMPLIFIES THE PLANNING PROCESS

Planning backward from where one wants to be reduces the number of alternatives that must be considered when making a choice of how to get there. It simplifies the planning process considerably.

An organizational example of simplification—requiring the details of planning backward and forward—is too long for our purposes here. So we offer instead an example drawn from a tennis tournament that nicely encapsulates how working backward greatly simplifies idealized design. If 64 players enter a tennis tournament, how many matches must be played to determine the winner? This is not hard to determine. There will be 32 matches in the first round, then 16, 8, 4, 2, and 1, successively. Added together, these equal 63 matches. However, if we start at the end and ask “How many losers would there have to be?” the answer is obviously 63, and no arithmetic is required. The advantage of working backward is even more apparent if we start with a number of players that is not a power of 2, say 57. The arithmetic now becomes complicated because some players must be exempted from the first round to make the number of players left after that round a power of 2. If we work backward, however, it is apparent that there must be 56 losers; hence this number of matches.

## ENHANCES CREATIVITY

Human creativity is as old as humankind, but it was not very long ago that we began to understand what it is. We believe that it is a three-step process. First, it requires that we identify a self-imposed constraint, an assumption that we make consciously or unconsciously that limits the number of alternatives we consider. Second, we must deny or eliminate that assumption as too limiting. Third, we must then explore the consequences of this denial.

These steps are conspicuous in solving a puzzle (because a puzzle is a problem we cannot solve if we make an incorrect assumption). When the solution to a puzzle we have not been able to solve is revealed to us, we want to kick ourselves because we realize that we were the obstruction between the puzzle and its solution.

For example, consider the following puzzle that most of us were confronted with when we were youngsters (see Figure 1.1).

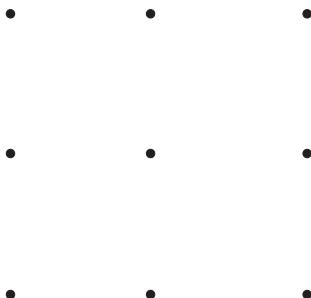


Figure 1.1

Then you are supposed to place a pen or pencil on one of the dots and, without lifting the pen or pencil from the paper, draw four straight lines that cover all nine dots. It cannot be done unless you deny an assumption of which you may not be conscious: that you cannot draw the lines outside the boundaries of the square formed by the nine dots. If you are not told that you can draw outside the boundaries, however, you must take it that you can. And when this assumption is put to rest, the solution is relatively easy (see Figure 1.2).

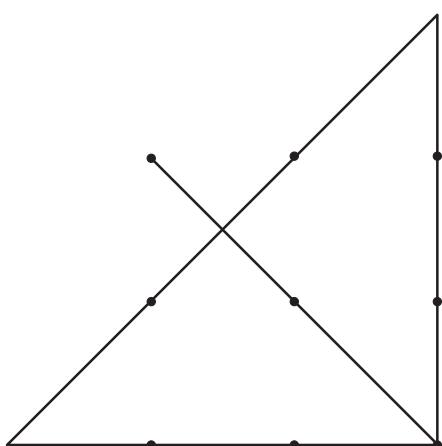


Figure 1.2

Furthermore, other possible solutions exist when all assumptions are ignored. If you fold the paper a certain way, the nine dots can be covered with one line using a felt-tip pen. An eight-year-old watching adults trying to solve this puzzle asked why they did not get a “great big fat pen that covered all the dots and just go blop.” No constraints were imposed on the size of the pen used.

Creativity flows from this process.

## FACILITATES IMPLEMENTATION

A major reason most plans are not fully implemented is that those people responsible for implementing it have no sense of ownership of it. This leads to resentment and subversion of its implementation. Idealized design, however, requires the participation of everyone who will be affected by it. Therefore, ownership of the resulting plan is widely spread among those who must implement it. This avoids resistance and subversion. Implementation of a design and plan based on it is usually carried out enthusiastically by those who had a hand in preparing it.

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## IDEALIZED DESIGN AT GENERAL MOTORS

In the Introduction, we saw how idealized design could be used to reinvent a major corporation, AT&T, and at the same time reinvent the industry in which it operates. However, it is likely that idealized design will be used more often in projects of smaller scope. At General Motors, in the late 1990s, the company faced a challenge with one of its new products, the OnStar safety and security system. Their actions illustrate the steps by which idealized design was applied locally in a huge organization through the determination of a few partisans of the method.

The example also illustrates that an organization going through a crisis of market-share loss and declining profits—that continues to this day—can nevertheless successfully remake parts of its business. The example was told to the authors by Nick Pudar, Director of the GM Strategic Initiatives group, who worked with Ackoff on problems at GM.

General Motors had introduced the OnStar system in its Cadillac line as a differentiating feature in 1996. Consumers could purchase the OnStar feature and have it installed on their vehicle at the time of purchase of the vehicle. OnStar was based on an electronic device installed in the cars that provided two-way cellular communication with a live advisor in a call center. The system delivered a range of services to owners: automatic two-way communication with the call center if the car is in an accident and the airbag deploys (at the same time, the car's GPS location is sent to the call center advisor who can dispatch emergency services to the car's location if necessary); if the owner is locked out of the car, the advisor can send a signal that unlocks it; if the owner cannot find the car in a crowded parking lot, the advisor can send a signal to the car to flash its lights and honk its horn; if the "check engine" light comes on, the owner can request the advisor to do a remote diagnostic check to determine how severe the problem is and what to do about it. These and other services that OnStar provided are, of course, of considerable value to owners.

But the OnStar system was expensive to install and maintain. Cadillac buyers could afford the car at a price that included OnStar. On the other less-expensive GM lines, however, the additional cost presented more of a problem. The system could not be included in the base price of the car without increasing the price beyond what planners believed buyers would pay. Therefore, installation had to be made by dealers who were able to sell the system as an "accessory" to those buyers willing to pay for it. It cost the customer almost \$1,000, not including the cost of installation and dealer profit. In addition, buyers had to pay a monthly charge for cellular service and a subscriber fee for services provided by OnStar advisors. The result was that GM had more than 30,000 OnStar subscribers by 1998, far too few to consider the system a success.

It became clear to the people directly involved with OnStar that they needed to rethink their strategy if the system were ever to become widely adopted by owners and profitable. The OnStar leadership commissioned a small team to study the problem, and the team decided to use an idealized design approach. We look

here at what they did at each stage in the process without going into all the details of the steps described earlier in this chapter. The object is to give an overview of a real-world application of a typical idealized design.

## IDEALIZATION

### *1. Formulate the Mess*

GM indeed had a mess on its hands if it wanted to expand the number of buyers who would pay for OnStar. The high cost of device installation and the high monthly fee of the combined OnStar and cellular service resulted in too few new customers for it to be profitable for GM.

The team formulated the mess. First, the device either added to the price of the vehicle and had an impact on sales, or, if it were offered below cost, it degraded the profitability of the program. Second, the team was concerned that dealer installation might potentially result in added quality and warranty costs because the vehicles had to be partially torn up to install the OnStar device. Third, the installation of OnStar bypassed GM's policy of lengthy testing to validate each new product, raising concerns about the quality of the system.

The team was concerned about the complexity of the business. Maintaining the availability of the right installation kits for each dealer was a daunting task. Each different GM vehicle required a different installation. Dealer training for the installation process was not a simple task either.

Dealers had their own concerns. Although they made a reasonable profit on each OnStar device they sold and installed, each dealer did not sell enough units to make it seem worth the time it took to install. Dealers also believed that selling OnStar to their customers created possible confusion and could interfere with selling the vehicle itself.

When the teams modeled the current business, they found that the same issues would be present regardless of how aggressively the business was pursued in the future. The economics and logistics of dealer installation could not be made into an attractive and lasting aspect of the business. Thus, the team realized that dealer installation was not sustainable. However, factory installation had its own problems. If the OnStar device was installed on a vehicle in the factory at no cost to the buyer, there was no guarantee that a customer would become a subscriber (and thus allow the subscription revenue to offset the hardware cost). Given the hardware costs at the time, it did not appear that factory installation would ever be a viable solution for the business.

## *2. Ends Planning*

The team then came to the heart of idealized design, asking this question: “If you could have anything you wanted today, what would it be?” For the OnStar idealized design, the team’s answer was simple: GM would have OnStar factory installed across the entire vehicle lineup for the 2000 model year. (The idealized design project was being conducted in the fall of 1998, and the 2000 model year vehicles would start being built by the next summer [1999].)

This design met the challenges identified in the original formulation of the mess. If OnStar were a standard feature on all vehicles, it would confer a distinctive and desirable awareness of GM to prospective buyers; factory installation would eliminate the need for dealers to “sell” the system and, instead, it would become a sales feature for dealers to use in closing the sale of a vehicle; factory installation would ensure quality control on installation and a lower installation cost; the final result would be a more aesthetically pleasing hardware package.

When the team presented this timing as the “ideal,” they got uniform rejection from across the entire enterprise. The ideal was deemed to be ridiculously unrealistic, and completely disconnected from the reality of the extensive and lengthy vehicle development processes. At that time, typical product programs took up to

five years to complete. The validation and testing process would never allow any vehicle features to be added late in the process. If new hardware such as OnStar was to be installed in the factory, it had to be added to a new product program and start from the beginning. The implication was that the earliest that OnStar could be factory installed in GM was for the 2005 model year, and on only one vehicle line to begin with. It would have to prove its value to the corporation, and then other vehicle platforms would decide whether it was warranted to add OnStar to their programs.

However, the team persisted and continued to describe and communicate the virtues of having a factory-installed solution across the entire line of GM vehicles. They presented a business simulation and financial model that showed a steady decline in costs through learning effects as well as economies of scale and scope.

Eventually, upper management became convinced of the value of factory installation but was unconvinced that it could be accomplished by the 2000 model year. The team was faced with finding ways to fill the gaps between the ideal and present reality.

## REALIZATION

### 3. Means Planning

While the team was promoting the value of factory installation to upper management, it also turned its attention to finding the means of accelerating the expansion of factory installation of OnStar across all vehicle lines as soon as possible—shooting for a launch in the 2000 model year. The stages of idealized design do not always occur in lock-step sequence but often overlap as they did at GM.

The team identified five components of a successful business model to develop, based on Adrian Slywotzky's elements of a business model. First was this: Who were the *customers to be served*? These were to be every owner of a new GM vehicle. Spirited debate broke out over the question of including cellular phone service along with OnStar services. While some argued that cellular

service was not in GM's product portfolio, others made the point that including it would generate revenue as GM became a "reseller" of that service. The team decided in favor of the opportunity to participate in the revenue from cellular service.

The second component of the business model to develop was the *value proposition* (what will be delivered to the customer that has value for that customer). OnStar would deliver a broad array of safety, security, and information services in a way that would be appropriate for different situations confronting vehicle owners.

The third component was *service delivery*; the team decided that the service would be "high-touch" and delivered directly by a live human advisor when required or requested by owners. However, an automated "virtual advisor" would also be available if the customer preferred that kind of service. Finally, the service would also be delivered and enhanced through the Internet at a personalized website for the customer. Setting up the system would take place outside the vehicle, and then voice recognition technology was used to navigate through the information when the customer was in the vehicle.

The fourth component turned out to be as contentious as any issue facing the team. This component was the extent of *strategic control* over the service. Should the design of the service be kept proprietary and exclusive to GM as a way of differentiating its vehicles to customers? Or should it be an open architecture across the entire automobile industry? The team concluded that the idealized design would have both open and closed aspects. The exchange of information to and from the vehicle would be an open architecture design with standard protocols. This would stimulate third-party developers to create service applications that could be used with the OnStar hardware. The team believed that the creativity and energy of outside companies would create "killer apps," or software applications that eventually dominate their markets, more quickly than if GM tried to develop everything in-house. However, the data and information that would be exchanged would have "controlled access" that was handled with encryption and authentication keys. The data would get "red, yellow, and green" designations. Things that were green would have encryption and

authentication keys that were license free, and would have full read/write access to and from the vehicle. Such areas as radio control, seat memory control, heating, and ventilation would be candidates for the green designation. Things that were red would not have any access at all. Such areas as traction control, brakes, airbags, steering, and other safety critical systems would not be allowed to have read or write access by any non-GM application. However, there were other areas of the vehicle that had some economic value such as maintenance diagnostic data that would be designated as yellow, and would be made available through license arrangements.

All the data would flow through a single control point called the vehicle gateway. The team viewed this gateway as an important common interface for OnStar to connect to a wide array of vehicles. If the idealized design included other manufacturers' vehicles, it would be important that all vehicles had a similar gateway that functioned in the same manner for easy and standard communication for OnStar. The team recommended that an industry consortium be formed to drive toward a common approach to handling vehicle data exchange and set the appropriate standards. GM initiated the early discussions with other car manufacturers, and the Automotive Multimedia Interface Consortium (AMIC) was formed to address these very issues.

Finally, the team dealt with the fifth component of the idealized design business model, *value capture*. OnStar should make money from a variety of transaction types, including—but not be limited to—subscriptions, pay-per-use, supplier commissions, access fees, slotting fees, revenue sharing, reselling, and so forth.

#### 4. Resource Planning

The team parceled out resource planning to a number of groups to determine how much of the types of resources—personnel, money, facilities and equipment, information and knowledge—would be required to meet the 2000 model year deadline. Groups determined when each resource would be needed and where it would be deployed. The groups also planned how to ensure that

the resources would be available when needed. Specific focus was placed on design of low-cost and simplified hardware; development of the process of installation at the factory; design and negotiation of access to a system of non-geographic-based wireless phone numbers; redesign of the role of the dealer in the marketing process; change of the marketing approach from a *customer acquisition* focus (which would become automatic if OnStar was installed on all vehicles at the factory) to a *customer retention* focus (signing up owners for the OnStar service after their trial period was over); increasing the call center personnel to handle the huge anticipated volume growth; major redesign of the associated information technology applications to handle the business growth; renegotiation of many support contracts with outside vendors to take advantage of economies of scale; and development of a sales force to market OnStar to other vehicle manufacturers. Many additional details had to be identified and worked through to scale up the business in preparation for the increased volume of factory installation.

### *5. Design of Implementation*

The team laid out a timeline specifying who was responsible for the completion of each phase of the implementation by the scheduled deadlines. It also specified the resources that needed to be allocated to each phase in order that the project move forward as planned. Each of the activities previously described had individual timelines that flowed into an overall timeline. The organization was small enough and concentrated enough to allow for regular meetings among the leaders in each area to track progress and to react quickly to deviations from the plan.

### *6. Design of Controls*

Finally, the team designed control mechanisms to monitor the progress of the project. To succeed, each part of the system would have to be brought on line in time to make the 2000 model year deadline. If a scheduled completion of some part of the project did

not occur on time, the final deadline would be in jeopardy. Having timely awareness of a slipped schedule would give project managers a chance for corrective action that might meet the ultimate deadline, or minimize the delay it might cause.

## THE OUTCOME

This example of idealized design took place in the real world, and in the real world perfection is elusive. The idealized design called for OnStar to be factory installed on all GM models in the 2000 model year. The team did not succeed in full implementation, but it achieved enough success to prove that the concept of the project was feasible and that it would result in a significant increase in the sales of and revenue from OnStar.

Through hard work and determination, they were able to find solutions to launch OnStar as a factory-installed feature in half of GM's portfolio of 54 vehicles for the 2000 model year. Not every vehicle carried OnStar across the board. Some vehicles included OnStar as part of an "option package." Others offered it as an optional feature. A few did include it as a standard feature on each vehicle. Another important decision made was that the marketing divisions of GM would include one year's worth of OnStar service at the time of vehicle sale at no cost to the buyer as part of their differentiation strategy. The team expected that buyers who experienced the value of OnStar would sign up to continue the service. These decisions quickly launched OnStar's growth from 30,000 subscribers in 1998 to more than 3,000,000 subscribers in 2005. Table 1.1 shows the approximate monthly average of service requests by owners.

**Table 1.1** Subscriber Interactions in 2005**Approximate Monthly Average**

900 automatic airbag notifications per month	20,000 roadside-assistance requests per month
400 stolen vehicle location requests per month	35,000 remote door unlocks per month
13,000 emergency button pushes per month	293,000 route-support calls per month
23,000 GM Goodwrench remote diagnostics	7 million OPC calls per month (OnStar Personal Calling)
4,500 Good Samaritan calls	19 million OPC minutes per month
90 advanced automatic crash notifications	32,000 Virtual Advisor Traffic requests
62,000 Virtual Advisor Weather requests	

In addition, GM announced in 2005 that it would aggressively expand its OnStar delivery to be standard across all retail vehicles by 2007. By that time, GM plans to provide OnStar standard on more than four million new vehicles each year in the United States and Canada. In keeping with its important strategic decision to license OnStar to other automakers, in 2005 OnStar provided service to Lexus, Audi, Acura, VW, Honda, Subaru, and Isuzu. Some of these automakers installed the hardware in their factories before shipping the vehicles to the United States, and others installed it at the port of entry. None required their dealers to do the installation. Neither of the other two Big Three U.S. automakers licensed OnStar.

Many people worked extremely hard to make OnStar the success that it is, but at the beginning, OnStar's future was uncertain. The idealized design framework helped people focus on what the OnStar business "should be now" instead of focusing on the then-existing problems and constraints. It is safe to say that without idealized design, the partial launch in the 2000 model year would have been impossible and the full implementation in the 2007 model year would not be GM's mainstream plan.

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## SUMMARY

We have described the essential stages for a successful idealized design. We have also described the process in action in the real world. In the real world, some of the gaps between idealized design and today's reality can be filled, and some cannot. Without idealized design, however, most projects that seem impossible today will not be realized tomorrow.

The next chapter explains how, by organizing the design process, to increase the potential for success at each stage of idealized design.

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# INDEX

## A

A&P, 82-85  
absolution of problems, 117  
Academy of Vocal Arts (Philadelphia), 88-92, 219-233  
Ackoff, Russell L., 97, 100, 236, 248  
adaptation in business enterprises, 75-81, 202-210  
airliner design example, 132-135  
Alcoa, 49-50  
assumed futures in idealized design, 9-11  
autocratic systems, democratic systems versus, 63  
automobile example (urban challenges), 147-153  
AVA (Academy of Vocal Arts (Philadelphia)), 88-92, 219-233

## B

Barabba, Vincent P., 55  
Bell Laboratories example, xxxiii-xli  
Berra, Yogi, 176  
boards functions of, 64, 191-193 in government agencies, 253-254  
Boeing, 132-135  
Brandyberry, Gregg, 107  
bus violence example (problem dissolution), 119-122  
business enterprises, idealized design in, 61-62  
A&P example, 82-85  
common design content, 62  
Energetics example, 189-217  
human resources development, 210-217

internal economy, 68-71, 193-197  
 internal political system, 63-68, 189-193  
 learning process, 75-81, 202-210  
 organizational structure, 71-75, 197-202

## C

cars. *See* automobile example  
 Carstedt, Goran, 130  
 CHHSP (Community Home Health Services of Philadelphia), 92-95  
 circular organization, 64  
   in government agencies, 253  
 Clark Michigan Company, 112-115  
 Clinton, Bill, 239  
 Coated Paper Company, 122-126  
 commercial enterprises. *See*  
   business enterprises  
 commission, errors of, 77, 203  
 communications. *See* White House Communications Agency  
 Community Home Health Services of Philadelphia (CHHSP), 92-95  
 Companion Animal and Family Health Council, 56  
 computing services example  
   (internal market economies), 104-105  
 conductors. *See* bus violence example  
 conference facilities for design sessions, 39-40  
 consensus design, 37-39  
 constrained designs, 35-37  
 constraints of idealized design, 8-9  
 consumers, customers versus, 30  
 Contact (suicide hotline), 126

contingency planning, 10  
 contracts system. *See* procurement process example  
 controls design, 8, 222  
   General Motors example, 22  
 corporations. *See* business enterprises  
 corruption, 185  
 cost centers in internal economy, 68-71, 193-197  
 creativity (effect of idealized design), 13-15  
 crises. *See* organizational crises  
 culture. *See* organizational culture  
 customers  
   consumers versus, 30  
   General Motors example, 19

## D

data (in organizational learning), 76, 202  
 Deming, W. Edwards, 97, 236, 240  
 democracy, 178, 184  
 democratic hierarchy, 64  
 democratic systems, autocratic systems versus, 63  
 design  
   controls design, 8, 222  
   General Motors example, 22  
   implementation design, 8, 222  
   General Motors example, 22  
 design sessions. *See also* team involvement  
   conference facilities and equipment, 39-40  
   frequency and duration of, 31  
   procedural rules of, 33-35, 41-42  
 development programs. *See*  
   terrorism response example  
 dissolution of problems, 118-119  
   bus violence example, 119-122  
   licensing system example, 127

paper production example, 122-126  
 suicide hotline example, 126  
 drivers. *See* bus violence example  
 Drucker, Peter, 77

## E

election system example  
 (governmental challenges), 172-174  
 ends planning, 7, 221  
 General Motors example, 18-19  
 Energetics  
 business enterprise idealized  
 design example, 189-217  
 human resources development  
 example, 210-217  
 internal economy example,  
 69-70, 195-197  
 internal political system  
 example, 64-67, 189-193  
 learning process example, 78-81,  
 205-210  
 multidimensional organizational  
 structure example, 73-75,  
 199-202  
 errors of commission, 77, 203  
 errors of omission, 77, 203  
 Euclid Truck Company, 114

## F

facilitators, 29-32  
 opera school example, 224-226  
 facilities and sites, idealized design  
 for, 129  
 Boeing example, 132-135  
 IKEA example, 130-132  
 fear in the workplace, 240, 257  
 feasibility, concept of (effect of  
 idealized design), 12

flight. *See* airliner design example  
 for-profit enterprises. *See* business  
 enterprises  
 forecasts, assumed futures  
 versus, 10  
 form and function, 129  
 Boeing example, 132-135  
 IKEA example, 130-132  
 formulating the mess, 5-6,  
 44-50, 221  
 General Motors example, 17-18  
 government agencies  
 example, 248  
 function and form, 129  
 Boeing example, 132-135  
 IKEA example, 130-132  
 future, assumed futures in  
 idealized design, 9-11

## G

General Motors (GM)  
 idealized design at, 15-17  
 controls design, 22  
 ends planning, 18-19  
 formulating the mess, 17-18  
 implementation design, 22  
 means planning, 19-21  
 outcome of, 23-24  
 resource planning, 21  
 property specifications example,  
 55-56  
 Gharajedaghi, Jamshid, 82, 97,  
 244, 248  
 GlaxoSmithKline (GSK), 107-112  
 global challenges. *See*  
 governmental challenges  
 GM. *See* General Motors  
 Goggin, W. C., 71, 197  
 Gore, Al, 239

government agencies  
 idealized design in, 87  
   White House Communications Agency, 96-100, 235-262  
 organizational culture, 241-245  
 participative management in, 252-254  
 quality initiatives in, 238-239  
 governmental challenges  
   national election system example, 172-174  
   terrorism response example, 181-186  
   United Nations example, 175-181  
 GSK (GlaxoSmithKline), 107-112

## H

Hawes, Thomas, 243  
 health-care challenges  
   health-care mall example, 165-169  
   home health care example, 92-95  
   national health-care system example, 159-164  
 health-care mall example, 165-169  
 home health care example, 92-95  
 human resources development in business enterprises, 210-217

## I

ideal-seeking systems, designing, 223  
 idealization stage (idealized design process), 5-7  
   General Motors example, 17-22  
 idealized design  
   advantages of, xlivi-xliv  
   assumed futures, 9-11  
   Bell Laboratories example, xxxiii-xli

benefits for individuals, 139  
 in business enterprises, 61-62  
   A&P example, 82-85  
   common design content, 62  
   Energetics example, 189-217  
   human resources development, 210-217  
   internal economy, 68-71, 193-197  
   internal political system, 63-68, 189-193  
   learning process, 75-81, 202-210  
   organizational structure, 71-75, 197-202  
   constraints and requirements, 8-9  
 design sessions  
   conference facilities and equipment, 39-40  
   frequency and duration of, 31  
   procedural rules of, 33-35, 41-42  
   effects of, 11-15  
   evolution of, 4-5  
   facilities and sites, 129  
   Boeing example, 132-135  
   IKEA example, 130-132  
 General Motors example, 15-17  
   controls design, 22  
   ends planning, 18-19  
   formulating the mess, 17-18  
   implementation design, 22  
   means planning, 19-21  
   outcome of, 23-24  
   resource planning, 21  
 in government agencies, 87  
   White House Communications Agency, 96-100, 235-262  
 for governmental challenges  
   national election system example, 172-174

- terrorism response example, 181-186
- United Nations example, 175-181
- for health-care challenges
  - health-care mall example, 165-169
  - home health care example, 92-95
  - national health-care system example, 159-164
- in not-for-profit organizations, 87
  - home health care example, 92-95
  - opera school example, 88-92, 219-233
- obstacles to, 139
  - procedural obstacles, 140-143
  - psychological obstacles, 140-142
- for organizational crises, 138
- for organizational improvement, 138-139
  - preparation for, 43-44
    - design property specifications, 54-56
  - formulating the mess, 44-50
  - mission statement writing, 51-54
- problem dissolution, 119
  - bus violence example, 119-122
  - licensing system example, 127
  - paper production example, 122-126
  - suicide hotline example, 126
- process improvement
  - of internal market economies, 104-107
  - joint venture example, 112-115
  - procurement process example, 107-112
  - reengineering versus, 103-104
- process of, 5, 221-222
  - idealization stage, 5-7
  - realization stage, 7-8
- team involvement, 27-31
  - consensus design, 37-39
  - constrained and unconstrained designs, 35-37
  - facilitators, 32
  - recorders, 32-33
- for urban challenges
  - Paris redesign example, 153-156
  - urban automobile example, 147-153
- IKEA, 130-132
- implementation, facilitating (effect of idealized design), 15
- implementation design, 8, 222
  - General Motors example, 22
- improvement. *See* organizational improvement
- inactivism, 4
- individuals, idealized design
  - benefits for, 139
- information (in organizational learning), 76, 202
- input units, in organizational structure, 71, 197
- interactive planning, 221-222. *See also* idealized design
- interactivism, 5
- internal market economies, 104
  - in business enterprises, 68-71, 193-197
- computing services example, 104-105
- transfer pricing example, 106-107
- internal political system in business enterprises, 63-68, 189-193

**J—K—L**

- joint venture example (process improvement), 112-115  
 Juran, Joseph M., 259  
 knowledge (in organizational learning), 76, 202  
 Kodak, 36-37  
 labor violence. *See* bus violence example  
 learning process in business enterprises, 75-81, 202-210  
 licensing system example (problem dissolution), 127

**M**

- market economies, licensing system example, 127. *See also* internal market economies  
 McDowell, Kevin, 91  
 means planning, 7, 221  
     General Motors example, 19-21  
 mess  
     formulating, 5-6, 44-50, 221  
     General Motors example, 17-18  
     government agencies  
         example, 248  
     presentation of, 48-50  
 mess-formulating team, 48  
 Meyers, Peter, xxxiv  
 mission statements, 51-54, 250  
 mistakes  
     concealing, 257-258  
     learning from, 76-77, 203-204  
 multidimensional organizational structure in business enterprises, 71-75, 197-202  
 Mumford, Lewis, 148

**N**

- national election system example (governmental challenges), 172-174  
 national health-care system example, 159-164  
 Nelson, Del, 238  
 not-for-profit organizations,  
     idealized design in, 87  
     home health care example, 92-95  
     opera school example, 88-92,  
         219-233

**O**

- obstacles to idealized design, 139  
 procedural obstacles, 140  
     overcoming, 142-143  
 psychological obstacles, 140  
     overcoming, 141-142  
 obstruction analysis, preparing, 6  
 omission, errors of, 77, 203  
 omnicompetence, 184  
 OnStar system (General Motors),  
     idealized design and, 15-17  
 controls design, 22  
 ends planning, 18-19  
 formulating the mess, 17-18  
 implementation design, 22  
 means planning, 19-21  
 outcome of, 23-24  
 resource planning, 21  
 opera school example, 88-92,  
         219-233  
 organizational crises, idealized design for, 138  
 organizational culture in  
     government agencies,  
         241-245  
 organizational design, research questions for, 261

organizational improvement,  
idealized design for, 138-139  
organizational learning. *See*  
learning process in business  
enterprises  
organizational psychology,  
research questions for, 262  
organizational structure, in  
business enterprises, 71-75,  
197-202  
Ortega y Gasset, 176  
output units in organizational  
structure, 71, 198  
ownership of plans (effect of  
idealized design), 15

## P

paper production example  
(problem dissolution),  
122-126  
Paris redesign example (urban  
challenges), 153-156  
participative management in  
government agencies,  
252-254  
participative planning, 219-220  
Pfendt, Henry, 36  
planning  
contingency planning, 10  
ends planning, 7, 221  
General Motors example, 18-19  
interactive planning, 221-222  
means planning, 7, 221  
General Motors example, 19-21  
participative planning, 219-220  
resource planning, 7-8, 222  
General Motors example, 21  
simplification of (effect of  
idealized design), 13  
pluralism, 179  
politics in business enterprises,  
63-68, 189-193

Pourdehnad, John, 93, 97, 248  
preactivism, 4  
preparation for idealized design,  
43-44  
design property specifications,  
54-56  
formulating the mess, 44-50  
mission statement writing, 51-54  
presentation of the mess, 48-50  
preparing, 6  
problems  
absolution, 117  
dissolution, 118-119  
bus violence example, 119-122  
licensing system example, 127  
paper production example,  
122-126  
suicide hotline example, 126  
resolution, 117  
solution, 118  
procedural obstacles to idealized  
design, 140  
overcoming, 142-143  
procedural rules of design sessions,  
33-35, 41-42  
process improvement  
of internal market economies  
computing services example,  
104-105  
transfer pricing example,  
106-107  
joint venture example, 112-115  
procurement process example,  
107-112  
reengineering versus, 103-104  
procurement process example  
(process improvement),  
107-112  
profit centers in internal economy,  
68-71, 193-197  
promoting understanding (effect of  
idealized design), 11-12

property specifications in idealized design, 54-56  
 psychological obstacles to idealized design, 140  
     overcoming, 141-142  
 Pudar, Nick, 15

## Q-R

quality initiatives in government agencies, 238-239  
 reactivism, 4  
 realization stage (idealized design process), 7-8  
     General Motors example, 19-21  
 recorders, 29-33  
 reengineering, process  
     improvement versus, 103-104  
 reference projections, preparing, 6  
 Reich, Robert, 239  
 reorganizations in business enterprises, 71-75, 197-202  
 requirements of idealized design, 8-9  
 resolution of problems, 117  
 resource planning, 7-8, 222  
     General Motors example, 21  
 Rinehart, James, 34, 37, 113  
 rules. *See* procedural rules of design session

## S

service delivery (General Motors example), 20  
 Shaffer, Jan, 85  
 Shalala, Donna, 239  
 Simmons, Joseph J., 97, 100,  
     258-259  
 simplification (effect of idealized design), 13  
 sites. *See* facilities and sites  
 solution to problems, 118

stakeholder participation (opera school example), 224-228  
 store layout example, 130-132  
 strategic control (General Motors example), 20  
 Suárez, J. Gerald, 97-100, 236,  
     239-250, 253-261  
 suicide hotline example (problem dissolution), 126  
 Super Fresh, 82-85  
 synthesis, 250  
 system analysis, preparing, 6  
 systemic problems, idealized design for, 138

## T

team involvement. *See also* design sessions  
 in idealized design, 27-31  
     consensus design, 37-39  
     constrained and unconstrained designs, 35-37  
     facilitators, 32  
     recorders, 32-33  
     mess-formulating team, 48  
 terrorism response example (governmental challenges), 181-186  
 transfer pricing  
     defined, 194  
     example (internal market economies), 106-107

## U

unconstrained designs, 35-37  
 understanding  
     in organizational learning, 76, 202  
     promotion of (effect of idealized design), 11-12

United Nations example  
(governmental challenges),  
175-181  
urban challenges  
Paris redesign example, 153-156  
urban automobile example,  
147-153  
user units in organizational  
structure, 72, 198

## V

value capture (General Motors  
example), 21  
value proposition (General Motors  
example), 20  
visiting nurses example, 92-95  
VME Corporation, 115  
Volvo BM, 115

## W-Z

White House Communications  
Agency, 96-100, 235-262  
wisdom (in organizational  
learning), 76, 202  
Young, Wendell, 82