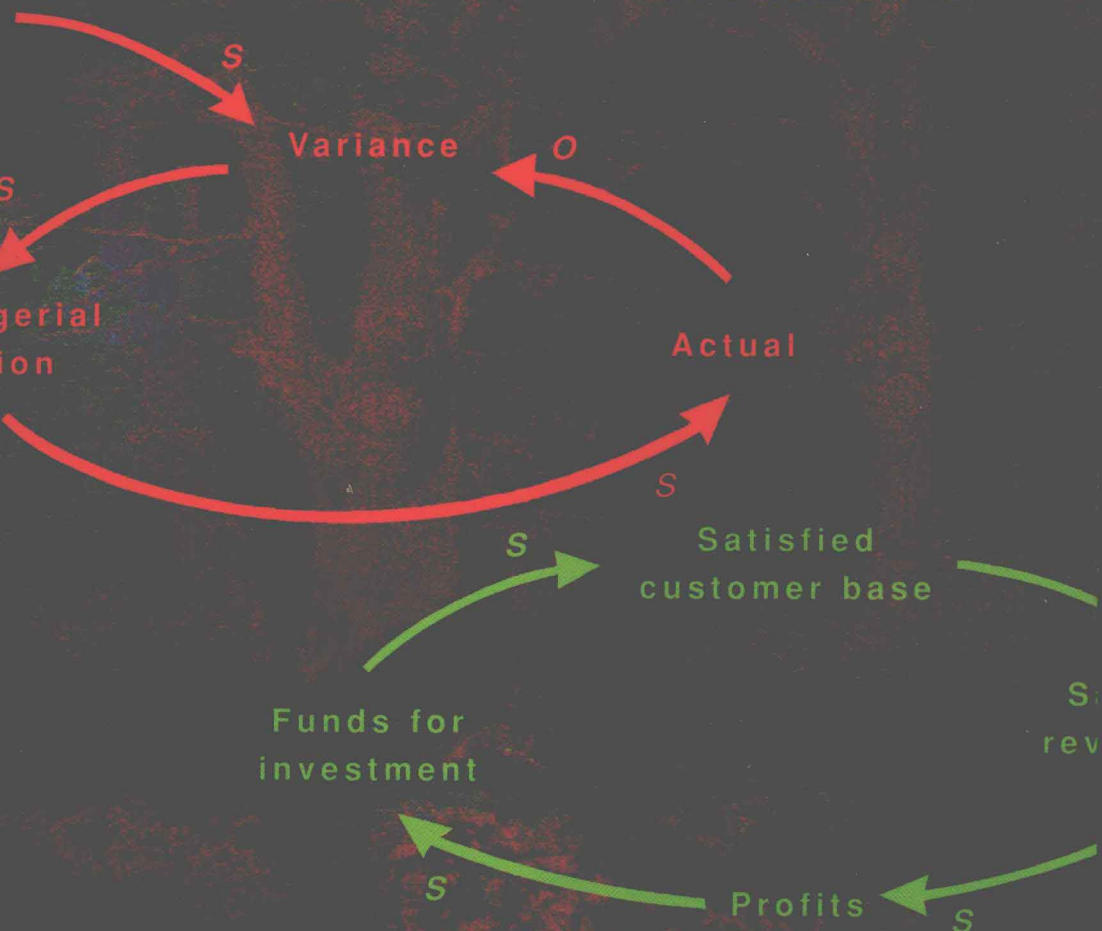


SEEING THE FOREST FOR THE TREES

A MANAGER'S GUIDE TO APPLYING SYSTEMS THINKING



DENNIS SHERWOOD

Seeing the Forest for the Trees

A Manager's Guide to Applying
Systems Thinking

Dennis Sherwood



NICHOLAS BREALEY
PUBLISHING
L O N D O N

First published by
Nicholas Brealey Publishing in 2002

3–5 Spafield Street
Clerkenwell, London
EC1R 4QB, UK

Tel: +44 (0)20 7239 0360

Fax: +44 (0)20 7239 0370

PO Box 700
Yarmouth

Maine 04096, USA

Tel: (888) BREALEY

Fax: (207) 846 5181

<http://www.nbrealey-books.com>

© Dennis Sherwood 2002

The right of Dennis Sherwood to be identified as the author of this work has been asserted in accordance with the Copyright, Designs and Patents Act 1988.

ISBN 1-85788-311-X

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the
British Library.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording and/or otherwise without the prior written permission of the publishers. This book may not be lent, resold, hired out or otherwise disposed of by way of trade in any form, binding or cover other than that in which it is published, without the prior consent of the publishers.

Printed in Finland by WS Bookwell.

Praise for **Seeing the Forest for the Trees**

“Dennis Sherwood has the ability to tame the most difficult and complex intellectual ideas, and to apply them to real situations in a language which is both down to earth and stimulating.”

Peter Brown, Vice President Human Resources, Astra Zeneca

“If you are struggling with information overload, the paralysis of analysis; trying to tame the complexity of the busyness of business; or simply keen on finding ways to make better decisions, this is the book for you. Dennis Sherwood does a masterful job in providing a dynamic guidebook filled with how-tos, practical tools, and insightful techniques to enrich your future strategy, teamwork, and growth initiatives.”

*Patrick J. McKenna, Partner, Edge International, and co-author of
First Among Equals, Beyond Knowing, and Herding Cats*

“Dennis Sherwood offers a pragmatic view of a complex subject, rich in practical examples you can relate to. Essential reading for all managers.”

Tim Cooper-Jones OBE, European NPI Project Director, Unilever

“This is a valuable guide for those who are currently trapped in a linear thinking mode. Dennis Sherwood demonstrates how systems thinking helps to break down complexity, and how individual actions affect others in a causal fashion. This book is full of real-life examples of how to use systems thinking in our day-to-day lives.”

Andrew Yue, Director, Credit Suisse First Boston

“Dennis Sherwood’s use of Gaia Theory to illustrate the value of systems thinking is well done, truly capturing its essence.”

*James Lovelock, author, independent scientist, and originator of
Gaia Theory*

“If you’ve been looking for a book that will improve your understanding of systems thinking, you’ll find *Seeing the Forest for the Trees* as the answer to your quest. It provides a wonderful overview of the field of systems thinking.

But more than that, it uses thoughtful, realistic examples to build the reader’s understanding of not only when a more systemic solution is possible, but how to uncover that solution.”

Chris Soderquist, Pontifex Consulting

“This book will bring systems thinking into your business life, making problems—which seem impossible—possible, and in so doing, helping you understand and drive your business more effectively than ever before.”

Cary Adams, Distribution Director, Business Banking, Lloyds TSB Bank

“This technique of systems thinking is enormously useful to public policy makers, who need to unpack very complex problems and identify the key strategic levers government can use to address them.”

*Janet Evans, Head of Libraries Division, Department of Culture,
Media and Sport, UK Government*

“The age of ‘Keep It Simple, Stupid’ is over, as business people wake up to the complexity and contradictions of the world they operate in. Dennis Sherwood’s clear and patient handbook shows business people how to Keep It Complex and retain their sanity. Step by step, *Seeing the Forest for the Trees* tells us how to translate hitherto difficult ideas into potent management tools for change. Dennis Sherwood’s infectious enthusiasm transforms tough ideas into practical possibilities.”

*Peter Day, presenter of In Business on BBC Radio 4 and Global Business on
BBC World Service*

“I managed technology for more than twenty years and thought I knew everything about building effective business systems, until Dennis Sherwood introduced me to systems thinking—it was like finding the missing pieces of all my jigsaws stacked neatly in a pile. Systems thinking is a no-brainer decision for the 21st century. Without it your business will never really fulfil its potential. Worse, you may even lose what you have now—without ever knowing what went wrong. The question is not so much ‘Why should we use systems thinking now?’ It is more like ‘Why the hell didn’t we apply it sooner?’”

Colin Beveridge, IT director, author and visionary

“IT systems analysis and design is all about breaking problems down into smaller and smaller pieces until you are able to tackle them with simple programming instructions. But all IT professionals will recognise a common problem: when you build all the pieces back up into a system, it doesn’t do what you wanted. This book gives a set of useful techniques on how to look at the problem as a whole and hopefully to avoid some of the unpleasant surprises. It doesn’t replace the traditional analysis techniques—but introduces a new (and fun) one to the armoury.”

Ruth Crook, Egg Bank

“For me, Dennis’s enthusiasm and clarity of writing brings systems thinking to life. He makes this important business concept both simple to understand and exciting to learn.”

Paul Smith, Group Managing Director, Accord plc

“One of the most precious skills that a communicator can have is the ability to convey complex ideas in a clear and readable way. Dennis Sherwood has this rare talent in abundance. To understand complex problems, we need to make them simple. The danger, however, is that we will over-simplify them and miss out crucial details. This book is about systems dynamics thinking ... With clear explanations throughout, Dennis Sherwood demonstrates the value of this powerful thinking tool.”

Rob Eastaway, creativity guru, author of What’s a Googly? and co-author of Why Do Buses Come in Threes? and How Long Is a Piece of String?

“Good organisations only flourish when their people give their best. It is Dennis Sherwood’s gift and achievement to show how effective systems thinking can help realise this happy state. He has a clarity of thinking and ease of communication which will enable managers and leaders to make sense of the complexities of their organisations and see the way ahead. In short, he really does help you see the wood/forest for the trees. This is an excellent book.”

Tony Little, Headmaster Oakham School (1996–2002), Eton College (2002–)

“Dennis Sherwood develops the seminal insights of Jay Forrester and Ludwig von Bertalanffy into powerful practical tools for analysing and influencing the complex systems around us. The usefulness of his approach goes well beyond the world of business into that of government management and public policy making more generally.”

Mark Allen, Deputy Director, Policy Development and Review Department, International Monetary Fund

“Dennis captures the very essence of why systems thinking is so relevant to management today. No one else I know has Dennis’s unique ability to bring simplicity and clarity to what were, at first sight, impossibly complex situations. This book is essential reading to anyone wishing to understand the underlying drivers and dynamics of business models.”

Henry Kenyon, Partner, PricewaterhouseCoopers

“This highly readable, practical guide to systems thinking makes it possible for the layman and the manager to make better sense of the world around them, to find leverage points where a small amount of effort can make a big impact, and to gain insights into why putting something right often has unforeseen knock-on effects, both good and bad.”

Mark Batten, Managing Director, makingbreakthroughs

“Seeing the Forest for the Trees is crammed full of vivid case studies, practical examples, much food for thought—and some lively humour too!”
Vikas Agarwal, Quality Manager, Honda Motor Company, India

“The application of systems thinking to business, which Dennis Sherwood describes so well in this book, offers beleaguered managers a rare combination. It gives new insights into complex management issues whilst also introducing practical tools to help managers to make wise decisions. Every manager will be able to find practical applications in their own business for the principles and techniques described here.”
Peter Cox, Managing Director, OMLX Exchange

“Dennis Sherwood addresses complex issues in a way that is easy to understand, and more importantly, easy to apply and execute—assuming you can match his enthusiasm and energy!”
*Phil Bulley, former IS and transformation director,
Yorkshire Electricity Group plc*

Acknowledgments

I thank many people for their help over the years. Let me mention specifically Alan Budd, Andrew Barton, Bruce Barnard, David Blood, Doug Smit, Harpal Lalli, Harsha Mistry, John Lawrence, John Morecroft, John Rountree, John Taylor, Judith Hackett, Kerry Turner, Michael Ballé, Nick Hester, Paul Deighton, Tessa Lanstein, Tim Beswick, Tony Vernon, and Warren Gemberling. Nicholas Brealey has been extremely helpful in sharpening the focus of this book and in clarifying both my thinking and the text; Chris Soderquist gave me some most apposite advice; Ben Russell was especially generous in advising me on the history of feedback; Sally Lansdell has been a most efficient and attentive editor; and special thanks to all those who most generously have written the endorsements. In addition—of course—I also thank my family, Anny, Torben and Torsten.

May I also thank those who have given permission for me to use or refer to their materials:

The Institute for the History and Philosophy of Science and Technology at the University of Toronto for the plate from *The Steam Engine Familiarly Explained and Illustrated* by Dionysius Lardner reproduced on page 19.

Bloomberg L.P. for the charts on page 92 and 93. Copyright 2001 Bloomberg L.P. Reprinted with permission. All rights reserved. Visit www.Bloomberg.com.

The Financial Forecast Centre™ for the data on which the chart on page 121 is based.

The United Nations Population Division, Department of Economic and Social Affairs, for the chart on page 245.

The Goddard Institute of Space Studies for the chart on page 266.

Dennis Sherwood
Church Barn, Brabourne, Kent
May 2002

Foreword

John Speed, Director, The European Court of Auditors

An alternative subtitle to this book might be “The application of rigorous common sense to strategic and policy-focused thinking for organizations.” Because what Dennis Sherwood shows in a convincing and entertaining way is that by supporting common sense with the rigorous and structured techniques of causal loop diagrams and systems thinking, it is possible to address complex strategic issues in a manageable and understandable way.

Right at the beginning of the book Dennis points out the fundamental importance of taking a holistic view when addressing business and organizational problems. This rings true for managers in both business and public-sector organizations. As a manager in an institution of the European Union, I recognized immediately the validity of the approach to my own organization, which has a relatively decentralized structure and somewhat diffuse overall goals, and where the various sectors of the organization have their own vision of what is important and what are their priorities. In these circumstances there is a structural tendency to ignore the whole view. As we now, faced with enlargement, try to focus on the key goals for the whole institution, it is obvious—it’s common sense again!—that we must take a holistic approach. Systems thinking and causal loop diagrams can be powerful tools for focusing on what is really important: seeing the forest for the trees.

I think that one of the most important messages in the book is indeed that systems thinking is about what, with hindsight, seems obvious. The paradox is that as one works through the causal loop diagrams, it takes time to determine what afterwards seems obvious! As Dennis points out, thinking through the links, the dangles, how to express the elements to include in the diagram, whether the causality effect is the “same” or “opposite” can make the brain hurt and the wastepaper basket fill up with diagrams that don’t quite describe the situation. This is where the rigor has to be combined with the common sense; and, indeed, with a profound knowledge of the system being described. So a further valuable by-product of the approach is that one has to spend time making sure that one really does understand the business correctly.

Dennis has set out to show that the ideas in the book do not just apply to business organizations and business decisions. In Chapter 10 he does this by applying the techniques to a major issue of public policy, that of global warming. Global warming is a high-level public policy issue and it makes a most interesting and readable example. But for the purpose of showing the applicability Dennis could equally have chosen a more mundane strategic question facing a non-commercial organization, whether in the public sector or non-governmental. Wherever an organization has targets, and constraints, and complex interrelationships between the various elements that affect its performance, it is possible to apply systems thinking and draw causal loop diagrams. They may be more difficult—there are perhaps more “fuzzy variables” and fewer easily quantified ones such as profits or returns to investors—but they can still be used to great benefit.

Chapter 9, “Decisions, teamwork, and leadership,” stressing the importance of understanding the different mental models that exist in an organization in order for effective teamworking to occur, is particularly relevant in public-sector organizations. In the admittedly specific environment of the European Union institutions this is especially important in light of the different backgrounds and cultures of the organizations’ staff members. Even in a specialist institution such as ours (the Court of Auditors) where we are all supposed to be auditors, the traditions of audit across the Member States are very different, and combining them into one organization with a single culture so that the “telephone directory test” can work is a long task.

This is a useful and thought-provoking book, in that it makes managers want to get out their pens and paper and start trying to draw causal loop diagrams to analyze strategic issues for their own organizations. The way to do this is, of course, to get round a table and put brains together with a flipchart. Even better, invite Dennis to come round to help stimulate the process!

Contents

Acknowledgments	xv
Foreword	xvii
Prologue: What is systems thinking?	1
Systems thinking is a big idea	1
So what is systems thinking all about?	2
Connectedness	3
Why systems must be studied as a whole	5
The systems thinking toolkit	6
The benefits of systems thinking	7
How the book works	8
PART I: TAMING COMPLEXITY	11
1 The systems perspective	12
Systems	12
Emergence and self-organization	14
Feedback	16
Systems thinking	18
On with our journey...	24
2 Carrying the back office rock	25
The story	25
The context	26
The issue	27
A diagrammatic representation	27
Enriching the diagram	30
What happens as a consequence of error?	31
A nasty vicious circle	31
What else drives the ability to cope?	32
But what about cost?	34
There's still one thing missing...	35
Back to wisdom	38

3	Quality, creativity, and cutting costs	40
	The story	40
	The context	41
	The picture	41
	Another nasty vicious circle	42
	What should we do?	43
	Who's right?	44
	Deciding policy	45
	PART II: TOOLS AND TECHNIQUES	49
4	Feedback loops	50
	The central role of feedback loops	50
	Reinforcing loops	54
	Balancing loops	55
	Dangles, boundaries, and real systems	57
	There are only two types of link—the S and the O	59
	Distinguishing between reinforcing loops and balancing loops	59
	The two fundamental building blocks	62
	The importance of language	63
	Are all links always either an S or an O?	64
	Fuzzy variables	65
	Ss and Os that work in one direction only	66
	A final thought	68
5	The engines of growth—and decline	72
	Vicious and virtuous circles	72
	Vicious and virtuous circles really do have the same structure	73
	The engine of growth	74
	Patterns of growth	77
	Exponential growth becomes very fast	83
	Explicit and implicit dangles	85
	Boom and bust	87
	Reinforcing loops can be linked	94
6	Setting targets, seeking goals	103
	More on balancing loops	103

Balancing loops in business	108
Balancing loops are often linked	114
Balancing loops and time delays	117
What is the definition of variance?	121
Time to reflect	125
7 How to draw causal loop diagrams	127
Rule 1: Know your boundaries	127
Rule 2: Start somewhere interesting	128
Rule 3: Ask “What does this drive?” and “What is this driven by?”	129
Rule 4: Don’t get cluttered	129
Rule 5: Use nouns, not verbs	131
Rule 6: Don’t use terms such as “increase in” or “decrease in”	132
Rule 7: Don’t be afraid of unusual items	133
Rule 8: Do the Ss and the Os as you go along	134
Rule 9: Keep going	134
Rule 10: A good diagram must be recognized as real	135
Rule 11: Don’t fall in love with your diagrams	136
Rule 12: No diagram is ever “finished”	136
PART III: APPLICATIONS	138
8 Stimulating growth	139
In real life, exponential growth does not go on for ever	139
Breaking through the constraints	146
The growth of urban populations	150
The context	150
The dynamics of population growth	150
Driving economic prosperity	154
Urban growth doesn’t go on for ever	155
The final causal loop diagram	160
The moral of this story	161
Don’t pedal harder, take the brakes off	162
9 Decisions, teamwork, and leadership	164
The talent problem	164
The senior executive’s perspective	166

The star's perspective	169
The perspective of the more junior staff	173
What is the best policy?	174
But that's all so obvious, isn't it?	178
Mental models	180
Teamwork	184
Outsourcing, partnering, and cross-boundary conflict	188
How the world looks to the buyer	189
How the world looks to the contractor	195
Is there a better way?	197
The systems perspective	201
10 Levers, outcomes, and strategy	202
Levers	202
Outcomes	204
How are the levers and the outcomes connected?	205
Levers, outcomes, and systems thinking	209
Levers, outcomes, and loops	209
Connecting the loops	213
The last link	217
What about the other levers?	221
A general business model	223
The big picture	226
Encouraging ambition, vision, and imagination	232
How to be creative	235
Back to levers and outcomes	238
11 Public Policy	240
Systems thinking also applies to matters of public policy	240
Back to population	241
What are the consequences of economic activity?	243
What is the structure of this system and how does it behave?	244
Gaia	247
Global warming	251
Linking the loops together	256
The impact of storms	260
The four horsemen ride again	263

This goes way beyond global warming	263
What should we do?	266

PART IV: HOW TO BUILD A “LABORATORY OF THE FUTURE” 271

12 Turbo-charging your systems thinking	272
System dynamics	273
System dynamics and spreadsheets	274
Stocks and flows	278
Stocks and flows in business	281
Two more unifying concepts	286
Causal loop diagrams and plumbing diagrams	287
Modeling in itthink	292
13 Modeling business growth	302
A business example	302
Fuzzy variables	310
Models for answers, models for learning	312
Managing the marketing mix	316
What policies would you invoke to optimize the business?	326
Is the 80:20 split the best deal?	328
Epilogue: Complexity tamed	332
Bibliography	333
Websites	338
Software	339
Index	340

Prologue:

What is systems thinking?

Systems thinking is a big idea

This book is about **systems thinking**. Systems thinking is a big idea—the idea that you really can understand and tame the complexity of the real world. This complexity cannot be wished away, but if you look at the world in the right way, and have the confidence to embrace complexity rather than being cowed by it, it can indeed be tamed.

The essence of systems thinking is that the complexity of the real world can best be tamed by seeing things in the round, as a whole. Only by taking a broad view can we avoid the twin dangers of a silo mentality—in which a fix “here” simply shifts the problem to “there”—and organizational myopia—in which a fix “now” gives rise to a much bigger problem to fix “later.” Taking a broad view, however, is not at the expense of missing the detail; much of business is of course about paying attention to those all-important details. Nor is it a question of broad brush versus detail; rather, it is one of taking a broad view in the context of the *right* detail, of truly—as the title of this book suggests—seeing the forest for the trees.

The prize you get from doing this is better, more robust, and wiser decisions. Decisions that are better because they have been taken by considering the problem in the round, in all its complexity; decisions that are more robust because they have been taken in the full understanding of their consequences, so that you will not be surprised by unforeseen circumstances; decisions that are wiser, because they stand the toughest test there is, the test of time. And whether you are in a commercial organization or a not-for-profit one, better decisions must mean better business, in the widest sense of the term.

To win the prize, you have to do two things:

- Be willing to tackle complexity head on.
- Be confident in using the systems thinking toolkit, enabling you to understand, describe, examine, and explore the complexity of the real world.