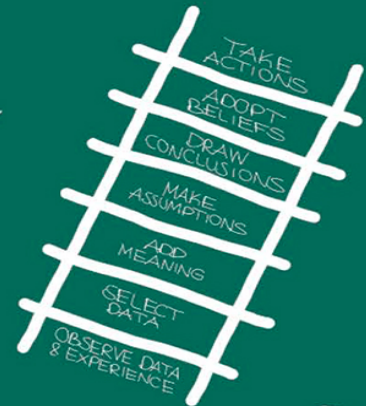
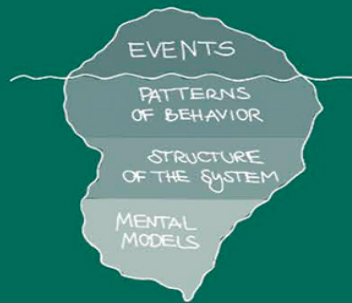


CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR EXPLORING SYSTEMS, PERSPECTIVES, AND COMPLEXITY



CONNECTIONS

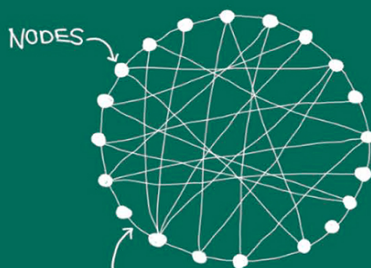
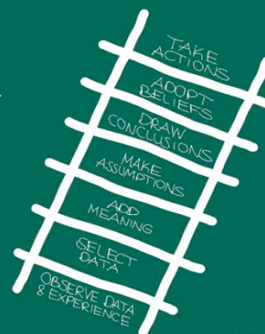
»IS« — ACTUAL SITUATION	»OUGHT« — IDEAL SITUATION



CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR
EXPLORING SYSTEMS, PERSPECTIVES,
AND COMPLEXITY



CONNECTIONS

•IS•—ACTUAL SITUATION	•OUGHT•—IDEAL SITUATION



Methods for Systems Thinking

Methods for Systems Thinking is a practical workbook with more than 65 methods you can apply right away. It helps you explore complex systems, involve the right people, and respond effectively to change.

The QuickStart Guide shows you where to begin. You can start with the short theory section, use the 5M Methods Matrix to choose an approach, or jump straight to a method. Methods are organized by the 5M Structure (Motivate, Meet, Map, Make, and Manage) so you can quickly find what fits your purpose, whether clarifying goals, engaging stakeholders, mapping connections, shaping responses, or adapting over time.

Each method spans three pages and gives you a description, purpose, application, illustration, and step-by-step guidance. You also get tips for facilitation, debriefing, and variations. The focus is on action, turning reflection into results.

Christian Baron , PhD, is a consultant, trainer, and systemic coach. He uses systems thinking to make complexity manageable, with a focus on clarity, collaboration, and lasting impact.

Methods for Systems Thinking

65+ Practical Approaches for Exploring Systems,
Perspectives, and Complexity

Christian Baron



Designed cover image: © Anna Frank

First published 2026

by Routledge

605 Third Avenue, New York, NY 10158

and by Routledge

4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2026 Christian Baron

The right of Christian Baron to be identified as author of this work has been asserted in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice : Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

ISBN: 978-1-041-11170-2 (hbk)

ISBN: 978-1-041-11171-9 (pbk)

ISBN: 978-1-003-65861-0 (ebk)

DOI: [10.4324/9781003658610](https://doi.org/10.4324/9781003658610)

For Product Safety Concerns and Information please contact our EU representative GPSR@taylorandfrancis.com . Taylor & Francis Verlag GmbH, Kaufingerstraße 24, 80331 München, Germany.

Contents

[*Foreword*](#)

[*Preface*](#)

[*About the Author*](#)

[*About This Book*](#)

[*QuickStart Guide*](#)

[Introduction](#)

[PART 1 Systems and Systems Thinking](#)

[Understand Systems](#)

[*But Not Everyone Sees the Same System*](#)

[*System Classification*](#)

[*Real-World Systems*](#)

[*Making Systems Tangible*](#)

[*Turning Toward Action*](#)

[Understand Systems Thinking](#)

[*Brief History*](#)

[*Two Strands*](#)

[*9 Core Concepts of Systems Thinking*](#)

[Think in Systems](#)

[*7 Core Habits for Systems Thinkers*](#)

[*How Systems Thinkers Make Meaning*](#)

[*Self-Check: Are You a Systems Thinker?*](#)

[Navigate in Systems](#)

[*Systemic and Systematic Thinking in Systems*](#)

[*Framing and Sensemaking in Systems*](#)

[*Preparing to Act in Systems*](#)

[*Diagnosing the Problem*](#)

[*Finding Leverage and Acting in Systems*](#)

[PART 2 Select Methods for Systems Practice](#)

[*Why This Set of Methods*](#)

[*Where These Methods Come From*](#)

[*The 5M Structure*](#)

[*Focus Areas of Methods*](#)

[The 5M Methods Matrix](#)

[*Motivate: Why and What For?*](#)

Meet: Engage Stakeholders and Perspectives

Map: Understand and Visualize the System

Make: Take Action and Create Solutions

Manage: Evaluate and Adapt Over Time

PART 3 Apply 65+ Methods for Systems Practice

Integration with Systems Thinking Principles

What's in Each Method

Motivate: Why and What For?

Deciding to Act

Readiness Assessment

Guiding Star and Near Star

Cynefin Framework

Certainty-Agreement Matrix

Power Mapping

Meet: Engage Stakeholders and Perspectives

Silent Signal

Invisible Connections

Collective Pulse

Speed Framing

Invisible Negotiation

Ladder of Inference

Fishbowl Discussion

Reverse Fishbowl

Stakeholder Mapping

Cluster Mapping

CATWOE Analysis

Boundary Critique (BC)

Appreciative Inquiry

World Café

Map: Understanding the System

Air Circles

Adaptive Pen Control

Group Juggle

Triangles

Live Systems Mapping

Bathtub Game

DSRP Framework

Behaviour Over Time Graphs

Paper Computer

Refrigeration Game

Fishbanks Ltd.

Sankey Diagrams

System in Focus

Rich Pictures

Double-Q Diagram

Impact Mapping

Connected Circles Map

Causal Loop Diagram (CLD)

Systems Archetypes

Leverage Point Mapping

Scenario Planning

World Game

Soft Systems Methodology (SSM)

Viable System Model (VSM)

Make: Take Action and Create Solutions

Human Knot

Paper Airplane Factory

Forced Prioritization

Resource Tree

Kano Model

Theory of Constraints (TOC)

Prototyping Sprints

Process Hacking

Backcasting

Synectics

Morphological Analysis

Futures Wheel

Manage: Evaluating and Adapting Over Time

Boom and Bust

Most Significant Change (MSC)

Outcomes Mapping

Lag vs. Lead Indicator Tracking

Balanced Scorecard

Iceberg Model

Scenario Stress Testing

Fuzzy Cognitive Mapping (FCM)

Critical Systems Heuristics (CSH)

Final Thoughts

Reference

Index

Foreword

Christian Baron's book points in a new direction for systems thinking resources. Let me explain with the aid of a brief reflection on systems thinking since the 1980s, including one of my own contributions, as this will make it clear why I see this book as an important new development.

Back in the early 1980s, there was a “paradigm war” (two competing understandings of what systems thinking is, underpinned by very different assumptions about the nature of reality and our knowledge of it) that threatened to tear our research community apart. Some people were concerned with enhancing objectivity, optimization, and expert analysis, while others emphasized intersubjectivity, stakeholder participation, and facilitated dialogue. Those seeking objectivity viewed systems as things we can know in the real world [1], while those facilitating intersubjectivity thought of systems as being useful interpretations (i.e., in the mind), constructed through processes of collaborative inquiry [2]. The paradigm war became entrenched, and there were almost no points of agreement between the two sides, making mutual appreciation very difficult [3].

In this context, Jackson and Keys [4] observed that, when it came to practice, the two different visions of systems thinking made fundamentally different assumptions about the nature of organizations and the relationships between stakeholders, which makes them useful in different contexts. At the risk of oversimplifying their argument, it's useful to pursue objectivity, optimization, and expert analysis when there is agreement between stakeholders on the issues being tackled. However, when there is disagreement, then stakeholder participation, dialogue, and a search for mutual understanding are more valuable. Building on this argument, Jackson [5] advocated methodological pluralism: treating different methodologies, which are grounded in the different paradigms, as complementary rather than competing.

This was a critically important contribution to systems thinking not just because it offered a way to save the systems research community from being riven in two but also because it offered a more flexible and responsive systems practice than either of the earlier versions of systems thinking. Essentially, it made clear that we can have the best of both worlds.

During the late 1980s and throughout the 1990s, over 100 authors contributed to our understanding of methodological pluralism [6] until, in the year 2000, two books consolidated contrasting understandings of what it involves. Jackson [7] emphasized the use of multiple methodologies based in four different paradigms (going beyond the original two from the early 1980s), and he argued that we can usefully switch from one methodological rationale to another – including movement between one set of philosophical assumptions about reality and our knowledge of it to a different set of assumptions. This appeared to assume there is a “neutral,” meta perspective from which methodologies and paradigms can be observed and understood [6 , 8]. Jackson was very clear that methods shouldn't be divorced from methodologies, as it is methodologies that provide philosophy and theory explaining why methods are valid and how they work. In contrast, I wrote a

book [8] arguing that there is no “neutral” place “above” the methodologies and their paradigms from which to observe and use them: methodologies come to be interpreted through the practitioner’s own paradigmatic lens, which cannot be transcended but can evolve over time through processes of learning with others. Also, I claimed that it is more useful to mix methods in practice than deploy whole methodologies, with methods being drawn from multiple methodological sources and reinterpreted by the practitioner. Thus, methods can be detached from their original methodological rationales and can be deployed in new ways, different from those that their creators intended. Indeed, I argue that whole methodologies are relatively blunt instruments: we need to be able to explore problem contexts (especially taken for granted value and boundary judgments, conflicts, and marginalization processes) to see more of the complexity than we (or a client, or any given stakeholder) might initially be aware of [9], and this most often results in the development of a bespoke intervention design, creatively mixing methods from multiple sources, as no single methodology is usually sufficient [6 , 10].

Intellectually, I regard both the contributions from Jackson and myself as credible. Indeed, I recognize a significant benefit of Jackson’s work [11]: by insisting on the teaching of multiple methodologies, Jackson provides an antidote to a common problem – practitioners discovering just one methodology and believing this is all systems thinking consists of. However, I argue that, when it comes to practice, mixing methods offers a great deal more flexibility and responsiveness than the use of whole methodologies, or keeping methods tied to the methodological rationales of their creators [12]. In addition, my approach doesn’t say that practitioners are paradigmatically neutral, so it asks them to learn from others with different perspectives on an ongoing basis [13], thus providing another antidote to them thinking that systems thinking is just one methodology. Through ongoing learning, practitioners come to see more of their own methodological blind spots, and thereby, over time, they enhance their capabilities for exploring complexity, as well as for designing and undertaking systemic interventions in the context of that complexity.

While I have long believed that mixing methods is the most practically advantageous approach (my writings on this go back to 1989 [14]), I suggest that, in recent years, we have witnessed considerable changes in how people in organizations work that magnify the practical difference between using whole methodologies and mixing methods. Work is becoming ever more intense, with high pressure decisions needing to be made increasingly quickly [15]. Also, since the COVID-19 pandemic, working from home has become much more common [16]. Both these changes to working practices make it hard for people to find time for special projects structured by a whole systems methodology [17], and in particular, convening workshops (a practice that is often advocated in the more participative and dialogical approaches) is increasingly resisted because of the difficulty of bringing everyone together in the same place at the same time [18]. While there is undoubtedly a case for rethinking how we run our organizations [19 , 20], we cannot afford to sit on our hands and wait for organizational environments to become more propitious for systems thinking; there are just too many complex and urgent issues that need tackling. If we are able and willing to

detach methods from their original methodological rationales, then they can be adapted for use in new ways, for day-to-day thinking and conversation [[17](#) , [21](#)], as well as for special projects and workshops when these are possible. This adaptation can happen without losing the idea that methods need to be understood by the practitioner in the context of his or her own evolving systems perspective.

Despite this argument for mixing methods being widely appreciated in the systems community, and despite recent changes in working practices, most contemporary, multifaceted resources for systems thinking [e.g., 11, 22–24] have continued to present systems methods in the context of whole methodologies. This is where the book you are reading is different, and it points to a new way forward.

I am not aware of another systems thinking book that presents as many methods as this one (65+), drawn from such a diversity of sources, offering the potential to be adapted for use in a multitude of situations. However, a list of methods alone would not be very useful: it would overwhelm the average reader who is approaching systems thinking for the first time. Two additional elements of this book are key:

First, Baron explains the importance of using the methods in the context of a systemic mindset: the unsystemic use of systems methods can lead to fundamental misunderstandings of systems thinking [[25](#)]. I would argue that it can do significant harm, too, as without a systemic mindset, there is nothing beyond the limited method at hand to support the practitioner in exploring boundaries, mapping relationships, appreciating different perspectives, and understanding emergent properties during interventions. These are all key systemic skills for engaging with complexity and enhancing critique and innovation, and they can be practiced even when no formal method appears to be relevant [[17](#) , [21](#) , [26](#) , [27](#)].

Second, of equal value to the insistence on a systemic mindset is Baron's categorization of five broad purposes for the methods he discusses, and this structure helps to differentiate between classes of methods. It is also simple enough to be immediately understood. Of course, methods can be adapted for purposes other than those they are usually used for [[28](#) , [29](#)], but as a starting point for learning, the emphasis on purposes is consistent with mixing methods [[8](#)] and can be readily appreciated by novice practitioners.

I recommend this book to you in the belief that it offers a new kind of resource for systems thinking, with many more methods than usual, which will be of real benefit to the growing number of systems practitioners who seek to mix methods creatively in response to ever more challenging social contexts.

– **Gerald Midgley**

Centre for Systems Studies, University of Hull, Hull, UK

Birmingham Leadership Institute, University of Birmingham, Birmingham, UK

School of Cybernetics, College of Systems and Society, Australian National University, Australia

Department of Informatics, Linnaeus University, Växjö, Sweden

Preface

This book began with a simple intention: to make systems thinking more accessible and usable in everyday work. What you now hold in your hands is the result of years of exploration, collecting methods, testing ideas, refining practices, and learning with others.

It started with a growing set of practical tools and exercises used in facilitation, workshops, and strategy work. Over time, a structure emerged, ways to organize the tools and frame the work, that made it easier to teach, share, and apply in many different settings. The idea behind this book is that it can be a resource not just for learning about systems thinking but also for applying it directly in complex, messy situations.

This book would not exist without the support of many people.

Thank you to those closest to me: Anna, Kirsten, Rita, and Wolfgang. Thank you for your presence, encouragement, and care.

Thank you to everyone who contributed feedback, reviewed drafts, challenged ideas, or helped sharpen the clarity of the text. Your input pushed this work forward in essential ways.

A special thanks to the reviewers: Tony Fish, Michael Frahm, Isabell Osann, and James Stauch. Thank you to Gerald Midgley for contributing the foreword and to all who offered endorsements and encouragement along the way. Your questions, critique, and perspectives helped bring this to another level.

Writing this book has been both a personal and professional process. Systems thinking is not just a set of tools, it is a way of seeing, of listening, of working with uncertainty. This book reflects what I have learned so far. It is not a final answer but a contribution to an ongoing field of practice.

The process was supported by modern AI tools, used for research, synthesis, and drafting. But the heart of the work lies in dialogue, reflection, and shared learning with people.

Thank you for being part of this. May this book support your own thinking, questioning, and action in the systems you care about.

About the Author



Christian Baron, PhD, is a freelance consultant, trainer, and systemic coach. As founder of *zusammen-weiterdenken*, he supports clients in creating sustainable value and navigating organizational transformation. With experience in research leadership and mid-sized industry, he applies systems thinking and systemic methods to make complexity more workable. His practice focuses on clarity, collaboration, and long-term impact.

About This Book

Methods for Systems Thinking is a workbook of practical approaches to systems thinking. It brings together a wide range of frameworks, methods, tools, visuals, and activities that help users explore, understand, and intervene in real-world systems. These approaches focus on visualizing relationships, understanding change over time, fostering creative responses, and supporting collaboration across diverse perspectives.

Why This Book?

This workbook is designed for immediate use. The focus is on approaches that can be applied rather than on theoretical discussion. It offers a broad collection of hands-on techniques to explore, understand, and intervene in real-world systems – whether mapping systems, analysing dynamics, or developing solutions.

Whom for?

Methods for Systems Thinking is for educators, managers, facilitators, leaders, consultants, and others working with real-world systems. It applies across fields, such as education, healthcare, business, government, and environmental work, and extends to any area where people deal with complexity, collaboration, or change. It is also useful in academic contexts, offering students and teachers clear examples and a broad set of approaches for teaching, research, and applied learning. Whether you work within a discipline or across boundaries, these methods support systems thinking in practice.

Why Methods?

Systems thinking is not a fixed set of rules or a single approach. What counts as systemic often depends on context, purpose, and perspective. This book offers structured approaches to help explore, test, and engage with systems.

Readers are encouraged to build their own understanding and choose tools that fit their needs. These resources are not shortcuts but prompts for reflection and action. You remain the master of your own thinking. The approaches in this book support your work but do not replace your judgment.

A Note on Terms

In this book, several terms to describe different types of resources are used:

- *Frameworks* help how we see, structure, or group situations.
- *Methodologies* are theory-based approaches for selecting and combining methods.
- *Methods* are structured processes for exploring, analysing, or planning.
- *Tools* are techniques that support a method or framework.

- *Visualizations* show patterns or connections, often as diagrams.
- *Activities* put these into practice, often in groups or workshops.

QuickStart Guide

Two Ways to Start

This book introduces key ideas in systems and systems thinking, followed by 65+ practical approaches organized using the 5M Structure. You can either start with the fundamentals or go straight to the methods.

- *Want context first? Part 1* covers what systems are, what systems thinking is, and how to become a systems thinker.
- *Ready to get hands-on? Parts 2 and 3* include practical tools, grouped in the 5M Structure.

The 5M Structure – Overview

Focus Area	What it helps with
Motivate	Clarify purpose and need for action
Meet	Engage stakeholders and perspectives
Map	Understand and visualize the system
Make	Take action and create solutions
Manage	Evaluate and adapt over time

Find Your Starting Point

Your Situation	Start with
You need to clarify purpose and direction	Motivate
You need to involve key people or perspectives	Meet
The system feels unclear or overwhelming	Map
You need to design and build possible solutions	Make

You need to evaluate, learn, or adapt over time

Manage

How the Methods Work

Each method in *Part 3* includes the following:

- Purpose, applications, and typical use cases
 - Step-by-step instructions
 - Tips for facilitators, debriefing, and variations
-

Introduction

DOI: [10.4324/9781003658610-1](https://doi.org/10.4324/9781003658610-1)

Many of today's world challenges have to do with systems – where multiple parts connect, interact, and change together. Climate change, economic shifts, or health crises don't happen in isolation. They are part of something bigger. They are part of interconnected systems. When a part changes, other parts respond. Because of these interrelations, simple fixes often fail – or make things worse.

Systems thinking can support work with these kinds of challenges. Instead of looking at isolated pieces, it encourages us to step back and understand how parts fit together. This helps us understand better how problems arise and where lasting solutions might come from.

This book is intended to support readers to apply systems thinking in practice. It offers simple, practical methods, simulations, exercises, and frameworks to explore, understand, and intervene in real-world systems. Systems thinking helps reveal patterns, feedback loops, and unintended effects. Rather than chasing symptoms, it encourages us to address deeper causes and design solutions that remain effective as situations evolve.

From education to urban planning, business, healthcare, or environmental management – many fields face systems where multiple factors interact. Though contexts differ, systems thinking offers shared principles to work with complexity and change.

At its core, systems thinking shifts how we see problems. When we change our perspective, new possibilities emerge – often in unexpected places. This change in perspective helps us work with difficult problems, adapt as conditions change, and build solutions that last.

The following chapters introduce the basics of systems and systems thinking, followed by a wide range of practical methods. Whether you need to map connections, address difficult problems, or plan for the future, these tools aim to make systems thinking practical and actionable.

This is a book for practice. I hope you find these methods helpful as you work with your systems challenges.

Now, let's begin.

Part 1

Systems and Systems Thinking

DOI: [10.4324/9781003658610-2](https://doi.org/10.4324/9781003658610-2)

Many tricky problems involve systems where parts connect, interact, and shift together.

In this part, I introduce how systems thinking helps frame such problems more effectively. Systems in nature, technology, and society display layers of relationships that produce outcomes we cannot predict by analysing parts in isolation.

Together, we explore how systems thinking shifts our framing of problems to see beyond isolated issues toward larger patterns and interactions that shape the world. This chapter sets the foundation for understanding how systems thinking supports better analysis, design, and decision-making when working with systems.

Understand Systems

DOI: [10.4324/9781003658610-3](https://doi.org/10.4324/9781003658610-3)

What do a tree, a weather system, and a company have in common? They're all systems but not of the same kind.

A useful first step in understanding systems is to group them into two broad types:

- *Natural systems* , like ecosystems, weather patterns, or the solar system, form and function without human design.
- *Human-made systems* , like companies, hospitals, or machines, are intentionally designed to serve specific goals.

How we describe a system depends on which type we're looking at. Human-made systems usually have clear roles, boundaries, and objectives. Natural systems show structure and interaction without designed intention.

One often-cited general definition aiming at broad applicability across many domains comes from von Bertalanffy [[30](#)]:

“A system can be defined as a complex of interacting elements.”

This is a minimal definition. It focuses on elements and the interactions between them, regardless of origin or design. In human-made and social systems, however, these elements are typically organized to serve a purpose or achieve specific goals [[31](#) , [32](#)].

Depending on the context, systems are often described by the domain they operate in: for example, biological systems (like organisms), technical systems (like machines), or social systems (like institutions). These categories help us focus on the kinds of interactions and components that matter most in each case.

Across most domains, systems typically share a few core traits that help define them, especially in human-made systems:

- *Purpose (when present)*: The system's reason for existing.
- *Components*: The individual parts or elements that form the system.
- *Interdependence*: Relationships and interactions between the components.
- *Boundaries*: Limits that define what is inside and outside of the system.
- *Environment*: External factors influencing and being influenced by the system.

One trait that often causes confusion and is often misunderstood is *purpose* . It's not the same as a goal. A goal is a specific, short-term outcome a system might try to achieve, like reducing wait times

or increasing output. Purpose is broader, it refers to the system's ongoing role or function over time. In human-made systems, purpose is often defined by design. In natural systems, purpose doesn't apply in the intentional sense because these systems aren't created with goals; they simply function.

Let's look at how this plays out in practice. Take a hospital, for example.

A hospital might set a goal of reducing patient wait times, but its actual *purpose* is reflected in what it consistently does. If its behaviour prioritizes revenue over patient care, then – regardless of stated goals – its effective purpose may be financial gain rather than community health [[33](#)].

The other traits of the system are often easier to observe:

- *Components* include doctors, nurses, equipment, and facilities.
- *Interdependence* describes how these parts interact, for example, nurses monitor patients and provide information that doctors use to make decisions.
- *Boundaries* define what belongs to the system (staff, patients, buildings) and what doesn't (insurance providers, external suppliers).
- *Environment* includes healthcare policies, public funding, and disease trends, all factors that shape how the hospital operates [[32](#)].

This example shows how each trait plays out in a real system and how *purpose* isn't always stated but is revealed by how the system operates in practice. It also highlights that understanding a system isn't just about listing parts. What matters is how those parts interact, how the system responds to its environment, and how its behaviour aligns (or doesn't) with its stated goals.

This view is central to general systems theory: a system is defined not just by its components but by how those components interact as well. Ross Ashby, Donella Meadows, and Peter Checkland each emphasized that it's the relationships and patterns of interaction that make a system. Without them, there may be no system at all, just a collection of elements [[32](#) , [33](#) and [34](#)].

Take the human heart: It doesn't work in isolation. It depends on signals from the brain, oxygen from the lungs, and coordination with other organs. Its function only makes sense within the full body. Or consider an orchestra: individual instruments make sounds, but only their interplay produces music.

Another illustrative example is the Matryoshka doll:



- *Purpose:* It serves as a decorative item representing unity.
- *Components:* A set of nested dolls of decreasing size.
- *Interdependence:* Each doll relies on the others to form a complete set.
- *Boundaries:* The outermost doll defines the system's boundary.
- *Environment:* Includes how the dolls are displayed and their cultural significance.

This example highlights how interconnected parts within a system contribute to a greater purpose, underscoring the value of understanding systems as a whole [32].

But Not Everyone Sees the Same System

What we call a system depends not just on what's physically there but on how we choose to look at it. As Ross Ashby [34] noted, any physical object – like a pendulum, a village, or a hospital – has countless variables. Which ones we focus on depends on our purpose.

This aligns with ideas from radical constructivism, as proposed by Ernst von Glasersfeld and Heinz von Foerster, which emphasize that knowledge, and system boundaries, are constructed by the observer, not simply found in the world [35 , 36]. We don't study "everything." Instead, we define a system by focusing on the elements and relationships that matter for the issue at hand.

Take a car, for example. Is it one system or many? That depends. If you're thinking about transportation, the engine, wheels, and steering might be central. If you're interested in climate control, the air conditioning system becomes relevant.

What counts as the system changes depending on what you're trying to understand or influence.

Let's take another example – a car repair shop:

- *For a customer* , the system seems simple: you bring your car, they fix it, and you pick it up. The customer focuses on the service outcome.
- *For a mechanic* , the system includes diagnostics, repair procedures, parts ordering, safety standards, and technical skills. What matters is finding and solving the technical problem.
- *For the shop manager* , the system is broader: staff schedules, finances, inventory, customer satisfaction, supplier contracts, and legal compliance all become relevant.
- *For someone developing management software* for repair shops, the system breaks down into subsystems: appointment scheduling, billing, parts inventory, customer databases, and reporting tools.

In each case, the same physical place is viewed as a different system depending on the observer's role, purpose, and knowledge. The system boundary shifts based on what questions are being asked.

But even once we've drawn a boundary, not all systems behave the same. They differ in how they respond to their environment, deal with change, or evolve over time.

To make sense of this variety, we tend to put things into mental boxes. It's how we explain our view of the world – by grouping things that seem similar. For systems, this means using categories or classifications. We group systems to spot patterns, highlight important differences, and choose better ways of working with them [37]. Without some kind of structure, we'd have to start from scratch every time we faced a new system. That's why it makes sense to begin with the basics – the common ways systems are understood and classified.

Even though every system depends on how we define it, certain recurring patterns help us work with systems more effectively. Classifications and categories give us a starting point for selecting appropriate methods and tools.

System Classification

There is a broad variety of systems. Some we call simple and predictable, like a light switch. Others are seen as dynamic and ever-changing, like the weather. Classifying systems helps us make sense of their diversity by organizing them into categories based on key characteristics [38].

There are many ways to classify systems, depending on the field or purpose. In classical systems theory, systems are seen as bounded, analysable, and made up of interacting parts with clear boundaries and purpose. In complexity science and ecology, Jean Boulton [39] describes systems as ongoing processes rather than fixed structures. She emphasizes flow, emergence, and the role of context. In economics, J. Doyne Farmer [40] shows that economies behave as complex systems that are nonlinear, uncertain, and shaped by the interaction of adaptive agents rather than by fixed rules.

To ground these ideas, we begin with one of the most accessible approaches: structural classification.

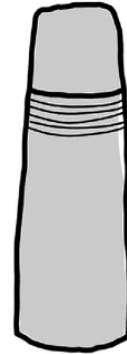
A Textbook Example

Textbooks often illustrate structural classification with a simple example: how systems interact with their environment and whether they are open, closed, or isolated. This framework, originally developed in thermodynamics, is often the starting point in system studies because it deals with observable boundaries and flows, making it useful for identifying what goes in, what comes out, and what stays contained.

This structural view divides systems into three types:

- *Open Systems* exchange matter, energy, or information with their environment. These interactions make them adaptable and responsive. In social or ecological contexts, their boundaries are often conceptual rather than physical. Examples include the human body and ecosystems [[30](#)], businesses and social systems [[32](#)], or simple physical examples like refrigerators, frying pans, or a cup of coffee, often used in systems teaching.
- *Closed Systems* exchange energy but not matter with their surroundings. Examples include a sealed water bottle, where heat passes through but water remains inside, or a pressure cooker, which transfers heat while retaining contents or a coffee cup with a lid [[32](#)].
- *Isolated Systems* neither exchange matter nor energy with their surroundings. While theoretical in nature, examples include a well-insulated thermos, effective only for a short time before heat escapes, or experimental setups in physics designed to minimize all external interactions, or the universe as a whole [[41](#)].

THERMODYNAMIC SYSTEMS



OPEN

CLOSED

ISOLATED

HEAT ✓

HEAT ✓

HEAT X

MASS ✓

MASS X

MASS X

The structural view is only one way of classifying systems. To capture a broader range of patterns, researchers also distinguish systems by their behaviour, complexity, adaptability, and hierarchy. Together, these five categories help identify key features, guide strategy, and show how systems interact with their environment [32].

Five Key Classifications

What counts as a system, and how it should be framed, depends on the field. Still, the following classifications offer a useful starting point in many practical contexts:

1. *Structural*: How systems interact with their environment (e.g., open, closed, or isolated) [34].
2. *Behavioural*: How systems change over time (e.g., static, dynamic, linear, or nonlinear) [42].
3. *Complexity-Based*: How interconnected and predictable they are (e.g., simple, complicated, complex, or chaotic) [37 , 43].
4. *Adaptability*: How systems respond to disruptions (e.g., resilient or adaptive) [44].
5. *Hierarchy*: How systems are organized (e.g., hierarchical or flat) [30 , 38].

These categories help us make sense of systems in theory. In practice, however, most systems don't fit neatly into a single category.

Real-World Systems

In theory , systems can be neatly classified – as open or closed, simple or structured, hierarchical or flat. These categories offer useful ways to study and describe them.

In practice , however, the systems encountered in everyday life rarely fit neatly into a single category. Those “*real-world systems*” don’t stay inside neat boxes. Their behaviour shifts depending on the situation, and many systems show features from more than one category at once [[44](#) , [45](#)].

Most systems we deal with are nonlinear and difficult to predict. They involve many parts that interact in often unexpected ways, with feedback loops and ongoing change.

Real systems rarely fit simple textbook definitions. Their behaviour depends not just on the parts they contain but on how those parts interact and adapt as well [[32](#) , [33](#)].

Even supposedly “closed” systems, such as a thermos or a pressure cooker, still interact with their surroundings, showing that system boundaries are not fixed but depend on our point of view.

As Donella Meadows [[33](#)] puts it:

“There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion.”

This perspective leads to three important insights:

- Systems are rarely fully isolated.
- Boundaries are defined by the observer and depend on context.
- Elements within and across systems are interconnected.

In light of this, it’s more useful to see systems not as fixed structures but as evolving patterns, shaped by feedback and outside influence. Systems that behave this way often show features like openness, emergence, self-organization, and change. These are typical of what complexity science calls *complex systems* : systems made up of many parts that interact in ways we can’t predict by looking at the parts alone. Examples include ecosystems, economies, cities, and social networks.

To capture how some of these systems change and learn over time, researchers use the concept of complex adaptive systems (CAS). This framing highlights systems that adjust continuously, with behaviour that emerges from many small interactions and shifts as conditions change [[46](#) , [47](#) and [48](#)].

Real-world systems don’t always fit neatly into this category, but the idea points to traits that are often useful when describing them. The following table shows examples and the kinds of patterns that are often observed in practice:

<i>System</i>	<i>Key Classifications</i>	<i>Description</i>
Human Body	Open, dynamic, complex, adaptive, hierarchical	Subsystems like circulatory and nervous systems work together, adapting to maintain homeostasis.
Cities	Open, dynamic, complex, adaptive, hierarchical	Interconnected infrastructure (e.g., transport, utilities) adapts to growth, crises, and disruptions.
Healthcare Systems	Open, dynamic, complex, adaptive, hierarchical	Hospitals and policymakers coordinate to address care and crises like pandemics.
Ecosystems (Forests)	Open, dynamic, nonlinear, complex, adaptive	Forests show resilience through feedback loops (e.g., regrowth after wildfires) and interdependencies.
Global Supply Chains	Open, complicated or complex, adaptive, hierarchical	Systems of suppliers and manufacturers adapt to global disruptions like COVID-19.
Social Media	Open, chaotic, adaptive, often flat	Viral content spreads unpredictably, with emergent patterns driven by user interactions.

Even though these examples show useful patterns, most systems rarely remain fully stable. Their behaviour can change over time, and many display different characteristics depending on scale, timeframe, or perspective. The same system may appear simple, complicated, or complex depending on which part is observed or which question is being asked.

That's why classifications are only a starting point. To work with real-world systems – especially under conditions of uncertainty, novelty, or unpredictability – we need practical approaches that support us understand how systems behave in specific situations.

The next section introduces ways to make systems more visible, more tangible, and more workable.

Making Systems Tangible

Knowing that real-world systems may be complex, adaptive, and unpredictable is important, but it's not enough. To work with them in practice, methods (a set of steps you follow to do something) can turn abstract understanding into concrete action. These methods support efforts to make systems more tangible, not just by naming structures or patterns but also by making them easier to see, map, and work with. They help reveal where connections form, how feedback loops work, and where small changes might matter, even in messy or uncertain systems.

For example, in dynamic systems, behaviour unfolds over time and is often shaped by delays and feedback loops. Tools such as [Causal Loop Diagrams](#) help map these cause-and-effect patterns. Methods like [Leverage Point Mapping](#) show where small changes might lead to big effects. Frameworks such as [Systems Archetypes](#), the [Iceberg Model](#), and [Cynefin](#) are intended to assist in making sense of system behaviour and help select suitable actions [[33](#) , [49](#)].

Recognizing that a system is possibly complex also means accepting its unpredictability. Methods like [Scenario Planning](#) [[50](#)], [Morphological Analysis](#) [[51](#)], and visualizations, such as the [Futures Wheel](#) [[47](#)], help explore possible developments and ripple effects. These methods don't offer control, but they help us prepare for change and uncertainty.

Some methods also make abstract system categories easier to grasp. For instance, terms like “open systems” or “resilient systems” can feel vague until paired with methods such as stakeholder mapping, causal loop diagrams, or rich pictures. These methods help bridge the gap between general ideas and practical engagement, making it easier to apply systems thinking in the real world [[32](#) , [33](#) , [52](#)].

Turning Toward Action

While many systems share similar core traits (see: “ [Understand Systems](#) ”), not all need the same attention or effort to manage. Supposedly simple systems, like light switches or mechanical levers, seem predictable and easy to handle. But most real-world challenges, such as climate change, financial instability, or organizational change, take place within systems that are interconnected, adaptive, and often unpredictable [[37](#)].

Recognizing their supposedly complex nature isn't enough. Without the right approaches, even getting started can feel overwhelming. That's why practical methods are essential: they help bridge understanding and action, linking what we know about a system with what we can actually do [[52](#)].

Systems thinking, when paired with the right approaches, helps us to do the following:

- *Reveal hidden patterns and relationships* : Spot trends and connections that aren't obvious [[33](#)].
- *Find leverage points for real change*: Identify where small shifts can make a big difference [[33](#)].
- *Deal with uncertainty and adapt as things change*: Stay flexible and adjust to new conditions [[44](#)].

After looking at how classifications, methods, and tools help us engage with systems, we now turn to the mindset that ties it all together. Tools and methods matter, but how we frame, interpret, and act on what we see matters just as much. Systems thinking gives us that lens: it helps reveal structure and patterns and helps us reflect on our role within the system.

Understand Systems Thinking

DOI: [10.4324/9781003658610-4](https://doi.org/10.4324/9781003658610-4)

There are many ways of thinking. At its core, thinking is the mental process of making sense of information, forming judgments, and guiding actions. Some kinds of thinking focus on quick fixes. Others step back and look at patterns. Some try to break things into parts. Others look at how things connect. Not all types of thinking work well in every situation. When we're dealing with something that changes over time, has many moving parts, or doesn't respond to simple fixes, a more connected kind of thinking is needed.

That's where systems thinking comes in.

Systems thinking is often described in broad or holistic terms, but those phrases can be vague and do not explain how systems actually behave. One simple way of putting it is that systems thinking is "thinking about systems." More accurately, systems thinking focuses on how systems generate behaviour through the interactions of their components [[33](#) , [52](#) , [53](#)] or, in the case of social systems, through ongoing communication processes that reproduce the system itself [[54](#)].

Brief History

Most published histories of systems thinking focus on academic and institutional developments in Europe and North America. As a result, they often foreground modern, formalized approaches while overlooking cultural and indigenous traditions that have long emphasized connection, balance, and interdependence, even if not described using systems language. While these broader traditions exist, the historical development of systems thinking in academic literature is usually traced as follows:

Over time, different people and schools of thought have shaped how systems thinking is used and understood. It is often described that this development has happened in waves, with each wave adding new ideas and tools for addressing connected problems [[8](#) , [22](#) , [55](#)]. The wave metaphor offers a useful overview but simplifies a more complex development. In practice, many of these approaches have evolved in parallel, overlap, and continue to influence each other. There are also different ways of defining the waves, depending on which traditions and frameworks are emphasized.

The first wave (hard systems thinking) focused on structured, goal-oriented problem-solving, modelling, and control, often using formal models to analyse interrelationships between system components. One of the earliest contributions came from Russian thinker Alexander Bogdanov, who developed *Tektology* (1910–1913) – a general science of organization [[56](#)]. He argued that social and organizational systems should reflect natural systems, or they would fail. Although his work was later suppressed in the Soviet Union, it laid important conceptual groundwork for later systems theories.

This early interest in wholes and interconnection re-emerged in the West. In the 1940s and 1950s, the development of cybernetics by Norbert Wiener [[57](#)] and W. Ross Ashby [[34](#)] introduced key ideas like feedback, control, and communication – particularly in the context of machines and biological systems. Around the same time, Kenneth Boulding’s paper “General Systems Theory – The Skeleton of Science” [[58](#)] applied systems thinking to economics and social science. Later, Ludwig von Bertalanffy’s *General System Theory* (1968) [[30](#)] offered a broad conceptual framing of how systems work. It proposed that systems show properties that cannot be understood by analysing their components separately. This laid the groundwork for interdisciplinary systems thinking, emphasizing the importance of understanding wholes, patterns, and structures.

During this period, systems thinking was strongly linked to intervention and practical problem-solving, often through structured modelling approaches such as system dynamics [[59](#) , [60](#)] and the viable system model [[61](#) , [62](#)]. The goal was to optimize performance or improve planning through rational, often expert-driven methods.

The second wave (soft systems thinking) introduced the importance of perspectives. As the limits of purely technical and control-based approaches became clear, attention shifted in the 1970s and 1980s to the role of human viewpoints, interpretation, and learning. Many real-world problems were recognized as ill-structured or “messy,” involving multiple stakeholders with different goals and worldviews.

Soft Systems Methodology [[32](#)] provided a structured way to explore these different perspectives and support learning in situations where problems cannot be clearly defined in advance. Similarly, Strategic Assumption Surfacing and Testing [[63](#)] offered ways to uncover and examine the assumptions behind competing positions. The focus moved from prediction and optimization toward negotiation, participation, and collaborative sense-making, emphasizing that understanding complex situations often requires dialogue, not just technical expertise.

The third wave (critical systems thinking) introduced critical reflection on power, values, and ethics in system interventions. It emphasized that systems are not neutral or purely technical but involve decisions about boundaries, inclusion, and exclusion [[8](#) , [22](#)]. Interpretive and constructivist approaches [[64](#) , [65](#)] stressed that systems are shaped by the observer’s purpose, interests, and cultural context. Rather than assuming that system boundaries are fixed, critical systems thinking views boundaries as choices that reflect particular perspectives and serve particular interests.

Critical Systems Heuristics [[22](#)] provided a structured way to examine whose interests are being represented, which voices are included or excluded, and how power relations shape system designs. This wave shifted attention from technical solutions to issues of fairness, legitimacy, and emancipation, encouraging practitioners to reflect on the broader social and ethical consequences of system interventions.

The fourth wave (complexity and adaptive systems) addresses systems that are dynamic, nonlinear, and unpredictable. Complexity science [[46](#) , [48](#) , [66](#)] explores how large numbers of interacting elements produce emergent behaviour that cannot be explained by analysing parts in isolation.

Concepts such as self-organization, adaptation, and emergence are central to this view. Complex adaptive systems (CAS) are characterized by ongoing change, distributed control, and sensitivity to initial conditions. While this perspective is widely adopted, some thinkers instead emphasize universal structures of systems thinking, highlighting frameworks such as DSRP [[27](#)]. Alongside this work, new ideas about living and social systems also took shape, such as the concept of autopoiesis. Autopoiesis [[67](#)] describes systems as self-producing entities that maintain themselves through internal processes rather than external control. Niklas Luhmann [[54](#)] applied autopoiesis to social systems, arguing that they reproduce themselves through communication, constructing their own meaning rather than simply reacting to their environment.

Today's systems thinking has become a mix of approaches, shaped by fields as different as neuroscience, complexity science, social theory, and consciousness studies. These fields use systems terms but often in different ways.

Concepts like meaning, perception, ethics, and emergence have moved to the foreground, replacing earlier emphasis on control and prediction. The field is shifting away from managing systems from the outside and toward acting wisely within them. The real challenge now is practical and ethical: how to respond with awareness, care, and adaptability in complex, uncertain situations, where people have different values [[39](#) , [49](#) , [68](#)].

Two Strands

Systems thinking has developed across a wide range of disciplines and traditions. Within this diversity, two main strands can be distinguished:

- *Theoretical systems thinking* , which focuses on understanding what systems are and how they work. This includes describing system elements, relationships, boundaries, and purposes – the basic building blocks of systems theory. It draws on formal models, abstract concepts, and general principles that help frame complex situations. This strand is sometimes described as *conceptual*, *ontological* , or *thinking about systems* and includes work by foundational thinkers such as Ashby, von Bertalanffy, Checkland, Churchman, and Luhmann [[30](#) , [34](#) , [38](#) , [54](#) , [64](#) , [69](#)].
- *Applied systems thinking* , which focuses on how systems concepts can be used in practice – to support learning, diagnosis, planning, or intervention in complex, real-world contexts. It includes methods such as causal loop diagrams, soft systems methodology, and critical systems heuristics. This strand is often referred to as *practical*, *methodological* , or *thinking with systems* , drawing on the work of Checkland, Ison, Meadows, Midgley, and Hoverstadt [[8](#) , [33](#) , [62](#) , [64](#) , [70](#)].

This book follows the applied strand of systems thinking. It builds on the work of practitioners such as Forrester, Meadows, Midgley, Senge, and Sterman [[8](#) , [33](#) , [52](#) , [59](#) , [71](#)], who, among other things, developed approaches to support decision-making, facilitation, and systems-based inquiry.

At the same time, insights from the theoretical strand help us understand the assumptions behind these tools. Thinkers like Maturana and Varela (autopoiesis), Prigogine (self-organization), and Haken (synergetics) have shaped how we conceptualize systems in fields such as biology, sociology, and complexity science. While their contributions are foundational, they are not always directly aimed at application or intervention [[42](#) , [67](#) , [72](#)].

By making this distinction clear, the book supports readers move between theory and practice – using systems ideas not only to act in the world but also to reflect on how systems are seen, framed, and understood. It encourages practitioners to remain aware of how their own framing shapes what they notice, prioritize, and do in complex situations.

9 Core Concepts of Systems Thinking

Having clarified the historical and theoretical foundations, we now turn to the practical building blocks of systems thinking – concepts that help us understand, engage with, and influence systems in applied settings.

Systems thinking offers a way to look beyond events and linear cause-and-effect. Instead, it focuses on the patterns, structures, and mental models that shape system behaviour over time [[71](#)].

There are many ways to approach systems thinking, and different disciplines may emphasize different approaches or ideas. The concepts discussed here are among the most widely used across fields and offer a common foundation for applied work. They're not the only valid approach, but they provide a strong starting point for practice.

Concepts such as interconnectedness, feedback loops, stocks and flows, delays, nonlinearity, emergence, boundaries, perspectives, and leverage points give us practical tools for mapping systems, identifying points of intervention, and reflecting on how our framing shapes what we notice and act on. These ideas help shift the focus from isolated problems to the relationships and interdependencies that shape real-world outcomes [[33](#)].

With a foundational understanding of systems as mental constructs, we can now explore these core concepts in more detail. Feedback loops show how systems self-regulate or reinforce change. Stocks and flows represent how things build up or move over time. Delays and nonlinearity highlight how timing and scale matter. Emergence describes patterns that arise from interaction. Leverage points help identify where small changes might make the biggest difference. And boundaries and perspectives remind us that how we see the system shapes how we engage with it.

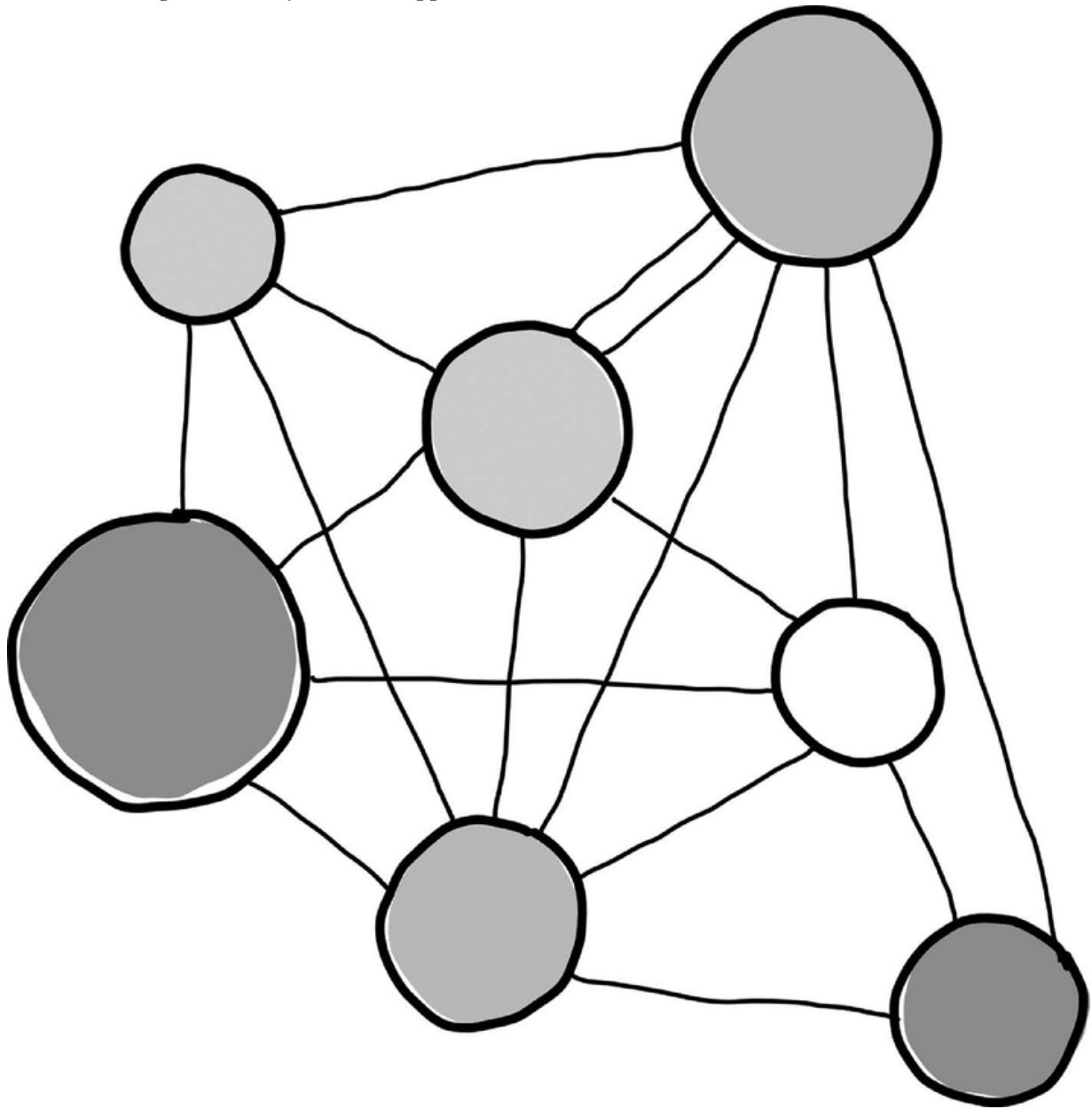
Now, we look at the core concepts in detail:

Interconnectedness

Interconnectedness describes how all parts of a system are linked, often in ways that are not immediately visible. No part functions in isolation. The behaviour of any individual element depends on its relationships with other elements [[33](#)]. This network of connections gives rise to the system's overall behaviour.

In practical terms, this means that a change in one area can lead to effects elsewhere – sometimes expected, sometimes not. For instance, in urban planning, investing in bike lanes might reduce car traffic, which then lowers air pollution, improves public health, and even affects housing demand along those routes. These chain reactions often cross traditional boundaries between sectors or domains.

Failing to consider interconnectedness can lead to short-term fixes that create long-term problems elsewhere. Systems thinking helps us zoom out, identify those connections, and understand how actions in one part of the system can ripple across others.



The following examples show how changes in one part of a system can trigger effects elsewhere.

Examples

- *Building more* bike lanes may reduce car use, which lowers pollution, improves public health, and increases housing demand near bike-friendly areas.
- *In agriculture* , using chemical fertilizers might boost crop yields short-term but over time can degrade soil, reduce biodiversity, and contaminate water sources.
- *Cutting school budgets* could save money now but might later lead to higher dropout rates, reduced job readiness, and long-term economic costs.

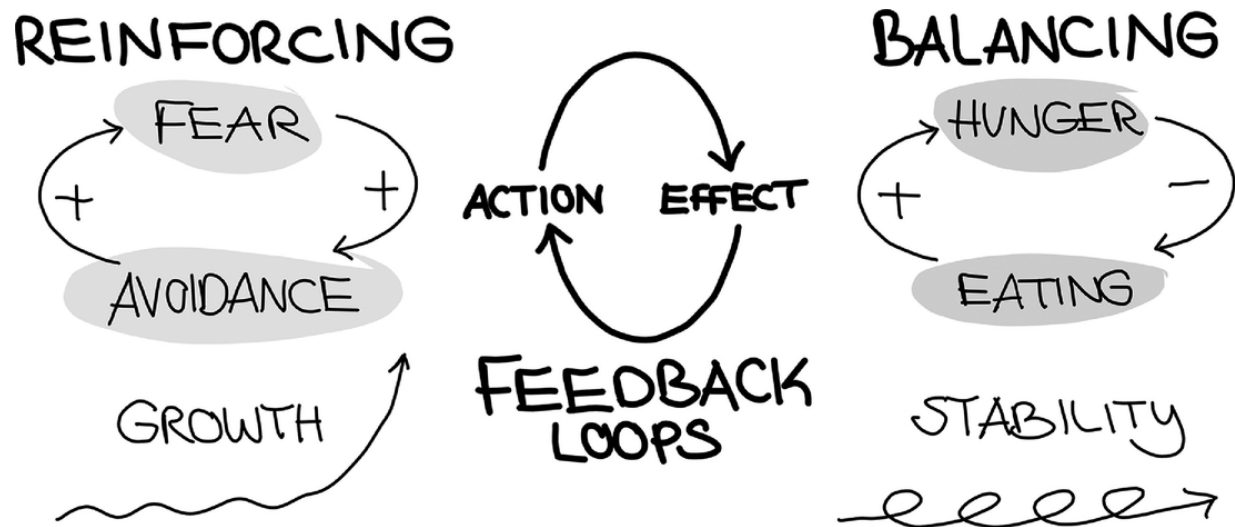
Feedback Loops

Feedback loops describe how parts of a system influence each other through circular cause-and-effect relationships. These loops can either reinforce change or balance it out over time. Understanding them helps explain why systems grow, adapt, stabilize, or spiral out of control [[33](#) , [71](#)].

There are two main types:

- *Reinforcing loops* (also called positive feedback) amplify change. Each action pushes the system further in the same direction. These loops are behind patterns like exponential growth or collapse.
- *Balancing loops* (negative feedback) work in the opposite way: they push back against change to help maintain stability or reach a goal. They're responsible for regulation and self-correction in systems.

Not all feedback is obvious or controllable. Some loops are easy to model (like thermostats), as in control systems, while others (like team motivation) involve delays, uncertainty, or effects we only see over time. In social and complex systems, feedback may not follow strict or fully predictable patterns. This can lead to delays, hidden effects, or unintended consequences, especially when multiple loops interact.



The following examples illustrate how reinforcing and balancing loops affect system behaviour over time.

Examples

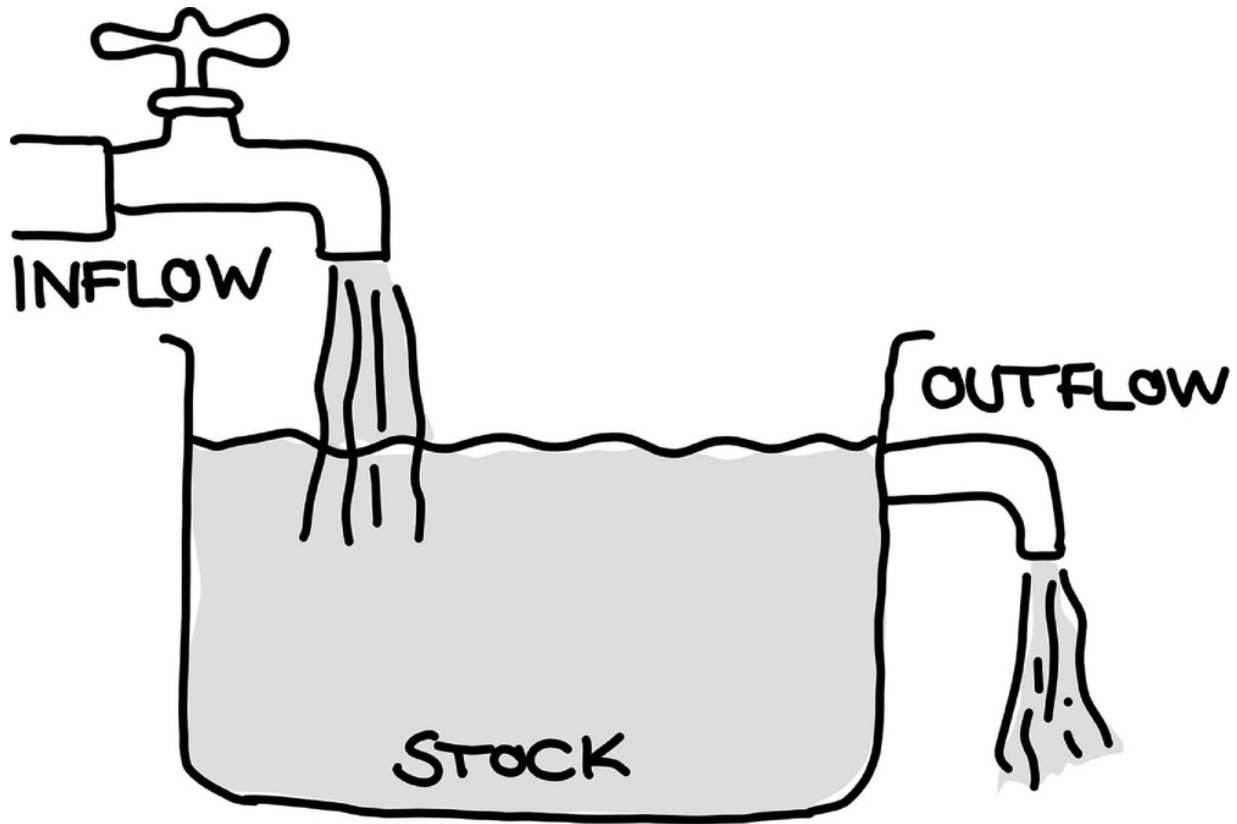
- *Population growth* is driven by a reinforcing loop: more people lead to more births, which increases the population, which then leads to even more births.
 - *A thermostat* is part of a balancing loop: when the room temperature drops below the set point, the heating turns on; once the target temperature is reached, it turns off again. This keeps the system stable.
 - *Team motivation* can be shaped by a reinforcing loop: reaching goals boosts morale, which increases motivation, making further success more likely.
-

Stocks and Flows

Stocks and flows help us understand how parts of a system grow or shrink over time – and how those parts interact [71].

- A *stock* is something that accumulates or depletes. It represents a quantity at a specific moment and tends to change gradually.
- A *flow* is what changes the stock – either adding to it (*inflow*) or reducing it (*outflow*) [33]. These two elements shape system behaviour over time.

By observing how stocks and flows behave, we can identify what drives change in a system and where interventions might be most effective. These relationships are often visualized in stock-and-flow diagrams, where stocks are shown as boxes and flows as arrows to reveal the system's structure.



The following examples show how resources build up, drain, or shift within a system.

Examples

- *Water in a reservoir* is a stock: rain and river inflow increase it; evaporation or usage decreases it.
- *Money in a bank account* is a stock: deposits add to it; withdrawals reduce it.
- *The number of people* in a city is a stock: births and migration increase it; deaths and emigration reduce it.
- *Traffic congestion* is a stock of cars on the road: cars entering add to congestion; cars exiting reduce it.

Delays

Delays refer to the time gaps between an action and its visible effect in a system. These delays are common in both physical and social systems, and they often lead to confusion, misinterpretation, or overreactions [[71](#)].

When delays are not recognized, people may assume their actions have no effect or the “wrong” effect. This can lead to policies being reversed too soon or to actions that overshoot the goal. In

systems with strong feedback loops, delays can even cause instability or oscillations, where responses come too late and overcorrect.

Understanding delays helps us make more thoughtful decisions. It encourages patience when needed and helps avoid reacting to short-term symptoms rather than long-term trends. Recognizing delays also supports to explain why systems don't always respond immediately or predictably to interventions.



The following examples highlight how delayed responses can affect how we interpret and respond to change.

Examples

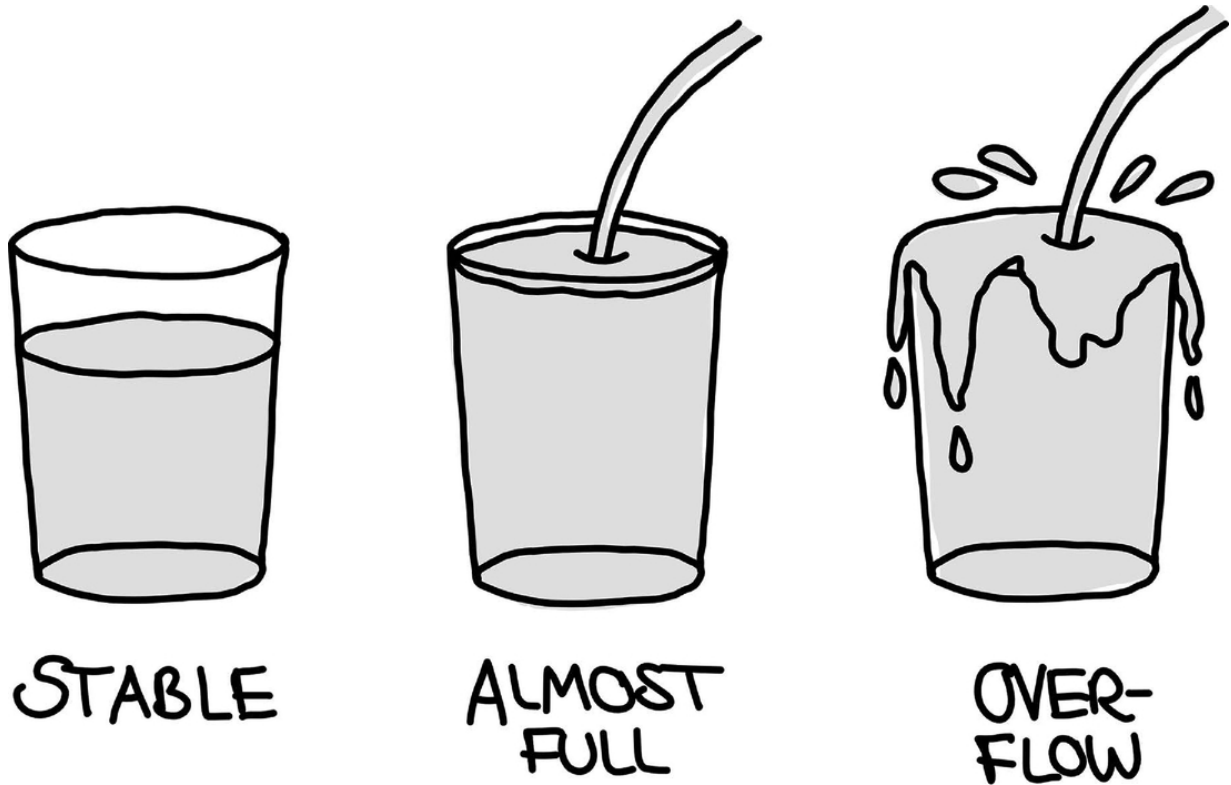
- *A government* increases healthcare funding, but improvements in health outcomes may take years to appear. Reversing the policy too soon could undo long-term gains.
- *Greenhouse gas emissions* released today may not cause visible climate effects for decades, making it difficult to generate urgency in the present.
- *A company* responds to falling sales with aggressive marketing, but due to delayed customer response, it overcompensates and floods the market.
- *In supply chains*, production adjustments take time to impact inventory, often leading to cycles of over- and understocking.

Nonlinearity

Nonlinearity means that cause and effect in systems are not always proportional. A small change might have no visible effect, or it might push the system into a new state with very different behaviour. The outcome depends on timing, context, and how close the system is to a threshold or tipping point [[33](#)].

This makes systems more difficult to predict and manage. Nonlinearity challenges the assumption that a certain level of input will always produce a matching level of output. It shows that context, thresholds, and feedback matter just as much as the action itself. In practice, this means that even well-intentioned interventions can have minimal effect or trigger major, unintended shifts.

Understanding nonlinearity helps decision-makers avoid oversimplified thinking and consider how systems might respond in unexpected ways as conditions change.



The following examples show how outcomes don't always scale with inputs; small actions may have big or no effects.

Examples

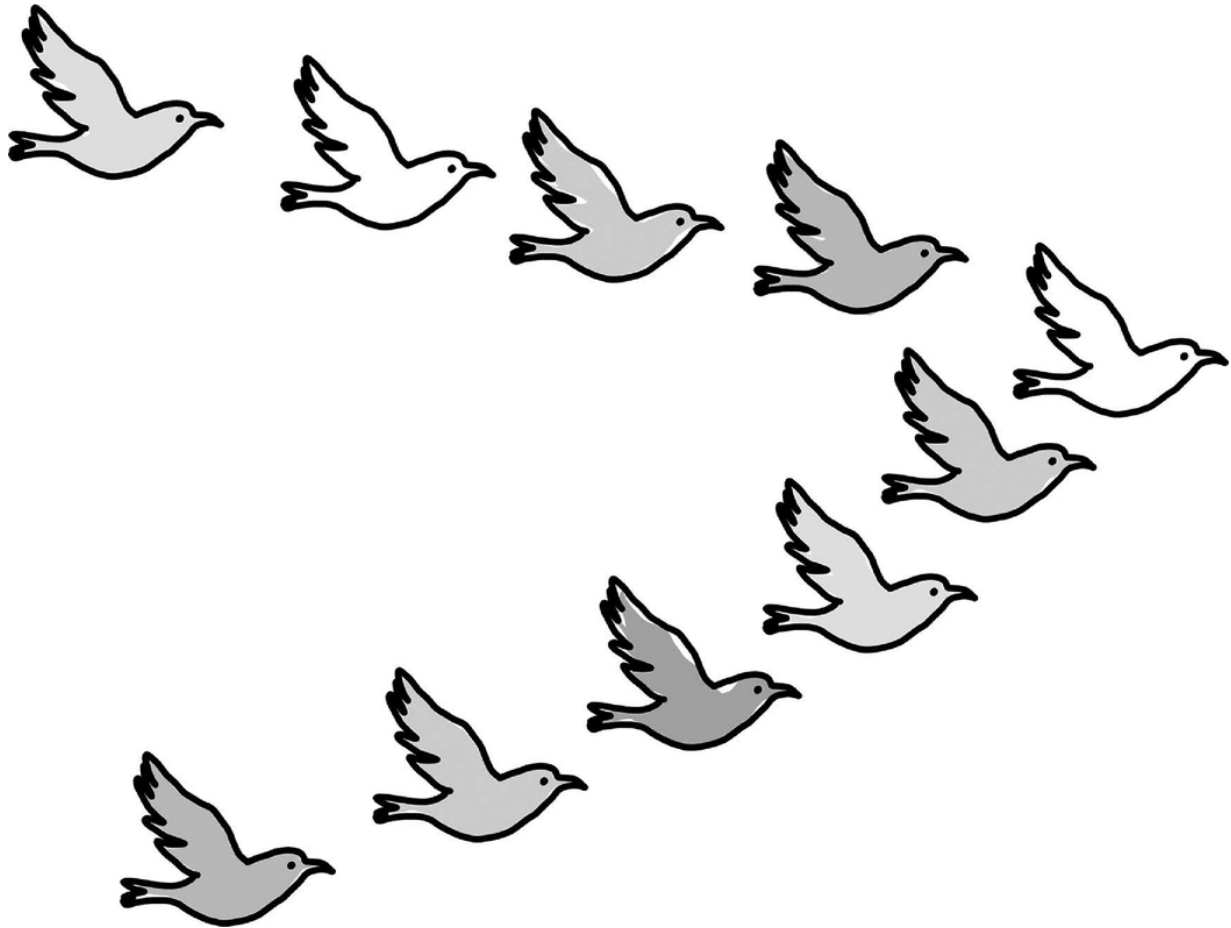
- A small *increase in pollution* may have no visible effect – until it crosses a threshold that causes rapid species collapse in an ecosystem.
 - *Reducing wait times* in a customer service setting might have little impact – unless the system is already under strain, in which case even a small improvement could shift public perception dramatically.
 - A minor *policy adjustment* might go unnoticed in a stable economy, but in a fragile one, it could trigger significant market volatility.
 - *In education* , small class size reductions may have limited effects – until they reach a point where teacher-student interaction quality shifts significantly.
-

Emergence

Emergence describes how patterns, behaviours, or properties arise from the interaction of simpler elements – without any single part containing or controlling the whole outcome [[32](#)]. This means that a system can display qualities that none of its parts have in isolation.

Emergence is often hard to spot because it can look like there's a central cause, even when there isn't. The system's behaviour "emerges" from how parts relate to each other. Studying components individually can miss what only becomes visible when everything interacts as a whole.

This concept is widely used in fields like biology, sociology, and artificial intelligence. In systems thinking, emergence explains why interventions at the component level don't always work and why system-wide behaviours can seem unpredictable. It reminds us to focus on structure, interaction, and context, not just individual parts.



The following examples illustrate how simple interactions can lead to surprising system-level patterns.

Examples

- *Consciousness* is not found in a single neuron but emerges from the interactions of billions of them.
 - *Market trends* are not caused by one decision-maker but by the combined behaviour of many individuals responding to shared signals.
 - *Traffic patterns* don't come from one driver but emerge from the timing, spacing, and flow of many vehicles interacting at once.
 - *A bird flock* moves as a coordinated group, but no single bird is in charge. The collective behaviour comes from local rules followed by each bird.
-

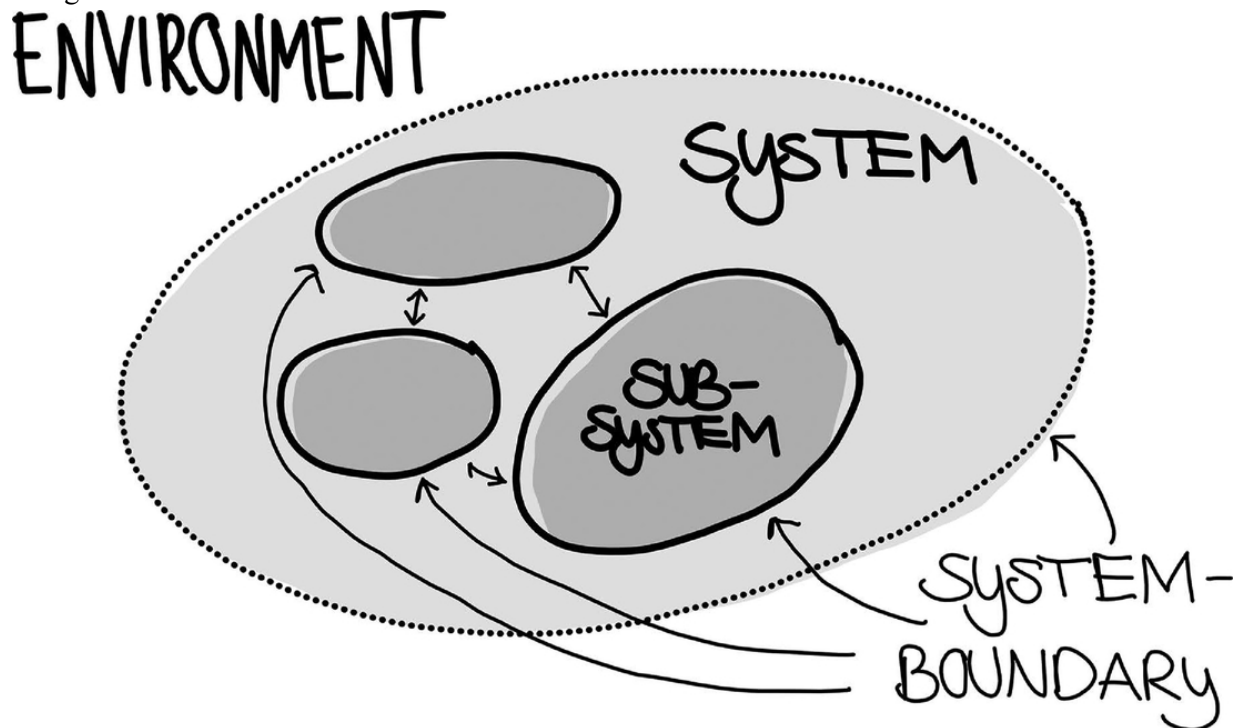
Boundaries

Boundaries define what is included and excluded when we analyse a system. They are not fixed but shaped by the perspective of the person or group doing the analysis [8]. Different stakeholders may see the same system in very different ways, depending on their values, interests, roles, and experiences.

At the same time, boundaries are also shaped by practical limits, by what we can observe, measure, or model. In complex systems, we often simplify by drawing boundaries that make the system easier to study or manage. But these choices also come with trade-offs.

Because of this, boundaries are not just technical, they are also political. Whoever defines the system's boundaries also defines what counts as relevant, what gets attention, and what is left out. These choices influence how problems are framed and which solutions are seen as legitimate.

In systems thinking, questioning and adjusting boundaries is a key part of making sure different viewpoints are considered. It helps reveal blind spots and opens up space for more inclusive, thoughtful interventions.



The following examples show how defining what's inside or outside a system affects how we understand and work with it.

Examples

- *A city's transport system* may be seen by a commuter as roads and transit routes, by an ecologist as a source of emissions, and by a policymaker as an infrastructure investment.

- *A school system* might be viewed by teachers as a learning environment, by parents as a support structure, and by budget officials as a cost centre.
- *In healthcare* , a hospital administrator might focus on operations, while a patient cares more about trust, access, and well-being – each framing defines different boundaries.

Perspectives

Perspectives describe the different ways people understand and define a system. What one person sees as a problem, another might see as a solution, or does not see as a problem at all. These differences depend on people's roles, values, experiences, and positions within or around the system [[8](#)].

In systems thinking, perspectives are not just opinions, they also shape how systems are mapped, which elements are considered important, and what outcomes are pursued. Overlooking them risks creating narrow, incomplete, or biased understandings of the system.

These views are not fixed, people may revise their understanding through dialogue, learning, or exposure to new evidence.

Recognizing these different views doesn't make things easier, but it does make our understanding of systems more honest, inclusive, and useful.



The following examples highlight how different viewpoints can shape how a system is described or understood.

Examples

-
- A patient sees the healthcare system as a lifeline. A nurse sees it as a place of work. A government administrator might see it mainly in terms of cost and efficiency.
 - A river might be viewed as a sacred site by Indigenous communities, a resource by farmers, or a hazard by flood managers.
 - A school system can be seen as a place for learning by students, a job environment by teachers, and a policy tool by education departments.
-

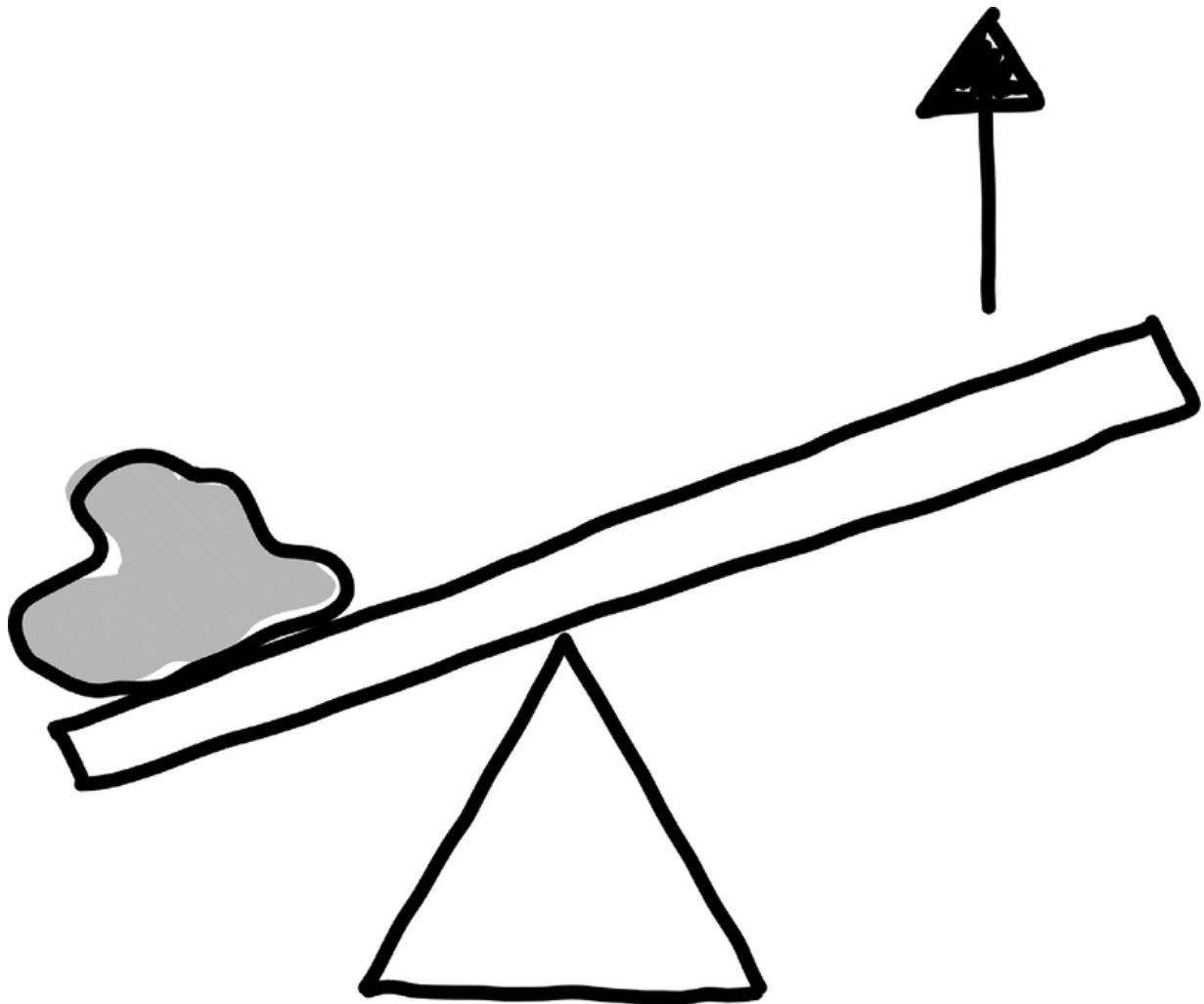
Leverage Points

Leverage points are places in a system where a small shift can lead to big, lasting change [[73](#)]. These points matter because they show us where to act if we want the most impact with the least effort, like a well-placed push on a seesaw on a children's playground.

Donella Meadows, a key voice in systems thinking, described different kinds of leverage points – some easier to change, others more powerful. For example, changing numbers (like tax rates) is a shallow leverage point. Changing how people think or what goals the system serves is much deeper – and often harder – but it can transform the whole system.

While the term “points” is widely used, it can be misleading. These aren't fixed spots in a machine. Often, they are patterns of interaction, relationships, or flows within the system – ongoing structures that shape behaviour over time.

Understanding these deeper patterns helps us move beyond surface fixes and focus on changes that truly last. It also helps avoid wasting time on adjustments that won't matter in the long run.



The following examples show how targeted changes in the right place can shift the behaviour of an entire system.

Examples

- Improving how *information flows in an organization* (e.g., clearer internal communication) can boost trust, reduce delays, and raise morale.
- *In a transport system*, changing road rules might help, but changing how people *think* about car use (e.g., encouraging bikes or public transit) can shift the entire system.
- *In education*, changing test formats might tweak outcomes. But shifting the purpose of schooling – from performance to learning – can reshape the system completely.

The principles earlier reflect core concepts commonly discussed in systems thinking literature. Different authors and schools of thought may emphasize additional principles or frame them

differently, depending on their perspective, discipline, or purpose. Still, these concepts offer widely used tools to see patterns, uncover causes, and better understand how systems behave not just in theory but also in real-world systems. Together, these concepts shift our attention away from quick fixes and isolated symptoms toward deeper structures, relationships, and dynamics.

Systems thinking is especially valuable when working with uncertainty, change, and interdependence – as found in public health, education, urban planning, environmental policy, and organizational life. It equips us to see more clearly, act more thoughtfully, and stay aware of how our own framing shapes what we notice and how we intervene.

In the end, systems thinking doesn't promise control or simple answers. Instead, it offers better questions, deeper insight, and more realistic ways to engage with the world we live in.

Think in Systems

DOI: [10.4324/9781003658610-5](https://doi.org/10.4324/9781003658610-5)

Thinking in systems starts with attention – what you notice, what you ignore, what you assume, and how you decide what something is “really” about.

In systems work, the way we frame things often *is* the work. A person who sees only parts will act on the parts. Someone who sees relationships and feedback will act very differently. This chapter is about that difference.

We’re not looking for the “right” mindset as a fixed thing. It is a way of noticing – a set of thinking habits, such as the following:

- Paying attention to what’s included and what’s excluded
- Asking what parts make up a system – and how those parts relate
- Watching for patterns, not just events
- Remembering that every view is just that – a view, from somewhere

These are subtle shifts in how people make meaning. Some of these habits have been formalized into structured models. For example, Cabrera and Cabrera [[53](#)] describe four basic habits: making distinctions, recognizing part-whole systems, identifying relationships, and taking perspectives. They call it the [DSRP Framework](#), which is also presented later in this book (cf. [Part 3](#)). This framework is a structured method for thinking that helps build the habit of pausing, slowing your immediate reaction, and looking one level deeper.

When someone says, “This process is broken,” pause:

What’s the process? Where does it begin? What’s assumed to be inside it? Who’s left out?

When someone says, “We need to fix this,” ask:

Is it a one-time event or part of a longer pattern? What’s reinforcing it? Who benefits from how it works now?

Systems thinkers do not have magic answers. They simply ask better questions – earlier. The rest of this chapter explores these habits: how they work, why they matter, and how they shape what happens next.

7 Core Habits for Systems Thinkers

Systems thinking is not limited to diagrams or terminology. It represents a shift in how we perceive and interpret the world around us. The habits discussed here are not sequential steps but cognitive

practices – ways of directing attention to aspects that often remain hidden: feedback loops, time delays, interconnections, mental models, and one's own role in shaping the systems being observed.

They are shared mental practices drawn from over six decades of systems research and application across disciplines. They synthesize recurring insights found in core systems traditions, including the following:

- System dynamics, pioneered by Jay Forrester [59] and developed by John Sterman [71];
- Organizational learning, through Peter Senge's five disciplines [52];
- Cybernetics, introduced by Norbert Wiener [57] and extended by von Foerster [36];
- Soft systems methodology, from Peter Checkland [32]
- Critical systems thinking, advanced by Churchman [69], Ulrich [22], and Midgley [8]; and
- And leverage-focused interventions, through Donella Meadows [33 , 73].

Different thinkers emphasize different habits – some include more, others fewer. The seven included here reflect patterns that appear across major sources. They serve as practical anchors for engaging with complex systems – supporting awareness of feedback, delays, interconnections, boundary choices, mental models, and one's role as both observer and actor.

Together, these habits form a usable foundation for systems thinking in action – not to replace existing methods but to sharpen the mindset behind them.

We now turn to the individual habits, starting with the following:

1. Look for Patterns, Not Just Events

When something happens – a missed deadline, a sudden breakdown, an unexpected success – our natural tendency is to focus on that isolated incident. Systems thinkers, however, train themselves to see beneath these surface events to the patterns generating them.

As Jay Forrester [59] demonstrated in his foundational work on system dynamics, what appears as a crisis or sudden change is often just one visible point on a longer trajectory. The isolated event isn't the story; the underlying structure producing it is what matters. These structures often involve reinforcing feedback loops, delayed effects, or accumulated pressure that eventually crosses a threshold.

In practice, this means asking:

- “Is this part of a recurring pattern we've seen before?”
- “What trends are forming over time that might explain this event?”
- “If we graphed this situation over months or years, what curve would we see?”

John Sterman [71] emphasized that graphing behaviour over time is essential for exposing system dynamics that remain invisible when we fixate on individual incidents. And as Peter Senge observed, “Seeing patterns of behaviour rather than events is the beginning of systems thinking” [52].

This shift – from reacting to individual events to recognizing underlying patterns – moves us from reactive firefighting to genuine systems insight. It’s the foundation for all other systems thinking habits.

2. Always Ask: What's the System?

Before attempting to solve a problem, systems thinkers first clarify: What system are we actually dealing with? Where does it begin and end? Who and what should be included in our analysis?

These boundary questions aren’t merely technical decisions; they’re profoundly consequential choices that determine what gets attention and what remains invisible. C. West Churchman [[69](#)] was among the first to highlight the ethical dimension of system boundary judgments, noting that how we define a system inherently privileges some perspectives while marginalizing others.

Werner Ulrich formalized this insight through his Critical Systems Heuristics [[22](#)], providing structured methods for questioning boundary assumptions. As he noted, “Every boundary judgment has ethical consequences.” Deciding what’s “in” vs. “out” of our system analysis directly shapes what solutions become possible.

When engaging with any system, ask:

- “What elements and relationships am I including in this system?”
- “What important factors might I be overlooking or excluding?”
- “Who benefits from defining the system boundaries this way?”
- “Whose perspectives or needs are being marginalized by this framing?”

Building on Ulrich’s work, Gerald Midgley [[8](#)] incorporated boundary critique as a reflexive practice – a way to systematically question how we’re defining problems and who gets to participate in finding solutions. This critical awareness of boundary judgments helps prevent the common mistake of solving the wrong problem precisely.

3. Zoom In, Zoom Out

Systems reveal different patterns depending on our level of focus. What appears as individual miscommunication at a close-up level might reveal itself as systemic understaffing or structural pressure when viewed from a broader perspective.

Systems thinkers cultivate the ability to shift their vantage point deliberately – moving between detailed examination and bird’s-eye view to gain richer understanding. This capacity to change scale perspective connects to Holling’s panarchy theory [[74](#)], which demonstrates how systems operate simultaneously at different spatial and temporal scales, with different dynamics emerging at each level.

This habit involves conscious perspective shifts:

- Zoom in: What specific interactions and behaviours are occurring in detail?

- Zoom out: What broader patterns become visible from a distance?
- Change time scales: How does this look over days vs. decades?

Peter Senge [[52](#)] emphasized this movement between the parts and the whole as essential for understanding underlying system behaviour. Similarly, Frank Geels [[75](#)] showed how innovation and transition processes can only be understood by examining interactions across micro (individual), meso (organizational), and macro (societal) layers.

When a situation seems confusing or intractable, try changing your zoom level; the problem might look entirely different from another scale.

4. Follow the Relationships

Traditional analysis breaks systems into their component parts. Systems thinking reverses this approach, recognizing that a system's behaviour emerges primarily from the relationships between elements, not from the elements themselves.

This perspective traces back to Norbert Wiener's [[57](#)] pioneering work in cybernetics, which placed feedback and communication at the centre of understanding complex systems. W. Ross Ashby [[34](#)] extended this by exploring how relationships create self-regulation and stability in natural systems. Gregory Bateson [[76](#)] further advanced this thinking, arguing that the basic unit of survival is not the individual but the relationship. His work laid the foundation for relational thinking in systems science.

For social systems, Niklas Luhmann [[54](#)] argued that communication itself forms the system. Social systems emerge through ongoing exchanges of information and meaning, rather than from individual people or fixed structures.

And Donella Meadows [[33](#)] noted, "The structure of a system is the pattern of interconnections between its components." Changing a single relationship – creating a new information channel, modifying a feedback loop, introducing a different decision rule – can transform system behaviour without changing any of the components themselves.

When analysing a system, focus your attention on:

- What's influencing what? Where do causal connections flow?
- Where is information flowing well or getting blocked?
- Are there reinforcing loops (where change accelerates) or balancing loops (where change is resisted)?
- What relationships seem missing that might make the system work better?

Fritjof Capra and Pier Luigi Luisi [[77](#)] reinforced this relational perspective from biological and cognitive science, showing how living systems exist fundamentally as relationship networks.

When you're trying to understand or change a system, don't look harder at isolated parts; look between them, at the connections.

5. Respect Delays

One of the most common mistakes in dealing with systems is expecting immediate results from our interventions. In reality, most systems have built-in delays – gaps in time between actions and their full effects, between decisions and their consequences, between problems and their visible symptoms.

Jay Forrester [[59](#)] demonstrated mathematically how even small delays in feedback loops can destabilize entire systems, leading to oscillations or unexpected outcomes. John Sterman's [[71](#)] experimental work showed that people consistently underestimate or misread delays, contributing to poor decision-making, especially in policy and organizational settings.

These time delays are particularly prominent in social, ecological, and economic systems:

- A company implements a new strategy, but results may take quarters or years to materialize
- A community adopts sustainability practices, yet environmental improvements lag behind
- A government changes policy, while effects ripple through society gradually

When working with systems, build delay-awareness by asking:

- “Where are there significant time gaps between cause and effect?”
- “How long might it reasonably take to see results from this intervention?”
- “What might happen if we act repeatedly before seeing the full effects of earlier actions?”

Meadows [[33](#)] noted, delays are one of the core system structures – and one of the most frequent sources of surprise – because they disconnect cause from effect over time.

Respecting these delays is essential for patience, appropriate timing, and avoiding the dangerous overcorrection that happens when we can't wait for feedback.

6. Notice Mental Models

Systems don't exist only in the physical world; they're also shaped by the cognitive frameworks we use to understand them. Mental models are the deep, often unconscious assumptions, beliefs, and frames through which we interpret reality. They determine what problems we recognize, what solutions we consider viable, and what metrics we value.

Peter Senge [[52](#)] identified mental models as one of five disciplines essential for building learning organizations, arguing that unexamined assumptions frequently block systemic insight. Similarly, Donella Meadows [[73](#)] placed paradigms – shared belief systems – near the top of her hierarchy of leverage points, showing how changing underlying mindsets can transform entire systems more powerfully than adjusting parameters or rules.

As Chris Argyris and Donald Schön [[78](#)] discovered, people often operate from implicit “theories-in-use” that contradict their stated intentions, creating systems that undermine the very goals they claim to pursue.

To surface these hidden models, systems thinkers regularly ask:

- “What core assumptions are we making that might not be true?”
- “Whose worldview is shaping how this problem is defined?”
- “What alternative perspectives might lead to different solutions?”
- “What are we collectively taking for granted that could be questioned?”

Derek and Laura Cabrera [[53](#)] advanced this work by developing DSRP theory (Distinctions, Systems, Relationships, Perspectives) to make mental models more explicit and workable. Their approach demonstrates that becoming aware of our conceptual frameworks is not merely philosophical; it’s practical and essential for effective systems change.

7. Stay Aware of Your Role

As a systems thinker, you are never a neutral observer standing outside the systems you study or seek to change. You are inherently part of those systems; your questions, your presence, your framing, and your interventions actively shape what emerges.

This insight stands at the heart of second-order cybernetics, developed by Heinz von Foerster [[36](#)], who insisted that “the observer must be included in the description of the system.” Humberto Maturana and Francisco Varela [[67](#)] provided biological foundations for this view, demonstrating how cognition itself is fundamentally participatory and bound within systems.

Peter Checkland [[32](#)] embedded this principle in Soft Systems Methodology, where the practitioner explicitly acknowledges their role within the inquiry process. Similarly, Werner Ulrich [[22](#)] showed how the observer’s values, interests, and position must be made transparent to ensure ethical systems practice.

This reflexive awareness raises important questions:

- “How might my presence be influencing what I’m observing in this system?”
- “What biases and blind spots am I bringing to this situation?”
- “How do my own goals and needs shape what I see as ‘the problem’?”
- “What role am I playing in how this system is evolving?”

This isn’t mere philosophical reflection; it’s practical humility. Recognizing your participation in the systems you wish to understand or change helps avoid the trap of presumed objectivity, opening space for more authentic engagement with complexity.

These seven habits aren’t acquired overnight. They represent an ongoing practice of perception, reflection, and engagement. They help us to spot patterns where others see random events, notice connections where others see separate parts, and include ourselves in the system we’re working with.

By cultivating these habits, we develop what systems pioneer Donella Meadows called “systems wisdom” – not just technical skill with models and methods but a deeper capacity to work with rather

than against the nature of systems [[33](#)].

How Systems Thinkers Make Meaning

Systems thinkers don't start with a fixed plan. They start with a different way of making sense of what's in front of them. The habits from the last section aren't just theory; they shape how people interpret real-world situations.

Where others might see confusion, contradiction, or chaos, systems thinkers ask different kinds of questions. Not because they know more – but because they're trained to look for structure, patterns, and relationships.

We might say, “It's not about having the full picture. It's about seeing enough to act wisely.”

This reflects the core principle of bounded rationality [[38](#)] combined with systems pragmatism: you never see the whole system, but you act wisely by watching structure and patterns. Also aligns with Schön's idea of “reflection-in-action” [[79](#)] and Checkland's [Soft Systems Methodology](#) [[32](#)].

Next, we look at how systems thinkers make meaning in practice:

They look for structure before they look for solutions

If a problem keeps coming back, systems thinkers don't reach for a quick fix. They pause and ask:

What's reinforcing this? What's built into the structure that makes this outcome likely?

Structure could mean:

- Rules (formal or informal)
- Information flows
- Incentives
- Habits
- Feedback loops
- Delays

They ask: *What's creating this behaviour – not just today but consistently?*

This is straight from the system dynamics tradition – especially Forrester [[59](#)] and Sterman [[71](#)]. Meadows also emphasized structure as the source of system behaviour: rules, feedback loops, delays, etc. [[33](#)].

They Delay Reaction to Observe the System

Instead of rushing to solve a problem, systems thinkers often hold back – just long enough to see what the system is actually doing. They resist the urge to respond immediately because they know that systems don't always respond in linear ways.

This doesn't mean doing nothing. It means noticing more before acting – especially:

- Time delays

- Patterns that repeat
- Unintended consequences

Similar patterns appear in Sterman's work on "worse-before-better" behaviour and decision delays [[71](#)] and in Meadows' warning that acting too early can backfire [[33](#)].

They Reflect on How They're Framing the Situation

No one is neutral. Systems thinkers are aware that *they're part of the system too*. Their role, perspective, and assumptions all influence what they see – and what they don't.

They ask themselves:

- "What story am I telling about this system?"
- "What's assumed in how I've defined the problem?"
- "Who's not in the room, and how might they see this differently?"

This reflection is not abstract theory. It helps reduce blind spots and keeps actions grounded in the real situation, not personal bias.

The idea draws on Critical Systems Thinking [[8](#) , [22](#) , [69](#)], mental models and reflection [[52](#)], and [Soft Systems Methodology](#) [[32](#)], which sees system framing as shaped by the perspectives of those involved.

They Look for Places with Leverage

Systems thinkers know that not all actions have the same effect. Some changes matter more – not because they're louder or more expensive but because of where they happen in the system. A small shift in the right place can lead to a big change.

They look for those places – where a pattern can shift, not just a symptom patched. These are called *leverage points*.

Donella Meadows [[73](#)] named 12 such points, from the shallowest (like adjusting numbers or buffers) to the deepest (like changing the system's purpose or mindset).

Systems thinkers ask:

- "What's holding this pattern in place?"
- "Where's the point that shifts the system itself – not just the surface?"
- "Am I pushing hard – or pushing smart?"

Meadows' work on leverage points [[73](#)] is being discussed in other places of this book (cf. [Part 1 – Chapters 2 and 4](#)).

The core idea is: don't just do more; look for what matters most.

They Choose Action Based on System Behaviour

There's no one-size-fits-all method. Systems thinkers choose actions based on how the system behaves – not based on habit, pressure, or urgency alone.

- Sometimes that means disrupting a loop.
- Sometimes it means slowing down.
- Sometimes it means creating space for learning or reflection.

It's not about control; it's about alignment.

This connects to adaptive management, complexity-informed design, and feedback-aware interventions. The same idea runs through Meadows on acting based on system structure [[33](#)], Snowden's [Cynefin Framework](#) on choosing actions that fit the domain [[49](#)], and Schön's work on reflective action in evolving situations [[79](#)].

It's not about having more data. It's about paying attention differently. That shift is what makes systems thinking useful – not just as a concept but in practice.

We've looked at how systems thinkers pause, notice patterns, reflect on framing, search for structure, and choose actions that fit system behaviour. Now it's your turn to see how these habits show up in your own thinking.

Are you ready for a small experiment?

Self-Check: Are You a Systems Thinker?

Here's a simple checklist to self-check your current habits.

It's not a test, just a way to notice how you tend to think, observe, and respond. No pressure to tick every box. Just notice what feels familiar – and what might be new. Just use it to reflect. The point is to start noticing your own thinking in real time.

When I look at a situation ...

- I pause before jumping to solutions.
- I look for patterns, not just isolated events.
- I ask what's reinforcing or balancing the current behaviour.
- I pay attention to what's included and what's left out.
- I try to see how parts relate and influence each other.
- I consider who is affected, even if they're not visible.
- I shift between detail (zoom in) and big picture (zoom out).
- I notice my own assumptions and framing.
- I ask how my actions might shape the system.
- I act with awareness, even when things feel uncertain.

Pick one or two that you don't usually do; you are invited to try them out this week. Nothing big. Just something small – a conversation, a meeting, a stuck moment.

In the next chapter, we shift from seeing to navigating. You'll explore tools to help act in systems that are fast-changing, uncertain, or stuck.

Navigate in Systems

DOI: [10.4324/9781003658610-6](https://doi.org/10.4324/9781003658610-6)

Understanding systems is one thing. Navigating them is another.

Real-world systems are often messy. They shift as you act. Effects don't always show up where or when expected. Goals compete, feedback loops surprise, and progress can be slow or uneven.

Many of the ideas introduced earlier – delays, nonlinearity, multiple perspectives, emergence – aren't just academic concepts. They are the reason why working in real-world systems is often difficult.

Real-world systems can't be controlled like machines. They have to be worked with – relationally and adaptively [[80](#)].

This part of the book builds on the previous chapters. It focuses on how to *navigate real-world systems* , especially when they tend to get more complex. That means combining reflection and action, using both systemic awareness and systematic methods to make sense, choose strategies, and intervene wisely.

To do this, it helps to look at two different ways of thinking: *systemic* and *systematic* . Each one plays a different role when working in challenging situations.

Systemic and Systematic Thinking in Systems

When working with real-world systems, it's helpful to distinguish between two ways of thinking that are often confused: *systemic* and *systematic* . While the terms sound similar, they describe different mental orientations, and each plays a distinct role in practice.

- *Systemic thinking* looks at relationships rather than isolated parts. It seeks to understand how parts interact, how feedback and delays shape behaviour, and how change in one place can affect outcomes elsewhere. This perspective is relational and contextual. It emphasizes patterns, connections, and unintended consequences. Grounded in the traditions of systems science and systems thinking (e.g. [8, 32, 33, 52]), systemic thinking asks: *What is influencing what? What is shaping the system's behaviour? What's missing from the frame?*
- *Systematic thinking* is methodical. It is about following clear steps to solve a problem or implement a plan. Often used in engineering, policy design, or project management, systematic approaches rely on checklists, procedures, and repeatable sequences. They are valuable for clarity, efficiency, and accountability – especially when problems are well-defined and environments are relatively stable.

Rather than choosing one over the other, we often need both. *Systemic thinking* helps us understand the situation; *systematic thinking* helps us respond to it. The challenge is switching between the two – zooming out to see the full picture, then zooming in to act in a focused way.

But before we act, we still need to be clear on what we're acting on. That's where framing comes in – shaping how we see the situation, what we focus on, and how we define success.

Framing and Sensemaking in Systems

Before jumping into action, it's worth to pause and ask:

How Are We Framing the Situation?

While diagnosis helps us understand the kind of system we're dealing with, framing shapes how we move forward – what we focus on, who we involve, and how we define success.

A number of approaches have been developed across design, systems thinking, and organizational change that support this early sensemaking phase. They come from different traditions, but many have become particularly influential in practice, not because they offer step-by-step answers but because they help teams work with ambiguity, surface assumptions, and move forward with care. This section briefly introduces several of these approaches. Many are explored in more detail later in the book, with guidance on how they can be used in practice (cf. [Part 3](#)).

Some frameworks focus on identifying the type of context:

- The [Cynefin Framework](#) distinguishes between clear, complicated, complex, and chaotic environments – each requiring a different kind of response [[49](#)].
- The [Certainty-Agreement Matrix](#) maps the level of agreement and certainty in a situation, showing when linear plans break down and adaptive strategies are needed.
- Poli's distinction between complicated and complex systems adds a helpful layer: some situations can be solved through analysis; others must be navigated relationally [[80](#)].

These frameworks don't describe the system itself. They offer a theoretical approach for how to think about a situation. A system may show features from different categories at the same time. The frameworks support choosing which approaches might fit best to start with, depending on uncertainty, dynamics, and the questions being asked.

Other approaches focus more on how to explore and reframe problems:

- [Soft Systems Methodology](#) [[32](#)]: Helps structure conversations across different stakeholder views, without forcing a single problem definition.
- [DSRP](#) [[53](#)]: Offers a way to reflect on how meaning is constructed – by noticing distinctions, systems, relationships, and perspectives.
- [Critical Systems Heuristics](#) [[22](#)]: Surfaces boundary judgments – who is included, whose views count, and what values shape the problem definition.

- [Rich Pictures](#) [64]: A visual tool to map out different perspectives, relationships, and concerns early in the process.

Still others come from participatory and exploratory practice:

- Design Thinking [81]: Supports user-centred exploration through iterative prototyping and testing.
- Double Diamond [82]: Structures problem-solving into phases of divergence and convergence – exploring the problem before defining solutions.
- Design Journey [83]: Guides teams through reflective, participatory exploration to frame complex challenges.
- Theory U [84]: Helps teams sense emerging futures through dialogue, deep reflection, and co-creation.
- [Appreciative Inquiry](#) [85]: Uses strength-based inquiry to surface shared values, hopes, and possibilities for change.

Despite their differences – or shared roots – what unites these methods is a common rhythm. They help people pause, sense, and reflect before acting.

Most follow a similar structure:

- *Open up* – explore the landscape, listen widely, and suspend assumptions
- *Make sense* – identify patterns, reframe the challenge, and clarify the system
- *Align and act* – converge on insights, test directions, and reflect together

Used well, these approaches support more thoughtful and inclusive action. They don't simplify the complex nature of real-world systems, but they help us work with it more wisely.

In the next section, we connect this framing work to strategic thinking and leverage points – the tools that turn insight into action.

Preparing to Act in Systems

Once you've seen the system and framed the situation, the next question is this:

Where Do You Start?

We've learned, in systems, you rarely know the full answer up front. That's not a problem. Systems thinking isn't about finding certainty; it's about acting wisely while staying open to what the system reveals.

This means:

- Acting with the system, not against it
- Expecting unintended consequences

- Testing small changes before scaling
- Involving people who are affected
- Being ready to adapt as you learn

You don't need a master plan. You need a clear direction, a good place to begin, and the flexibility to adjust as the system responds.

Where action is most effectively is focus of our next section.

Diagnosing the Problem

Before action can be taken in systems, it is essential to pause and ask:

What Kind of Problem Are We Working on?

Karl Popper [[86](#)] used a metaphor to explain different types of systems and predictability. He described two types: *clocks* and *clouds* .

- A *clock problem* is structured and predictable; you can break it into parts and solve it.
- A *cloud problem* is messy and unpredictable; it shifts while you're trying to define it.

Why this matters: Different problems need different tools. If you treat a cloud like a clock, you'll over-analyse and get stuck. If you treat a clock like a cloud, you'll waste time exploring what's already clear.

Use the following criteria to help choose the right method for your situation:

- *Problem Type*: Is it from your perspective: simple, complicated, or complex? Is it structured and clear, or messy and uncertain?
- *Purpose*: What do you need to achieve – understanding, action, planning, learning?
- *People*: Who needs to be involved? How much input or participation is needed?
- *Resources*: How much time, skill, and capacity do you have?
- *Evidence*: Do you need stories and insights, numbers and data, or both?

Unfortunately, there is no perfect formula for addressing cloud problems. Different situations call for different approaches. Instead of searching for a single correct answer, systems thinkers stay open, observe carefully, try approaches that fit, and adjust as the situation develops.

Trying to apply a fixed recipe would narrow your thinking rather than broaden it. Use the problem characteristics as a guide: notice the type of problem, apply a fitting approach, see what it reveals – and adjust. That's systems thinking in practice.

Now, once the nature of the problem is clearer, the next question is where change might have the greatest effect within the system. This leads to the idea of leverage points – places where small shifts can produce larger system-wide impact.

Finding Leverage and Acting in Systems

Not all actions in a system are equal. Some changes adjust the surface. Others reshape how the system behaves. A few can shift the system's purpose entirely. So it's important to clarify:

Where to Intervene to Create Meaningful Change?

Donella Meadows [[73](#)] described 12 *leverage points* – places where a small change can produce big results. They range from basic tweaks to deep shifts in purpose and mindset. Knowing where you're intervening helps clarify what kind of change you're aiming for – and what kind of tools you'll need.

For clarity and ease of use, I organized the 12 leverage points into three levels – tweaks, structures, and mindsets – ranging from surface adjustments to deep transformation.

The hospital example introduced earlier ([Part 1 – Understand Systems](#)) is used throughout this section to illustrate each leverage point with practical examples and explanations.

Tweaks

These are the most visible and often easiest types of changes – adjusting parameters, increasing capacity, or speeding up response times. They affect how the system operates on the surface but usually don't shift underlying patterns. Their impact tends to be short-term unless supported by deeper change.

#	Leverage Point	Example
12	Parameters	Adjusting nurse-to-patient ratio
11	Buffers	Adding more intensive care beds
10	Stocks and flows	Redesigning hospital layout to improve flow
9	Delays	Reducing time for lab analysis

Explanations

- Point 12: Adjusting nurse-to-patient ratios can improve care quality and reduce stress, but effects depend on staffing models, funding, and overall system goals.
 - Point 11: Expanding critical care capacity provides resilience during surges, though long-term effectiveness depends on patient flow and demand patterns.
 - Point 10: Rethinking the physical layout to support smoother patient flow can reduce delays and improve coordination across units.
 - Point 9: Speeding up lab turnaround enables faster decisions, especially when supported by aligned processes and staffing.
-

Structures and Rules

These points shape the internal logic of the system – what it responds to, how it adapts, what flows where, and who makes decisions. Intervening here means working with the feedback loops, rules, and flows of information that govern system behaviour. Changes at this level are harder to make but often more durable and far-reaching.

#	<i>Leverage Point</i>	<i>Example</i>
8	Balancing feedback loops	Use infection control to prevent outbreaks
7	Reinforcing feedback loops	Patient reviews attracting more patients
6	Information flows	Sharing real-time bed availability with staff
5	Rules	Changing how patients are admitted

Explanations

- Point 8: Disinfection routines act as balancing feedback – limiting the spread of infection and helping the system maintain safe, stable conditions.
- Point 7: When positive patient experiences are shared publicly, they can draw in more patients, reinforcing system growth and influencing demand patterns.
- Point 6: Giving staff access to live data on bed availability supports faster, better decisions, especially when that information is accurate, timely, and actionable.
- Point 5: Revising how patients are accepted for care (e.g., triage criteria) shifts who receives attention and when, affecting the system's internal priorities and flow.

Mindsets and Purpose

These are the deepest leverage points – the beliefs, values, and goals that define what the system is for. Changes at this level affect how the system sees itself and what it aims to do. While these shifts are the hardest to reach and often slow to unfold, they can lead to the most powerful and lasting transformations.

#	<i>Leverage Point</i>	<i>Example</i>
4	Self-organization	Staff teams designing their own workflows
3	System goals	Focusing on patient well-being, not throughput

#	Leverage Point	Example
2	Mindsets or paradigms	Seeing patients as partners, not cases
1	Transcending paradigms	Combining medical care with community healing

Explanations

- Point 4: When staff teams co-design their workflows, the system becomes more adaptive and grounded in real-world needs, allowing for more responsive and resilient operations.
- Point 3: Shifting the hospital's goal from processing volume to improving patient well-being reorients decisions, success metrics, and care strategies across the system.
- Point 2: Viewing patients as partners in care challenges traditional hierarchies and enables more collaborative, trust-based approaches that influence outcomes and relationships.
- Point 1: Transcending a single medical model makes space for integrating broader definitions of health, such as including social, cultural, or spiritual dimensions alongside clinical care.

Often, change efforts stay near the surface – adjusting parameters, incentives, or capacity. These changes can help in the short term but usually don't shift the system's underlying patterns. More durable change often requires working at deeper levels: revising rules, changing goals, or challenging mindsets.

Similar ideas to Meadows' approach appear in Goldratt's [Theory of Constraints](#) [100] which targets the key bottleneck, Beer's [Viable System Model](#) [61] which identifies weak subsystems, Checkland's [Soft Systems Methodology](#) [32] which builds accommodation between different worldviews, and Churchman's critical systems thinking [69] which brings forward voices that are usually marginalized. But knowing where to intervene is only part of the work. The next challenge is how, which methods to use, who to involve, and what kind of change is possible.

Some Caution Is Needed

Meadows' list is an incredibly helpful set of points for identifying *where to intervene*. At the same time, it doesn't fully address the next challenge:

How to Intervene?

As real-world systems are often messy, adaptive, and unpredictable, a leverage point at one scale may not exist, or may backfire. In some cases, changing mindsets or goals directly may not be possible.

That's why it's often helpful to start with small experiments – testing changes, watching how the system responds, and adjusting based on what emerges. Involving diverse perspectives also helps since no one person sees the full picture.

To support this, the methods in this book are grouped into five categories – the *5M Structure*. It's not a fixed process but as a simple structure to help you choose what might be useful depending on your situation.

The 5Ms are: Motivate, Meet, Map, Make, Manage.

Each group includes approaches you can explore and apply, while staying aware of the system as a whole.

In the next chapter, we explore how to choose methods and approaches that fit your situation and support effective action.

Part 2

Select Methods for Systems Practice

DOI: [10.4324/9781003658610-7](https://doi.org/10.4324/9781003658610-7)

This part presents how the methods in this book are structured to support systems practice to explore situations, engage people, develop interventions, and learn from the outcomes. The methods support different stages of systems work, depending on the situation, the people involved, and the questions at hand.

First, we'll look at why these methods were selected, where they come from, and how they are organized. Then you'll find guidance for selecting which methods to apply depending on your situation.

Why This Set of Methods

Asking why a set of methods was chosen or not can start useful conversations about completeness and incompleteness. From a systems perspective, any view of a situation depends on the lens used to look at it. For some systems thinkers, approaches not included in this book may still appear relevant or feel more appropriate than others. Recognizing that no collection can ever be complete is part of the practice itself, keeping the work open to ongoing revision and growth.

Its purpose is to offer a practical set of approaches for systems thinking and decision-making. Some focus on understanding relationships and power dynamics. Others help visualize complex challenges, develop creative solutions, or anticipate long-term consequences.

Each method can be used alone or combined, depending on the specific challenges with and in the system. The goal is to give practitioners approaches they can apply both strategically and operationally.

Together, these methods provide a structured, interactive, and action-oriented way to work in systems – supporting readers make better decisions, foster new solutions, and create change that lasts.

Where These Methods Come From

The methods in this book aren't drawn from a single school of thought or framework. They come from a mix of sources: some grounded in academic research or widely used professional practice –

like [Causal Loop Diagrams](#) , [Appreciative Inquiry](#) , or the [Balanced Scorecard](#) – and others drawn from facilitation work, systems practice, and creative group processes.

Some communities, like the Systems and Complexity in Organisation (SCiO) [[87](#)], highlight methods commonly used in systemic practice through their competency framework. Similarly, Jackson’s System of Systems Methodologies (SSM) [[22](#)] groups a set of well-established systems approaches based on his view of different problem situations. Both provide guidance for method selection, but neither sets a strict boundary around what counts as a systemic method.

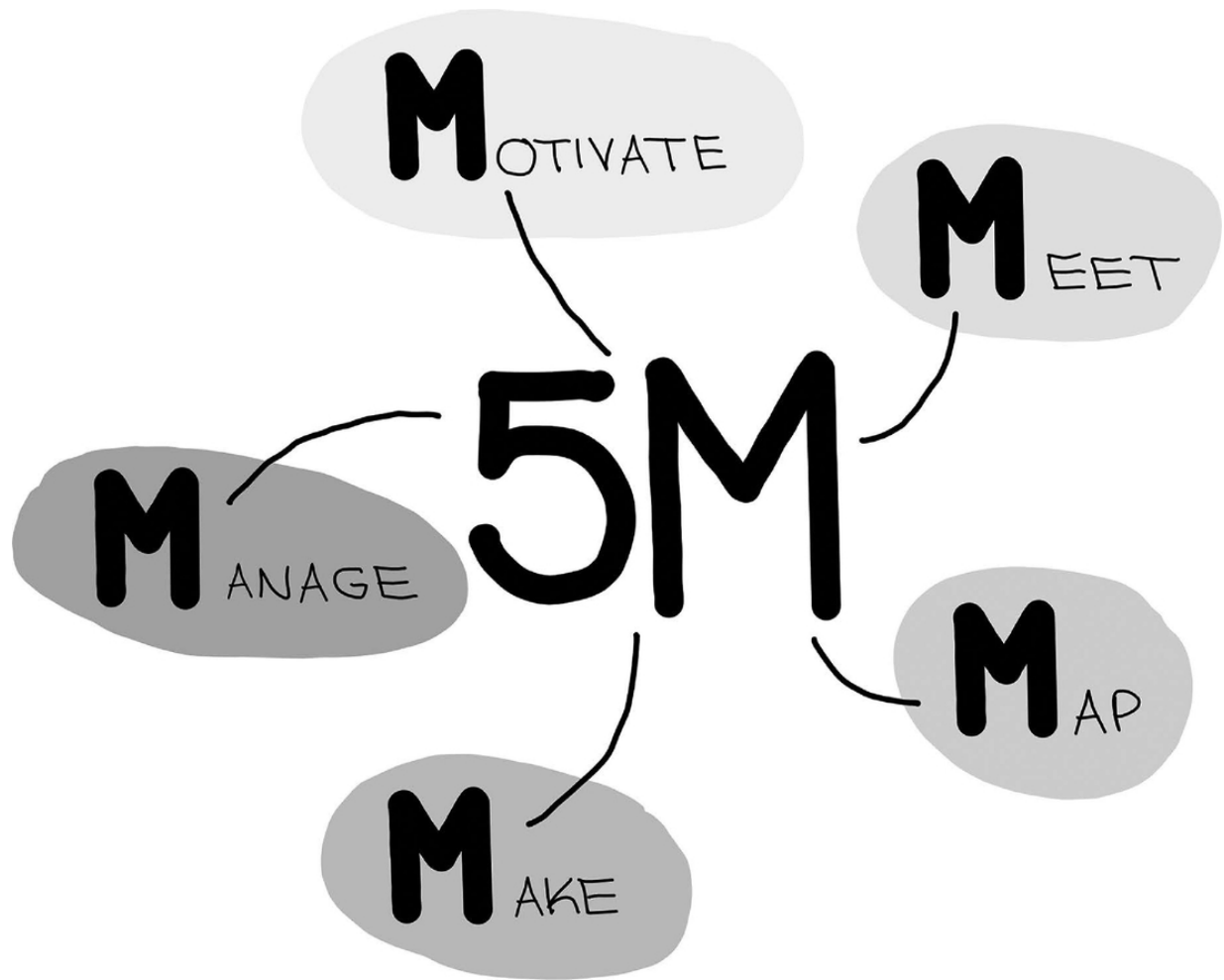
The methods in this book reflect a broad, practice-based view: Not all included methods are recognized in formal frameworks, but all may be used by systems thinkers to explore complexity, reflect, and act in real-world settings. This includes tools from facilitation, simulation, group dynamics, and related fields. Some are analytical or experiential. Others support learning, planning, or collaborative sensemaking.

None of these methods are presented as rigid solutions. They are not all “evidence-based” in a strict academic sense, but they are evidence-informed, which means tested by teams, communities, and organizations navigating challenging situations.

Use what fits. Adapt what helps. These aren’t rigid formulas, they’re approaches to spark thinking, sensing, making, and adjusting in systems that keep changing.

The 5M Structure

In this book, the methods are organized into five categories, the *5M Structure* , where the *Ms* stand for: *Motivate*, *Meet*, *Map*, *Make* , and *Manage*.



This structure offers a simple, practical way to organize, select, and apply methods depending on the situation. Each category supports a different type of work – from deciding whether to intervene, to engaging people, understanding systems, taking action, and adapting over time. It's a flexible way to organize methods and choose useful approaches depending on the situation. Each category includes a range of methods – from simple to advanced – covering different levels of cognitive effort and creativity. In real work, you may enter at any point or move back and forth between categories and approaches.

In organizations and other complex systems, isolated fixes rarely work. We need to recognize patterns, understand relationships, design smart responses, and track effects over time. That's why the methods are categorized this way – not just to analyse systems but also to engage with them and create change.

Let's take a quick walk through the 5Ms and how they support your work:

- Motivate: Why and What For?

Clarifies why intervention is needed and what purpose it serves. Helps teams assess motivation, urgency, and alignment with larger goals.

Example methods: [Deciding to Act](#) , [Guiding Star and Near Star](#) .

- Meet: Engage Stakeholders and Perspectives

Focuses on identifying key stakeholders, facilitating discussions, and surfacing different perspectives. Brings people together to build dialogue, collaboration, and shared understanding.

Example methods: [Stakeholder Mapping](#) , [World Café](#) , [Cluster Mapping](#) .

- Map: Understand the System

Supports teams in visualizing structures, dependencies, recurring patterns, and leverage points. Supports a deeper understanding of system dynamics and where interventions may have the greatest effect.

Example methods: [Causal Loop Diagrams](#) , [Rich Pictures](#) .

- Make: Take Action and Create Solutions

Supports improving processes, testing ideas, and developing solutions. Encourages teams to challenge existing structures, experiment with new approaches, and refine solutions iteratively.

Example methods: [Paper Airplane Factory](#) , [Process Hacking](#) , [Prototyping Sprints](#) .

- Manage: Evaluate and Adapt Over Time

Enables teams to track changes, measure progress, and respond to emerging patterns. Supports organizations monitor outcomes, evaluate effectiveness, and adjust as conditions evolve.

Example methods: [Balanced Scorecard](#) , [Scenario Stress Testing](#) .

Focus Areas of Methods

Each method also links to focus areas, which describe what the method is most effective at achieving. While *5M* organizes methods by type of work, focus areas are intended to support matching methods to goals.

The five focus areas are as follows:

- *Understand*: Visualize, map, and make sense of systems – their parts, connections, and structure – to find causes and relationships.
- *Collaborate*: Involve people, gather different views, create shared understanding, and align stakeholders toward common goals.
- *Strategize*: Plan solutions that address system complexity while considering long-term outcomes.
- *Innovate*: Support creative thinking and find unique solutions when usual approaches aren't enough.
- *Adapt*: Monitor, evaluate, and refine processes as conditions change and new information appears.

In *The 5M Methods Matrix* , focus areas are indicated by check marks.

With these focus areas defined, you can now select methods that fit your situation.

The 5M Methods Matrix

DOI: [10.4324/9781003658610-8](https://doi.org/10.4324/9781003658610-8)

The 5M Methods Matrix supports readers in matching appropriate methods to challenges. It provides a practical way to select methods based on where you are in your systems work, what you want to achieve, and who is involved.

The *5M Methods Matrix* is organized in the following categories: *Motivate*, *Map*, *Meet*, *Make*, and *Manage*.

You can use the following steps to select methods that fit your situation:

1. *Identify relevant “M”*: Consider which of the five areas are most relevant to your current challenge.
2. *Review the purpose*: Look at the specific purpose of each method to see which matches your goals.
3. *Consider the focus area*: Check which aspects (Understand, Collaborate, Strategize, Innovate, Adapt) each method supports.
4. *Select appropriate method*: Choose one or more methods that fit your situation and priorities.

With these steps in mind, we now turn to the matrix itself.

Motivate: Why and What For?

This section focuses on methods that help practitioners assess the need for systemic intervention and define strategic directions for meaningful change.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Deciding to Act	Assess the necessity and urgency of intervention	✓		✓		✓
Readiness Assessment	Evaluate system readiness for intervention	✓	✓	✓		✓
Guiding Star and Near Star	Define vision and milestones for intervention	✓	✓	✓		✓
Cynefin Framework	Categorize and understand system complexity	✓		✓		✓
Certainty-Agreement Matrix	Align decisions with levels of certainty and agreement	✓	✓	✓		✓
Power Mapping	Analyse power dynamics and influence in systems	✓	✓	✓		✓

Meet: Engage Stakeholders and Perspectives

This section emphasizes stakeholder involvement, collaboration, and capturing different perspectives to build shared understanding and alignment.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Silent Signal	Explore how messages change without words	✓	✓			✓
Invisible Connections	Experience interdependence through movement	✓	✓			✓
Collective Pulse	Demonstrate self-organization without leadership	✓	✓			✓
Speed Framing	Expose bias by quickly reframing problems	✓	✓	✓	✓	
Invisible Negotiation	Reveal how hidden goals influence group behaviour and decisions	✓	✓		✓	✓
Ladder of Inference	Reveal how unconscious thinking shapes beliefs and actions	✓	✓	✓	✓	
Fishbowl Discussion	Facilitate inclusive group dialogue		✓			✓
Reverse Fishbowl	Practice adapting discussions under disruption		✓			✓
Stakeholder Mapping	Identify and prioritize key stakeholders	✓	✓	✓		
Cluster Map	Explore and connect ideas around a topic	✓	✓			
CATWOE Analysis	Clarify system purpose from multiple angles	✓	✓	✓		
Boundary Critique (BC)	Define and challenge system boundaries	✓	✓	✓		
Appreciative Inquiry	Identify and build on system strengths	✓	✓	✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
World Café	Enable rotating conversations on shared topics		✓	✓		

Map: Understand and Visualize the System

This section focuses on methods that help practitioners explore, visualize, and map systems to gain deeper insights into their structures and dynamics.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Air Circles	Show how perspective shifts change interpretation	✓	✓			
Adaptive Pen Control	Visualize interdependence, adaption, and dynamics	✓	✓			✓
Group Juggle	Explore how systems grow more complex	✓	✓			✓
Triangles	Show interdependence within systems	✓				✓
Live Systems Mapping	Physically map evolving system relationships	✓	✓	✓		✓
Bathtub Game	Visualize system accumulation and delays	✓				✓
DSRP Framework	Thinking patterns to understand complexity and make better decisions	✓	✓	✓	✓	✓
Behaviour Over Time Graphs	Plot and analyse variable trends over time	✓		✓		
Paper Computer	Identify influence patterns and leverage in complex systems	✓	✓	✓	✓	✓
Refrigeration Game	Experience how delays and local decisions cause instability	✓	✓			✓
Fishbanks Ltd.	Experience how individual actions and delays lead to resource collapse	✓	✓	✓		✓
Sankey Diagrams	Show flows of resources across systems	✓		✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
System in Focus	Define the system, its boundaries, and external interactions	✓	✓	✓		✓
Rich Pictures	Capture complexity using visual storytelling	✓	✓			
Double Q-Diagram	Map hard and soft causes of problems to support balanced thinking	✓	✓	✓		✓
Impact Mapping	Align actions with strategic goals	✓	✓	✓		
Connected Circles	Reveal relationships between system variables	✓		✓		
Causal Loop Diagrams (CLD)	Identify feedback loops in systems	✓				
Systems Archetypes	Recognize patterns in system behaviour	✓		✓		✓
Leverage Point Mapping	Identify high-impact areas for systemic change	✓	✓	✓		✓
Scenario Planning	Plan for future uncertainties	✓	✓	✓		✓
World Game	Explore global challenges and interdependencies through cooperative, systems-based simulation	✓	✓	✓	✓	✓
Soft Systems Methodology (SSM)	Explore messy, contested situations by comparing perspectives and finding meaningful change	✓	✓	✓		✓

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Viable System Model (VSM)	Diagnose system structure and organizational viability	✓	✓	✓		✓

Make: Take Action and Create Solutions

This section covers methods that guide practitioners in moving from planning to execution, fostering innovation, and applying strategies to implement solutions effectively.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Human Knot	Build teamwork and collaboration		✓			✓
Paper Airplane Factory	Simulate and improve processes		✓		✓	✓
Forced Prioritization	Rank and cut options under pressure		✓	✓		✓
Resource Tree	Map needed resources to reach a goal, clarify dependencies, and spot constraints	✓	✓	✓	✓	✓
Kano Model	Prioritize features based on user satisfaction		✓	✓	✓	
Theory of Constraints (TOC)	Identify and manage system bottlenecks	✓	✓	✓		✓
Prototyping Sprints	Rapidly test and improve early-stage ideas		✓		✓	
Process Hacking	Redesign broken processes for better performance	✓		✓	✓	
Backcasting	Plan strategically from future goals	✓		✓		✓
Synectics	Solve problems using analogies		✓		✓	
Morphological Analysis	Generate creative solutions	✓		✓	✓	
Futures Wheel	Map and evaluate long-term impacts	✓		✓	✓	✓

Manage: Evaluate and Adapt Over Time

This section highlights methods for overseeing processes, tracking performance, and adapting strategies to ensure continuous improvement and resilience within systems.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Boom and Bust	Monitor and understand growth cycles	✓		✓		✓
Most Significant Change (MSC)	Capture significant outcomes and changes	✓	✓	✓	✓	✓
Outcomes Mapping	Track behavioural change and impact	✓	✓	✓		✓
Lag vs. Lead Indicator Tracking	Spot early signs vs. results	✓		✓	✓	✓
Balanced Scorecard	Measure and align strategic objectives			✓		✓
Iceberg Model	Reveal underlying system structures	✓				✓
Scenario Stress Testing	Test system response to shocks	✓	✓	✓	✓	✓
Fuzzy Cognitive Mapping (FCM)	Visualize and analyse causal relationships	✓				✓
Critical Systems Heuristics (CSH)	Evaluate system boundaries ethically	✓		✓		✓

Part 3

Apply 65+ Methods for Systems Practice

DOI: [10.4324/9781003658610-9](https://doi.org/10.4324/9781003658610-9)

In this part, 65+ methods are introduced that support systems thinking in practice. Each method is designed to help individuals and teams better understand systems challenges, act more effectively within dynamic environments, and reflect on what works – and why. The methods are grouped into five focus areas (Motivate, Meet, Map, Make, and Manage) and are intended to be practical, adaptable, and easy to apply across a wide range of contexts.

Integration with Systems Thinking Principles

Each method builds on several core concepts of systems thinking introduced earlier in the book – such as interconnection, feedback, delay, and perspective (cf. [Part 1](#)). They are grounded in real-world practice, not just theory. The methods offer ways to translate systems thinking into action: making invisible structures more visible, helping teams surface assumptions, exploring boundaries, and testing decisions before they are made.

These methods offer step-by-step approaches to guide thinking and action, but they are not rigid templates. Each one can and should be adjusted to fit the people, challenges, and context at hand. They are meant to support flexible, adaptive practice, not impose fixed routines. Think of them as scaffolds: they provide structure, but you choose how to build with them.

You can adapt them for quick sessions or extended projects, apply them individually or in combination, and use them across many settings: education, policy, organizations, communities, and more. They support both solo reflection and collaborative work.

By offering methods that can be applied to real design and decision-making challenges, this chapter supports more structured action and continuous learning.

What's in Each Method

Each method is presented in a consistent format:

- Purpose: What the method helps participants achieve.
- How It Works: The underlying process and logic.
- Applications: When and where the method is especially useful.

- Exercise: How to run the method in practice.
 - Participants/time/equipment/space
 - Setup
 - Instructional steps
- Tips for Facilitators: How to run the exercise effectively.
- Tips for Debriefing: How to reflect and guide learning after the exercise.
- Variations: Optional adaptations for different situations.

Together, these methods offer a flexible set of approaches for systems practice. Each method is described with clear steps and structure, based on principles that support effective learning and group work. But the steps are not fixed rules. As a facilitator, you can adjust, skip, or reorder parts depending on the situation. The goal is to support clear thinking, bring in diverse perspectives, and guide good decisions in complex situations.

Motivate

Why and What For?

DOI: [10.4324/9781003658610-10](https://doi.org/10.4324/9781003658610-10)

Intervening in a system is not just about fixing problems; it is about disrupting the structures that create and sustain them. Many interventions fail by addressing symptoms rather than deeper forces. Before acting, it is critical to understand both why intervention is necessary and what for – clarifying motivation and purpose.

“Why” and *“What for”* serve different but complementary purposes:

- *“Why”* questions look backward, helping to uncover the causes, motivations, and justifications for action. They help clarify the reasons to intervene and assess whether the timing and approach are appropriate.
- *“What for”* questions look forward, focusing on the purpose, function, and intended outcomes of your intervention. They ensure that your actions align with the broader goals of the system and address the right issues.

Some systems persist despite being harmful because they serve certain interests, are reinforced by policies, or are protected by cultural norms. Others remain unchanged because the risks of intervention seem greater than the risks of maintaining the status quo. Without understanding both the reasons for intervention and the purpose it serves, your actions may be misdirected or ineffective.

Use “why” and “what for” questions early in the intervention process – during problem diagnosis, strategy development, and stakeholder engagement – to build a shared understanding of both the justification and purpose of your actions. Encourage participants to reflect on these questions individually and collectively to ensure clarity and alignment.

The following questions support participants in justifying and defining a strategic intervention:

***“Why”* questions:**

- Why is intervention necessary?
- Why does the system resist change?
- Why intervene now?
- Why are we the ones to intervene?
- Why this approach?

***“What for”* questions:**

- What is this intervention for?
- What purpose does it serve?
- What function does it fulfil?
- What is the intended outcome?

By thoroughly exploring both “why” and “what for” questions and assessing system readiness before moving into action, participants ensure that interventions are justified, timely, well-targeted, and positioned for meaningful impact.

Deciding to Act

Boundaries | Perspectives | Leverage Points

Purpose

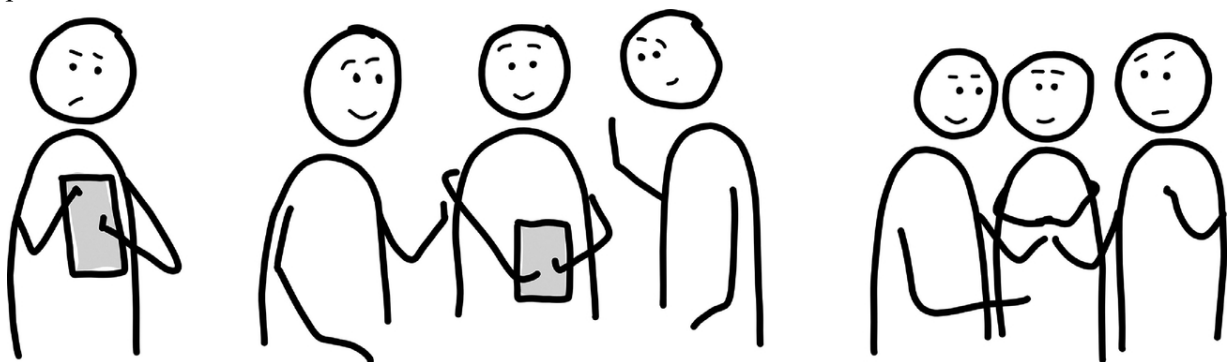
This exercise supports participants in critically assessing whether intervention is necessary and in clearly defining the real problem they seek to address. Instead of rushing into action, it encourages reflection on system resistance, urgency, risks of inaction, and possible impacts of change.

How It Works

Participants work individually or in small groups to examine a system they are involved with or wish to influence. They reflect on whether intervention is needed, who benefits from the current system, and what would happen if no action is taken. They then define the core problem, focusing on what must change and who is most affected.

Applications

This exercise is useful for system change teams, policymakers, leaders, and project groups starting new initiatives. It is especially helpful when there is uncertainty about whether to act or when previous interventions have failed.



Exercise: “Deciding to Act”

Participants 	Time 	Equipment 
2–20	60–90 minutes	Paper, markers, sticky notes
Space  : An open room with space for participants move around comfortably.		

Setup

1. Participants work alone or in small groups.
2. Provide space for brainstorming and discussion.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that this exercise helps test whether intervention is justified and defines the real issue to address.
 - Emphasize that disciplined thinking early on strengthens later interventions.
2. Identify the system (15 minutes)
 - Ask participants to select a system they are involved in or wish to change.
 - This could be an industry practice, organizational structure, or a social norm.
 - If participants are unsure, a *system mapping* can help clarify the system.
3. Reflect on the need for intervention (15 minutes)
 - List possible causes, not just symptoms. Name factors you can influence.
 - Individually, participants answer:
 - i. Why intervene now?
 - ii. What happens if no action is taken?
 - iii. Who benefits from maintaining the current status quo?
4. Frame the core problem (15 minutes)
 - Encourage participants identify:
 - i. What is happening what should not happen?
 - ii. Who is most affected?
 - iii. What would success look like?
5. Small group sharing and refinement (10 minutes)
 - Small groups work together to create a combined “Why and What” statement linking the need for action and the core problem definition.

- **Example:** “*We believe intervention is necessary because [reason why now]. If nothing changes, [risk or harm will increase]. Currently, [describe the problem]. This affects [who is harmed]. Success would mean [what changes].*”

6. Debriefing (15 minutes)

- Ask participants to share their insights with the group.
- Facilitate a discussion on how clarity about motivation and problem framing strengthens system change efforts.

Tips for Facilitators

Encourage participants to critically reflect on both the need for intervention and the clarity of the problem. Remind them that it is better to delay action than to rush into a poorly defined challenge. Push them to ground their reflections in real-world systems rather than theoretical problems. Guide them to stay focused on current conditions and affected groups rather than jumping ahead to possible solutions. Help participants recognize that strategic timing and clear framing are essential foundations for effective interventions.

Tips for Debriefing

Create a space where participants can reflect on how their understanding of intervention and problem clarity evolved through the exercise. Use these questions to guide the discussion:

- What made deciding whether to intervene difficult or easy?
- How did framing the problem affect your thinking about possible actions?
- Were there disagreements about whether intervention was justified?
- What risks can arise from acting without a clear problem focus?
- How did connecting urgency and problem definition strengthen your plan for change?

Summarize key takeaways, focusing on how disciplined decision-making and clear framing create a stronger foundation for future interventions.

Variations

The “Deciding to Act” exercise can be adapted for different contexts, group sizes, or system challenges while maintaining its focus on strategic decision-making and clear framing.

- *Silent reflection:* Participants complete the full template individually before any group discussion to encourage deeper independent thinking.
- *Stakeholder perspective framing:* Groups create separate “Why and What” statements from the viewpoint of different key stakeholders to uncover hidden biases or conflicts.
- *Challenge and defend:* After drafting their statements, groups switch and critique another group’s work, questioning assumptions and sharpening clarity.

- *Timing scenario*: Participants explore how the urgency of intervention might change under different future conditions (e.g., political shifts, social movements).
- *Combined decision wall*: Groups post their final statements on a wall and vote on which ones show the clearest justification and most focused problem framing.

Readiness Assessment

Boundaries | Perspectives

Purpose

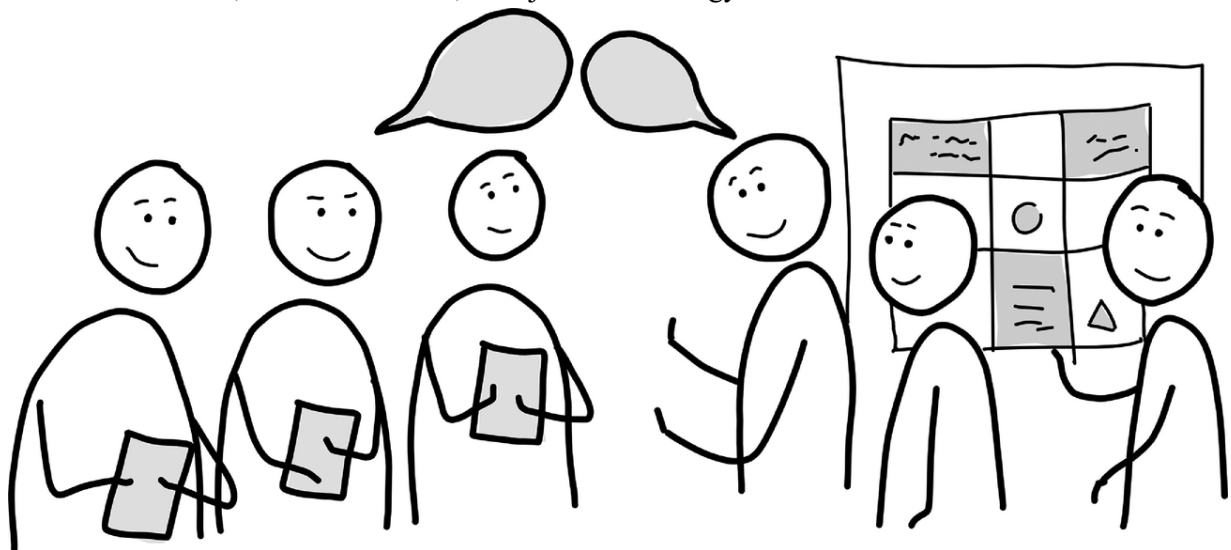
This exercise helps participants assess whether a system is ready for intervention by analysing key factors such as stakeholder support, structural barriers, and timing. Instead of pushing change without understanding potential resistance, this method ensures that interventions are well-timed and positioned for impact.

How It Works

Participants evaluate a system's readiness for change using a structured assessment framework. They analyse factors like urgency, stakeholder alignment, resources, and external conditions. By scoring these elements, they identify whether an intervention is likely to succeed, needs more preparation, or requires a shift in approach.

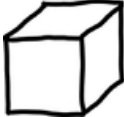
Applications

This exercise is valuable for change-makers, policymakers, and teams working on complex transformations. It helps organizations avoid premature or ineffective interventions by ensuring that systemic conditions are favourable for change. Participants leave with a clearer understanding of whether to act now, build momentum, or adjust their strategy.



Exercise: “Readiness Assessment”

Participants 	Time 	Equipment 
2–20	45–60 minutes	Paper, markers, sticky notes, assessment templates

Space  : An open room with space for discussion and reflection.

Setup

1. Participants work individually or in small teams.
2. Provide assessment templates with key readiness factors.
3. Ensure space for discussion and scoring.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that the goal is to assess whether the system is ready for intervention.
 - Encourage participants to approach the assessment critically rather than assuming action is always the next step.
2. Identify Readiness Factors (10 minutes)
 - Introduce key assessment criteria, such as the following:
 - i. Urgency: Is there a pressing need for change?
 - ii. Stakeholder Alignment: Are key actors supportive or resistant?
 - iii. Resources: Are funding, knowledge, and capacity available?
 - iv. External Conditions: Are policy, social, or market conditions favourable?
 - v. Past Efforts: Have previous interventions succeeded or failed?
3. Score the system (15 minutes)
 - Participants rate each factor on a scale (e.g., 1–5) and discuss their scores.
 - High scores indicate readiness, while low scores suggest obstacles that need addressing before action.
4. Analyse results (5 minutes)
 - Facilitate a discussion on overall readiness.
 - Discuss where the system is ready, where gaps exist, and what steps could strengthen readiness.
5. Debriefing (15 minutes)
 - Reflect on how this readiness assessment shapes the planned intervention.

- Encourage participants to consider timing, risks, and areas for preparation.

Tips for Facilitators

Encourage participants to be honest in their scoring rather than overly optimistic. Help them recognize that waiting and preparing can sometimes be more strategic than acting immediately. Push for evidence-based reasoning, ensuring scores are backed by real conditions rather than assumptions. Guide discussions toward what can be done to improve readiness if conditions aren't yet favourable.

Tips for Debriefing

Create a space for critical reflection and strategic thinking. Use these questions to guide the discussion:

- What readiness factors scored the lowest, and why?
- How does readiness influence the likelihood of success?
- What would need to shift to increase system readiness?
- Are there risks in intervening too soon?
- If the system is not ready, what next steps can help prepare for intervention?

Summarize key takeaways, emphasizing that systemic change requires the right timing and that building readiness can be a valuable intervention itself.

Variations

Readiness Assessment can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Fast-track version:* Participants use a simplified three-category scale, e.g., “ready, needs work, not ready,” for a quicker decision-making process.
- *Stakeholder perspectives:* Instead of assessing readiness from a single viewpoint, participants evaluate it from multiple system actors' perspectives (e.g., policymakers, funders, affected communities) to uncover potential misalignments.
- *Scenario-based readiness:* Participants test system readiness under different future scenarios (e.g., policy changes, economic shifts) to explore how external conditions might impact intervention success.
- *Barrier identification:* Rather than scoring readiness, participants identify the biggest obstacles to change and brainstorm targeted strategies to address them before moving forward.
- *Comparative readiness:* Participants assess multiple systems or potential intervention areas side by side to determine where action is most feasible and impactful.

Guiding Star and Near Star

Leverage Points | Perspectives

Purpose

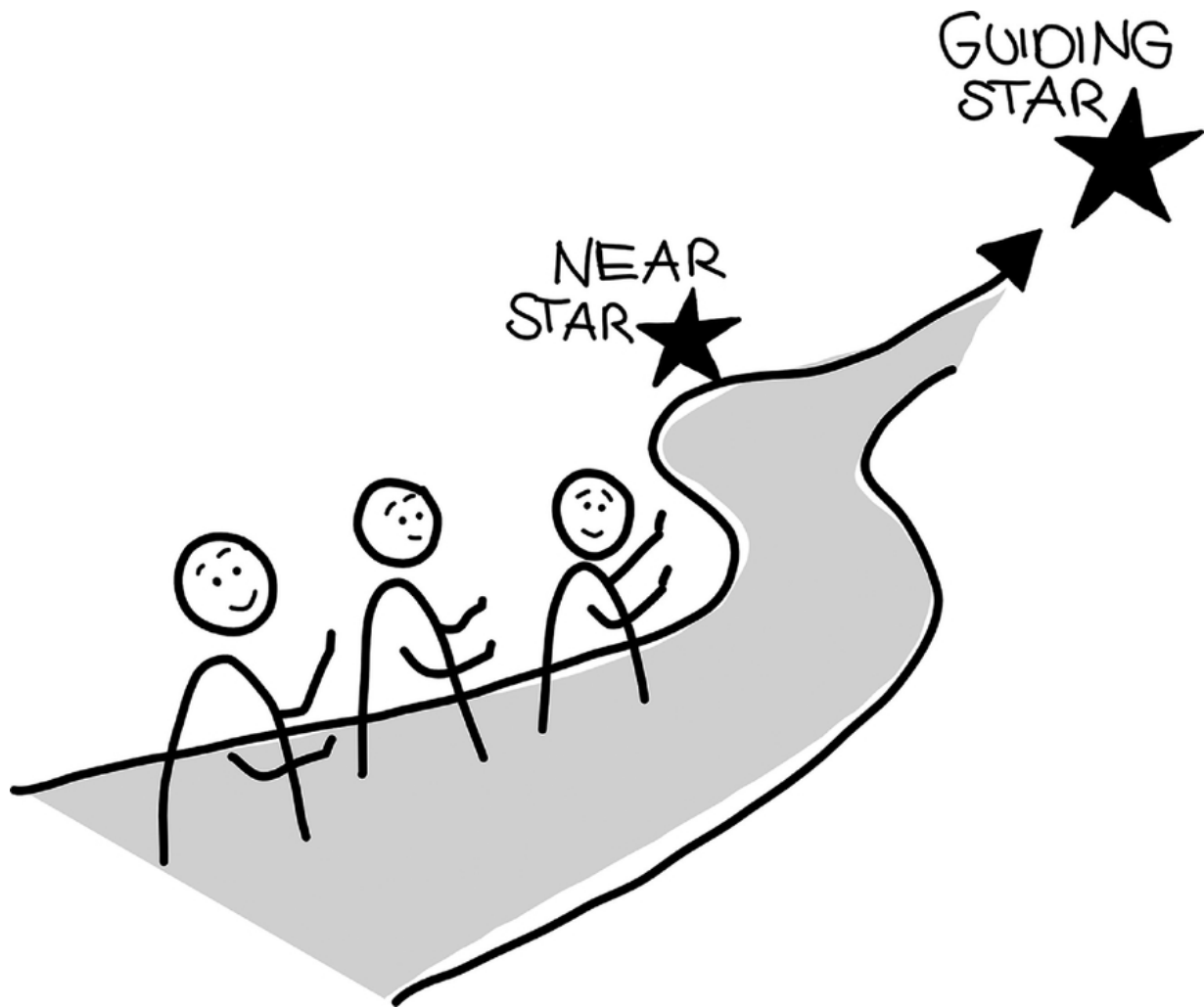
This exercise helps participants define a clear direction for systemic intervention by establishing a Guiding Star (long-term vision) and a Near Star (achievable milestone). By shifting focus from immediate fixes to systemic change, participants develop a structured, strategic approach. Instead of reacting to symptoms, this method encourages them to identify root causes and leverage points, ensuring that interventions are purposeful and impactful.

How It Works

Participants begin by envisioning a Guiding Star, a long-term vision that defines how the system should function if transformation is fully realized. They then establish a Near Star, a concrete and measurable milestone within 5–10 years that signals meaningful progress toward that vision. By clarifying both, participants create a bridge between ambition and action, ensuring that their intervention is both aspirational and achievable.

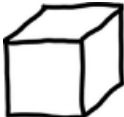
Applications

This exercise is ideal for teams working in policymaking, social impact, business transformation, and organizational change. It helps ensure that interventions are strategic, timely, and focused on deeper system shifts rather than temporary fixes. Participants gain clarity on why action is needed, how to measure progress, and what structural forces must be engaged to sustain long-term change.



Exercise: “Guiding Star and Near Star”

Participants 	Time 	Equipment 
2–20	45–75 minutes	Paper, markers, sticky notes

Space  : An open room with space for participants move around comfortably.

Setup

1. Participants work individually or in small teams.
2. Provide a workspace with flip charts, markers, or sticky notes for brainstorming.

Instructional Steps

1. Introduction (5 minutes)

- Explain that this exercise helps participants define a long-term vision for system change (Guiding Star) and a key milestone toward it (Near Star).
- Shift focus from short-term fixes to long-term system interventions.

2. Define the Guiding Star (15 minutes)

- Participants describe the *ideal future state* of the system:
What does a transformed system look like? What principles guide it, and how would people experience it differently?
- Prompt: “Our Guiding Star is a [name of system] that produces [desired condition].”
- Example: “Our Guiding Star is a global supply chain that eliminates labour exploitation and ensures fair wages.”

3. Define the Near Star (15 minutes)

- Participants identify a measurable milestone within 5–10 years:
What structural, policy, or behavioural shift signals progress? What measurable outcome is achievable?
- Prompt: “Our Near Star is a [specific achievement] that enables [broader system improvement].”
- Example: “Our Near Star is a corporate accountability standard that requires companies to verify fair wages across their supply chains.”

4. Share and refine (15 minutes)

- Teams present their Guiding Star and Near Star to the group.
- Facilitate discussion to refine clarity, alignment, and feasibility.

5. Debriefing (15 minutes)

- Ask participants to reflect on challenges in defining the Guiding Star and Near Star and how it helps guide systemic interventions.
- Facilitate a discussion on key next steps to move toward it.

Tips for Facilitators

Encourage participants to think beyond immediate solutions and focus on long-term system transformation. Guide discussions to ensure that both the Guiding Star and Near Star remain ambitious yet realistic. Push participants to refine their Near Star into a clear, measurable milestone that shows real progress. Keep the conversation grounded in systemic change rather than individual actions, and help participants identify key leverage points within the system.

Tips for Debriefing

Create a reflective space and encourage participants to connect the exercise with real-world system interventions. Use these questions to guide the discussion:

- What challenges did you face in defining your Guiding Star?
- Was it difficult to identify a Near Star that feels both ambitious and achievable?
- How does this approach shift your thinking about systemic interventions?
- What are potential barriers to achieving the Near Star, and how can they be addressed?
- What first steps can be taken to move toward the Near Star?

After gathering responses, summarize key takeaways, focusing on strategic direction, system evolution, and the balance between ambition and feasibility. Encourage participants to consider how these insights apply to their own interventions, organizations, or projects.

Variations

The Guiding Star and Near Star exercise can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Backcasting approach*: Instead of setting the Near Star first, participants work backward from the Guiding Star, identifying key milestones along the way.
- *Stakeholder perspectives*: Participants consider how different system actors (e.g., policymakers, businesses, communities) might define the Near Star differently.
- *Multiple Near Stars*: Instead of defining just one, participants identify several Near Stars to map how different interventions contribute to the same long-term vision

Cynefin Framework

Boundaries | Perspectives

Purpose

The Cynefin Framework is a sense-making tool for classifying situations based on how cause and effect are perceived. It is used when the path forward is unclear and adaptive strategies are needed. The framework helps identify the nature of a situation to guide appropriate action in complex or uncertain systems.

How It Works

Developed by Dave Snowden [[49](#)], the Cynefin Framework classifies situations into five domains depending on how predictable relationships appear at the time of assessment:

- *Clear*: Cause and effect are obvious; apply best practice.

→ *Sense – Categorize – Respond*

- *Complicated*: Cause and effect exist but require expert analysis.

→ *Sense – Analyse – Respond*

- *Complex*: Cause and effect only clear in hindsight; patterns emerge.

→ *Probe – Sense – Respond*

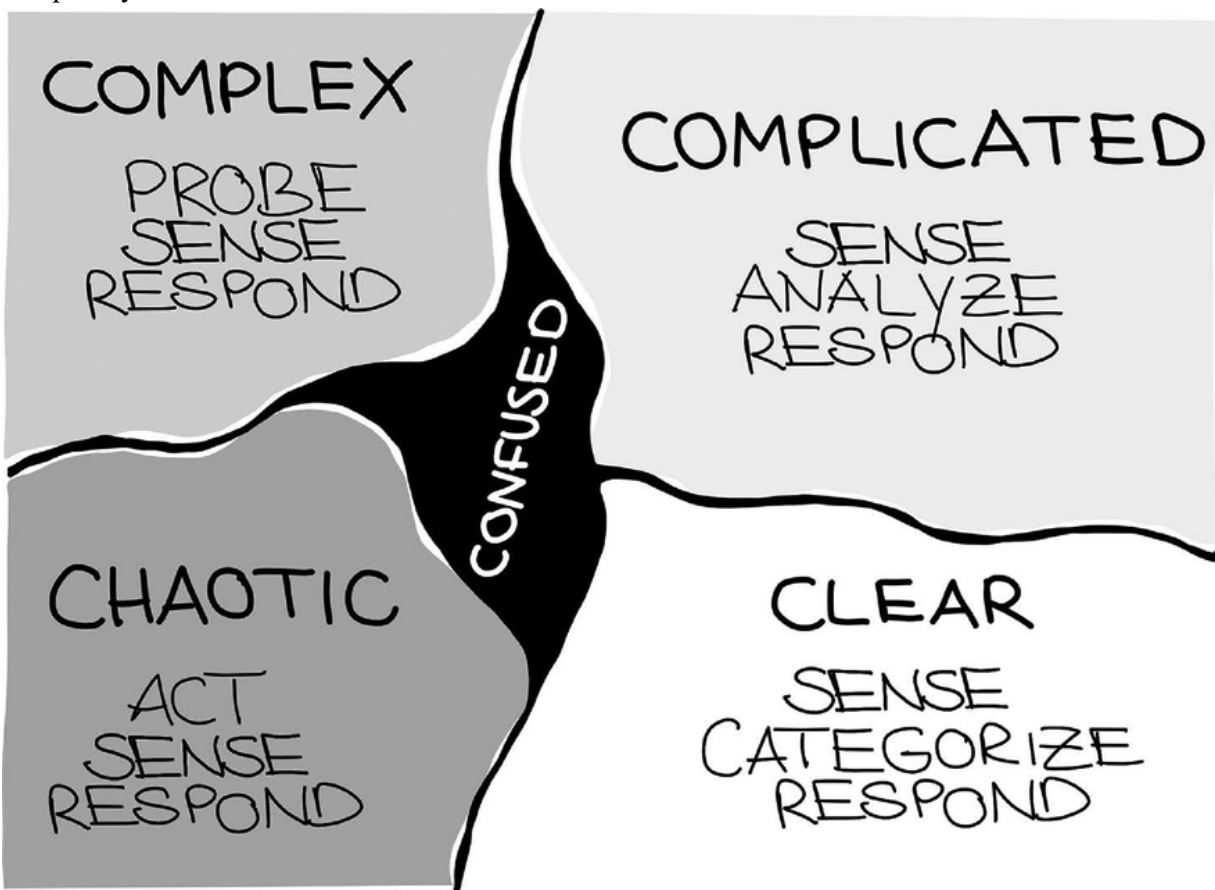
- *Chaotic*: No stability; immediate action is required to establish order.

→ *Act – Sense – Respond*

- *Confused*: Unclear situation; clarify which domain applies.

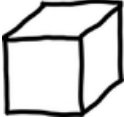
Applications

The Cynefin Framework is used in strategy, crisis response, policy, and organisational development. It supports decision-makers understand the context and choose how to act based on perceived complexity.



Exercise: “Cynefin Framework”

Participants 	Time 	Equipment 
1–10	60–90 minutes	Large sheets of paper or whiteboards, markers

Space  : A room with ample space for group discussion and visual brainstorming.

Setup

1. Set up large sheets of paper or whiteboards for group discussions.
2. Provide markers and reference materials for the Cynefin Framework.
3. Ensure space for breakout groups and group presentations.

Instructional Steps

1. Introduction (5 minutes)
 - Explain the Cynefin Framework and its role in framing situations and guiding decision-making for different types of situations.
 - Provide an overview of the five domains: Clear, Complicated, Complex, Chaotic, and Confusion.
2. Forming groups and initial discussion (10 minutes)
 - Divide participants into small groups, and explain that they will use their experiences to identify examples for each Cynefin domain.
3. Domain exploration (20 minutes)
 - Guide each group to discuss and document examples from their own work or real-life situations that fit into each Cynefin domain.
 - Encourage groups to talk through their reasoning and identify why each example belongs in a specific domain.
4. Group sharing and comparisons (20 minutes)
 - Have each group present their examples and reasoning.
 - Facilitate discussion to compare differing perspectives and framings.
5. Discussion and insights (15 minutes)
 - Encourage participants to discuss any challenges they faced in categorizing situations and what insights they gained from the exercise.
 - Allow groups to adjust their examples or reasoning based on what they learned from others.

6. Debriefing and application (15 minutes)

- Conclude with a reflection on how the Cynefin Framework applies to real-world decision-making and what steps to take next.
- Discuss how participants can use their understanding of the framework and apply the suggested strategies.

Tips for Facilitators

Make sure participants understand each Cynefin domain before starting. Use real-world examples they can relate to. Encourage open, collaborative discussion and remind them there's no single right answer when categorizing complex situations. Step in only when needed; let groups lead their own analysis. Summarize key points now and then to keep focus.

Tips for Debriefing

Ask participants to reflect on their experiences with questions like the following:

- What insights were gained from framing situations into different Cynefin domains?
- How did using the framework change your approach to understanding problems and developing strategies?
- What lessons or takeaways can you apply to improve decision-making in complex or uncertain environments?

Encourage participants to share specific examples of how their thinking shifted and discuss potential applications of the framework in their work. Highlight any common themes or new perspectives that emerged during the exercise to help solidify understanding. This process supports integrating the Cynefin Framework into daily practices and underscores its importance in sense-making and strategic planning.

Variations

- *Simplified domain exploration:* Focus on only a few key domains for a more manageable session, ideal for beginners or short workshops.
- *Digital Cynefin workshop:* Leverage online collaboration tools, such as virtual whiteboards, for remote sessions where participants can engage and contribute their insights.
- *Case study analysis:* Use a shared real-world case study that participants can categorize and discuss, providing practical context for applying the framework.

Note

This framework was developed by Dave Snowden in the early 2000s [[49](#)]. The framework has continued to evolve over time, including refinements such as a liminal zone and the aporetic state,

introducing more nuanced distinctions. This version keeps the focus on practical application and accessibility.

Certainty-Agreement Matrix

Boundaries | Perspectives

Purpose

The Certainty-Agreement Matrix provides a practical tool to reflect on situations based on two dimensions: certainty and agreement. Use it when perspectives differ or the problem feels unclear. It is intended to support choosing suitable ways of working by framing the perceived clarity and alignment.

How It Works

The Certainty-Agreement Matrix uses two dimensions:

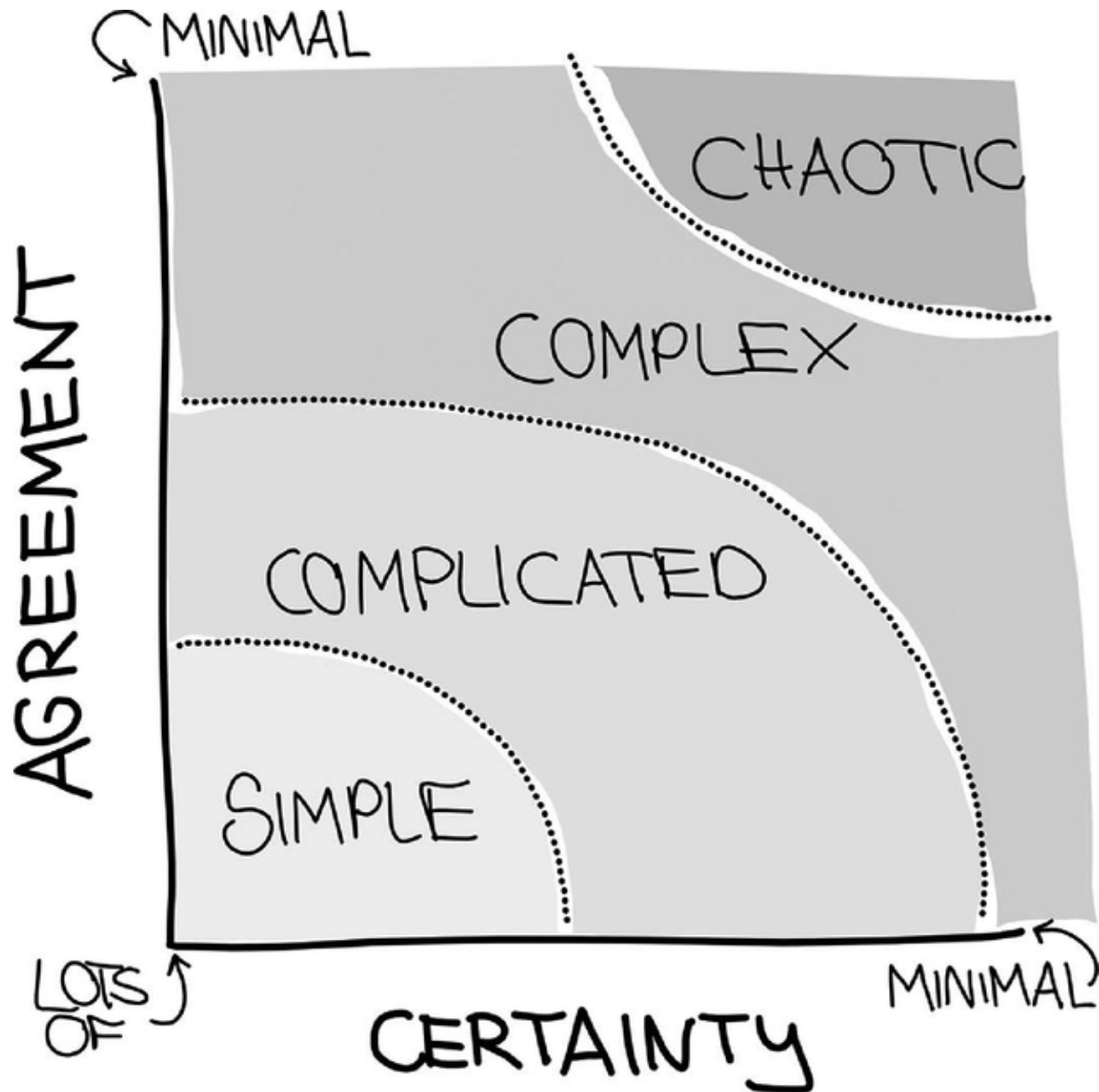
- *Certainty* – how well cause and effect are understood.
- *Agreement* – how much stakeholders align on goals or solutions.

Depending on where the situation falls, it suggests different modes of working:

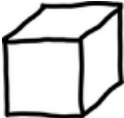
- *Simple*: Cause and effect are clear; follow standard procedures.
- *Complicated*: Cause and effect are knowable but may require expert analysis; apply expert knowledge and planning.
- *Complex*: Cause and effect are unclear and evolve over time; experiment, observe patterns, and adapt.
- *Chaotic*: No clear cause and effect; act fast to stabilize then assess.

Applications

The Matrix is used in leadership, project planning, group facilitation, conflict resolution, and strategic decision-making. It helps teams reflect on how they perceive a situation and choose approaches that match those perceptions.



Exercise: "Certainty-Agreement Matrix"

Participants 	Time 	Equipment 
10-30	60-90 minutes	Large sheets of paper or whiteboards, markers
Space  : A room with enough space for group discussions and visual work.		

Setup

1. Draw the Certainty-Agreement Matrix (two axes: Certainty and Agreement) on whiteboards or paper.
2. Provide markers and reference guides on the Certainty-Agreement Matrix for participants.

Instructional Steps

1. Introduction (10 minutes)

- Explain the Certainty-Agreement Matrix and its purpose.
- Walk through the four areas: Simple (high certainty, high agreement), Complicated (some uncertainty, but agreement), Complex (low agreement, some certainty), Chaotic (low agreement, low certainty).

2. Forming groups and initial discussion (10 minutes)

- Break participants into small groups.
- Brief them on brainstorming real-world situations and placing them onto the matrix.

3. Mapping exercise (20 minutes)

- Groups discuss examples and decide where they fit on the matrix.
- Encourage them to talk through why they chose specific spots.

4. Group sharing and comparisons (20 minutes)

- Each group presents their map.
- Facilitate discussion around different interpretations and placements.

5. Discussion and insights (15 minutes)

- Ask participants about challenges in placement and new insights gained.
- Allow groups to move examples if they change their mind after discussion.

6. Debriefing and application (15 minutes)

- Reflect on the usefulness of the Certainty-Agreement Matrix for decision-making.
- Discuss ways participants can use the matrix in everyday situations at work.

Tips for Facilitators

Ensure participants understand the Certainty and Agreement axes before starting. Use simple, relatable examples to illustrate the different zones. Emphasise that not all situations fit neatly, and differing views are part of the process. Let groups explain their reasoning and guide rather than provide answers. Summarize key points to maintain focus. Encourage open questioning and exploration.

Tips for Debriefing

Ask participants reflective questions such as the following:

- What did you learn from placing situations onto the Certainty-Agreement Matrix?
- How did thinking about Certainty and Agreement affect your understanding of the problems?
- What changes would you make to how you approach decision-making after this exercise?

Encourage participants to share real examples of shifts in thinking. Highlight surprising insights or common patterns. Discuss how complexity and uncertainty affect leadership and planning. Emphasise that the Certainty–Agreement Matrix can be used regularly in strategy or project sessions to build confidence in navigating complex, uncertain situations.

Variations

- *Whole group mapping* : Have everyone work together on one large matrix to encourage shared discussion and diverse examples.
- *Digital session* : Use online whiteboards like Miro or Jamboard for remote workshops; participants can map situations together in real time.
- *Case study* : Use a real-world scenario for participants to practice placing examples on the matrix.
- *Regular use* : Bring the matrix into regular meetings or reviews to help teams recognize and adapt to different problem types.

Note

This activity is based on concepts introduced by Ralph D. Stacey in the 1990s [[88](#)]. The version used here – with labelled areas like “Simple,” “Complicated,” “Complex,” and “Chaotic” – is an adaptation developed later by practitioners in leadership, systems thinking, and agile. Stacey did not present the model in this exact form. It’s not a diagnostic tool but a reflection aid to explore how a group sees a problem.

Power Mapping

Perspectives | Boundaries | Leverage Points

Purpose

This exercise helps participants analyse power structures within a system by mapping key actors, their influence, and their relationships. Instead of assuming change happens through direct action alone, participants uncover who holds power, who resists change, and where influence can be leveraged to drive systemic transformation.

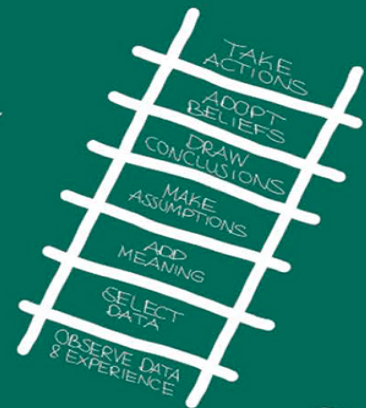
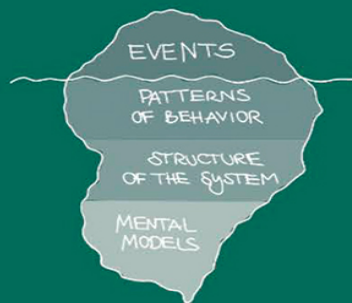
How It Works

Participants create a power map by identifying stakeholders within a system and categorizing them based on their level of influence and stance toward change. They then assess power dynamics to

CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR EXPLORING SYSTEMS, PERSPECTIVES, AND COMPLEXITY



CONNECTIONS



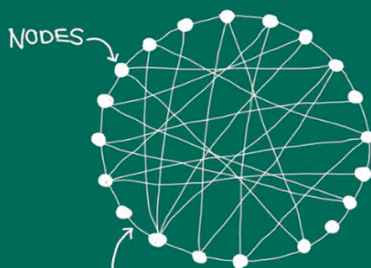
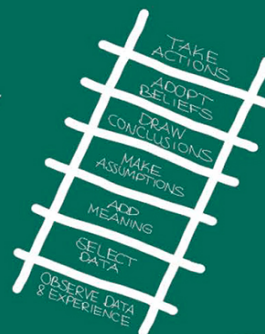
»IS« — ACTUAL SITUATION	»OUGHT« — IDEAL SITUATION



CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR
EXPLORING SYSTEMS, PERSPECTIVES,
AND COMPLEXITY



CONNECTIONS

•IS•—ACTUAL SITUATION	•OUGHT•—IDEAL SITUATION



Methods for Systems Thinking

Methods for Systems Thinking is a practical workbook with more than 65 methods you can apply right away. It helps you explore complex systems, involve the right people, and respond effectively to change.

The QuickStart Guide shows you where to begin. You can start with the short theory section, use the 5M Methods Matrix to choose an approach, or jump straight to a method. Methods are organized by the 5M Structure (Motivate, Meet, Map, Make, and Manage) so you can quickly find what fits your purpose, whether clarifying goals, engaging stakeholders, mapping connections, shaping responses, or adapting over time.

Each method spans three pages and gives you a description, purpose, application, illustration, and step-by-step guidance. You also get tips for facilitation, debriefing, and variations. The focus is on action, turning reflection into results.

Christian Baron , PhD, is a consultant, trainer, and systemic coach. He uses systems thinking to make complexity manageable, with a focus on clarity, collaboration, and lasting impact.

Methods for Systems Thinking

65+ Practical Approaches for Exploring Systems,
Perspectives, and Complexity

Christian Baron



Designed cover image: © Anna Frank

First published 2026

by Routledge

605 Third Avenue, New York, NY 10158

and by Routledge

4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2026 Christian Baron

The right of Christian Baron to be identified as author of this work has been asserted in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice : Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

ISBN: 978-1-041-11170-2 (hbk)

ISBN: 978-1-041-11171-9 (pbk)

ISBN: 978-1-003-65861-0 (ebk)

DOI: [10.4324/9781003658610](https://doi.org/10.4324/9781003658610)

For Product Safety Concerns and Information please contact our EU representative GPSR@taylorandfrancis.com . Taylor & Francis Verlag GmbH, Kaufingerstraße 24, 80331 München, Germany.

Contents

[*Foreword*](#)

[*Preface*](#)

[*About the Author*](#)

[*About This Book*](#)

[*QuickStart Guide*](#)

Introduction

PART 1 Systems and Systems Thinking

Understand Systems

[*But Not Everyone Sees the Same System*](#)

[*System Classification*](#)

[*Real-World Systems*](#)

[*Making Systems Tangible*](#)

[*Turning Toward Action*](#)

Understand Systems Thinking

[*Brief History*](#)

[*Two Strands*](#)

[*9 Core Concepts of Systems Thinking*](#)

Think in Systems

[*7 Core Habits for Systems Thinkers*](#)

[*How Systems Thinkers Make Meaning*](#)

[*Self-Check: Are You a Systems Thinker?*](#)

Navigate in Systems

[*Systemic and Systematic Thinking in Systems*](#)

[*Framing and Sensemaking in Systems*](#)

[*Preparing to Act in Systems*](#)

[*Diagnosing the Problem*](#)

[*Finding Leverage and Acting in Systems*](#)

PART 2 Select Methods for Systems Practice

[*Why This Set of Methods*](#)

[*Where These Methods Come From*](#)

[*The 5M Structure*](#)

[*Focus Areas of Methods*](#)

The 5M Methods Matrix

[*Motivate: Why and What For?*](#)

Meet: Engage Stakeholders and Perspectives

Map: Understand and Visualize the System

Make: Take Action and Create Solutions

Manage: Evaluate and Adapt Over Time

PART 3 Apply 65+ Methods for Systems Practice

Integration with Systems Thinking Principles

What's in Each Method

Motivate: Why and What For?

Deciding to Act

Readiness Assessment

Guiding Star and Near Star

Cynefin Framework

Certainty-Agreement Matrix

Power Mapping

Meet: Engage Stakeholders and Perspectives

Silent Signal

Invisible Connections

Collective Pulse

Speed Framing

Invisible Negotiation

Ladder of Inference

Fishbowl Discussion

Reverse Fishbowl

Stakeholder Mapping

Cluster Mapping

CATWOE Analysis

Boundary Critique (BC)

Appreciative Inquiry

World Café

Map: Understanding the System

Air Circles

Adaptive Pen Control

Group Juggle

Triangles

Live Systems Mapping

Bathtub Game

DSRP Framework

Behaviour Over Time Graphs

Paper Computer

Refrigeration Game

Fishbanks Ltd.

Sankey Diagrams

System in Focus

Rich Pictures

Double-Q Diagram

Impact Mapping

Connected Circles Map

Causal Loop Diagram (CLD)

Systems Archetypes

Leverage Point Mapping

Scenario Planning

World Game

Soft Systems Methodology (SSM)

Viable System Model (VSM)

Make: Take Action and Create Solutions

Human Knot

Paper Airplane Factory

Forced Prioritization

Resource Tree

Kano Model

Theory of Constraints (TOC)

Prototyping Sprints

Process Hacking

Backcasting

Synectics

Morphological Analysis

Futures Wheel

Manage: Evaluating and Adapting Over Time

Boom and Bust

Most Significant Change (MSC)

Outcomes Mapping

Lag vs. Lead Indicator Tracking

Balanced Scorecard

Iceberg Model

Scenario Stress Testing

Fuzzy Cognitive Mapping (FCM)

Critical Systems Heuristics (CSH)

Final Thoughts

Reference

Index

Foreword

Christian Baron's book points in a new direction for systems thinking resources. Let me explain with the aid of a brief reflection on systems thinking since the 1980s, including one of my own contributions, as this will make it clear why I see this book as an important new development.

Back in the early 1980s, there was a “paradigm war” (two competing understandings of what systems thinking is, underpinned by very different assumptions about the nature of reality and our knowledge of it) that threatened to tear our research community apart. Some people were concerned with enhancing objectivity, optimization, and expert analysis, while others emphasized intersubjectivity, stakeholder participation, and facilitated dialogue. Those seeking objectivity viewed systems as things we can know in the real world [1], while those facilitating intersubjectivity thought of systems as being useful interpretations (i.e., in the mind), constructed through processes of collaborative inquiry [2]. The paradigm war became entrenched, and there were almost no points of agreement between the two sides, making mutual appreciation very difficult [3].

In this context, Jackson and Keys [4] observed that, when it came to practice, the two different visions of systems thinking made fundamentally different assumptions about the nature of organizations and the relationships between stakeholders, which makes them useful in different contexts. At the risk of oversimplifying their argument, it's useful to pursue objectivity, optimization, and expert analysis when there is agreement between stakeholders on the issues being tackled. However, when there is disagreement, then stakeholder participation, dialogue, and a search for mutual understanding are more valuable. Building on this argument, Jackson [5] advocated methodological pluralism: treating different methodologies, which are grounded in the different paradigms, as complementary rather than competing.

This was a critically important contribution to systems thinking not just because it offered a way to save the systems research community from being riven in two but also because it offered a more flexible and responsive systems practice than either of the earlier versions of systems thinking. Essentially, it made clear that we can have the best of both worlds.

During the late 1980s and throughout the 1990s, over 100 authors contributed to our understanding of methodological pluralism [6] until, in the year 2000, two books consolidated contrasting understandings of what it involves. Jackson [7] emphasized the use of multiple methodologies based in four different paradigms (going beyond the original two from the early 1980s), and he argued that we can usefully switch from one methodological rationale to another – including movement between one set of philosophical assumptions about reality and our knowledge of it to a different set of assumptions. This appeared to assume there is a “neutral,” meta perspective from which methodologies and paradigms can be observed and understood [6 , 8]. Jackson was very clear that methods shouldn't be divorced from methodologies, as it is methodologies that provide philosophy and theory explaining why methods are valid and how they work. In contrast, I wrote a

book [8] arguing that there is no “neutral” place “above” the methodologies and their paradigms from which to observe and use them: methodologies come to be interpreted through the practitioner’s own paradigmatic lens, which cannot be transcended but can evolve over time through processes of learning with others. Also, I claimed that it is more useful to mix methods in practice than deploy whole methodologies, with methods being drawn from multiple methodological sources and reinterpreted by the practitioner. Thus, methods can be detached from their original methodological rationales and can be deployed in new ways, different from those that their creators intended. Indeed, I argue that whole methodologies are relatively blunt instruments: we need to be able to explore problem contexts (especially taken for granted value and boundary judgments, conflicts, and marginalization processes) to see more of the complexity than we (or a client, or any given stakeholder) might initially be aware of [9], and this most often results in the development of a bespoke intervention design, creatively mixing methods from multiple sources, as no single methodology is usually sufficient [6 , 10].

Intellectually, I regard both the contributions from Jackson and myself as credible. Indeed, I recognize a significant benefit of Jackson’s work [11]: by insisting on the teaching of multiple methodologies, Jackson provides an antidote to a common problem – practitioners discovering just one methodology and believing this is all systems thinking consists of. However, I argue that, when it comes to practice, mixing methods offers a great deal more flexibility and responsiveness than the use of whole methodologies, or keeping methods tied to the methodological rationales of their creators [12]. In addition, my approach doesn’t say that practitioners are paradigmatically neutral, so it asks them to learn from others with different perspectives on an ongoing basis [13], thus providing another antidote to them thinking that systems thinking is just one methodology. Through ongoing learning, practitioners come to see more of their own methodological blind spots, and thereby, over time, they enhance their capabilities for exploring complexity, as well as for designing and undertaking systemic interventions in the context of that complexity.

While I have long believed that mixing methods is the most practically advantageous approach (my writings on this go back to 1989 [14]), I suggest that, in recent years, we have witnessed considerable changes in how people in organizations work that magnify the practical difference between using whole methodologies and mixing methods. Work is becoming ever more intense, with high pressure decisions needing to be made increasingly quickly [15]. Also, since the COVID-19 pandemic, working from home has become much more common [16]. Both these changes to working practices make it hard for people to find time for special projects structured by a whole systems methodology [17], and in particular, convening workshops (a practice that is often advocated in the more participative and dialogical approaches) is increasingly resisted because of the difficulty of bringing everyone together in the same place at the same time [18]. While there is undoubtedly a case for rethinking how we run our organizations [19 , 20], we cannot afford to sit on our hands and wait for organizational environments to become more propitious for systems thinking; there are just too many complex and urgent issues that need tackling. If we are able and willing to

detach methods from their original methodological rationales, then they can be adapted for use in new ways, for day-to-day thinking and conversation [[17](#) , [21](#)], as well as for special projects and workshops when these are possible. This adaptation can happen without losing the idea that methods need to be understood by the practitioner in the context of his or her own evolving systems perspective.

Despite this argument for mixing methods being widely appreciated in the systems community, and despite recent changes in working practices, most contemporary, multifaceted resources for systems thinking [e.g., 11, 22–24] have continued to present systems methods in the context of whole methodologies. This is where the book you are reading is different, and it points to a new way forward.

I am not aware of another systems thinking book that presents as many methods as this one (65+), drawn from such a diversity of sources, offering the potential to be adapted for use in a multitude of situations. However, a list of methods alone would not be very useful: it would overwhelm the average reader who is approaching systems thinking for the first time. Two additional elements of this book are key:

First, Baron explains the importance of using the methods in the context of a systemic mindset: the unsystemic use of systems methods can lead to fundamental misunderstandings of systems thinking [[25](#)]. I would argue that it can do significant harm, too, as without a systemic mindset, there is nothing beyond the limited method at hand to support the practitioner in exploring boundaries, mapping relationships, appreciating different perspectives, and understanding emergent properties during interventions. These are all key systemic skills for engaging with complexity and enhancing critique and innovation, and they can be practiced even when no formal method appears to be relevant [[17](#) , [21](#) , [26](#) , [27](#)].

Second, of equal value to the insistence on a systemic mindset is Baron's categorization of five broad purposes for the methods he discusses, and this structure helps to differentiate between classes of methods. It is also simple enough to be immediately understood. Of course, methods can be adapted for purposes other than those they are usually used for [[28](#) , [29](#)], but as a starting point for learning, the emphasis on purposes is consistent with mixing methods [[8](#)] and can be readily appreciated by novice practitioners.

I recommend this book to you in the belief that it offers a new kind of resource for systems thinking, with many more methods than usual, which will be of real benefit to the growing number of systems practitioners who seek to mix methods creatively in response to ever more challenging social contexts.

– **Gerald Midgley**

Centre for Systems Studies, University of Hull, Hull, UK

Birmingham Leadership Institute, University of Birmingham, Birmingham, UK

School of Cybernetics, College of Systems and Society, Australian National University, Australia

Department of Informatics, Linnaeus University, Växjö, Sweden

Preface

This book began with a simple intention: to make systems thinking more accessible and usable in everyday work. What you now hold in your hands is the result of years of exploration, collecting methods, testing ideas, refining practices, and learning with others.

It started with a growing set of practical tools and exercises used in facilitation, workshops, and strategy work. Over time, a structure emerged, ways to organize the tools and frame the work, that made it easier to teach, share, and apply in many different settings. The idea behind this book is that it can be a resource not just for learning about systems thinking but also for applying it directly in complex, messy situations.

This book would not exist without the support of many people.

Thank you to those closest to me: Anna, Kirsten, Rita, and Wolfgang. Thank you for your presence, encouragement, and care.

Thank you to everyone who contributed feedback, reviewed drafts, challenged ideas, or helped sharpen the clarity of the text. Your input pushed this work forward in essential ways.

A special thanks to the reviewers: Tony Fish, Michael Frahm, Isabell Osann, and James Stauch. Thank you to Gerald Midgley for contributing the foreword and to all who offered endorsements and encouragement along the way. Your questions, critique, and perspectives helped bring this to another level.

Writing this book has been both a personal and professional process. Systems thinking is not just a set of tools, it is a way of seeing, of listening, of working with uncertainty. This book reflects what I have learned so far. It is not a final answer but a contribution to an ongoing field of practice.

The process was supported by modern AI tools, used for research, synthesis, and drafting. But the heart of the work lies in dialogue, reflection, and shared learning with people.

Thank you for being part of this. May this book support your own thinking, questioning, and action in the systems you care about.

About the Author



Christian Baron, PhD, is a freelance consultant, trainer, and systemic coach. As founder of *zusammen-weiterdenken*, he supports clients in creating sustainable value and navigating organizational transformation. With experience in research leadership and mid-sized industry, he applies systems thinking and systemic methods to make complexity more workable. His practice focuses on clarity, collaboration, and long-term impact.

About This Book

Methods for Systems Thinking is a workbook of practical approaches to systems thinking. It brings together a wide range of frameworks, methods, tools, visuals, and activities that help users explore, understand, and intervene in real-world systems. These approaches focus on visualizing relationships, understanding change over time, fostering creative responses, and supporting collaboration across diverse perspectives.

Why This Book?

This workbook is designed for immediate use. The focus is on approaches that can be applied rather than on theoretical discussion. It offers a broad collection of hands-on techniques to explore, understand, and intervene in real-world systems – whether mapping systems, analysing dynamics, or developing solutions.

Whom for?

Methods for Systems Thinking is for educators, managers, facilitators, leaders, consultants, and others working with real-world systems. It applies across fields, such as education, healthcare, business, government, and environmental work, and extends to any area where people deal with complexity, collaboration, or change. It is also useful in academic contexts, offering students and teachers clear examples and a broad set of approaches for teaching, research, and applied learning. Whether you work within a discipline or across boundaries, these methods support systems thinking in practice.

Why Methods?

Systems thinking is not a fixed set of rules or a single approach. What counts as systemic often depends on context, purpose, and perspective. This book offers structured approaches to help explore, test, and engage with systems.

Readers are encouraged to build their own understanding and choose tools that fit their needs. These resources are not shortcuts but prompts for reflection and action. You remain the master of your own thinking. The approaches in this book support your work but do not replace your judgment.

A Note on Terms

In this book, several terms to describe different types of resources are used:

- *Frameworks* help how we see, structure, or group situations.
- *Methodologies* are theory-based approaches for selecting and combining methods.
- *Methods* are structured processes for exploring, analysing, or planning.
- *Tools* are techniques that support a method or framework.

- *Visualizations* show patterns or connections, often as diagrams.
- *Activities* put these into practice, often in groups or workshops.

QuickStart Guide

Two Ways to Start

This book introduces key ideas in systems and systems thinking, followed by 65+ practical approaches organized using the 5M Structure. You can either start with the fundamentals or go straight to the methods.

- *Want context first? Part 1* covers what systems are, what systems thinking is, and how to become a systems thinker.
- *Ready to get hands-on? Parts 2 and 3* include practical tools, grouped in the 5M Structure.

The 5M Structure – Overview

Focus Area	What it helps with
Motivate	Clarify purpose and need for action
Meet	Engage stakeholders and perspectives
Map	Understand and visualize the system
Make	Take action and create solutions
Manage	Evaluate and adapt over time

Find Your Starting Point

Your Situation	Start with
You need to clarify purpose and direction	Motivate
You need to involve key people or perspectives	Meet
The system feels unclear or overwhelming	Map
You need to design and build possible solutions	Make

You need to evaluate, learn, or adapt over time

Manage

How the Methods Work

Each method in *Part 3* includes the following:

- Purpose, applications, and typical use cases
 - Step-by-step instructions
 - Tips for facilitators, debriefing, and variations
-

Introduction

DOI: [10.4324/9781003658610-1](https://doi.org/10.4324/9781003658610-1)

Many of today's world challenges have to do with systems – where multiple parts connect, interact, and change together. Climate change, economic shifts, or health crises don't happen in isolation. They are part of something bigger. They are part of interconnected systems. When a part changes, other parts respond. Because of these interrelations, simple fixes often fail – or make things worse.

Systems thinking can support work with these kinds of challenges. Instead of looking at isolated pieces, it encourages us to step back and understand how parts fit together. This helps us understand better how problems arise and where lasting solutions might come from.

This book is intended to support readers to apply systems thinking in practice. It offers simple, practical methods, simulations, exercises, and frameworks to explore, understand, and intervene in real-world systems. Systems thinking helps reveal patterns, feedback loops, and unintended effects. Rather than chasing symptoms, it encourages us to address deeper causes and design solutions that remain effective as situations evolve.

From education to urban planning, business, healthcare, or environmental management – many fields face systems where multiple factors interact. Though contexts differ, systems thinking offers shared principles to work with complexity and change.

At its core, systems thinking shifts how we see problems. When we change our perspective, new possibilities emerge – often in unexpected places. This change in perspective helps us work with difficult problems, adapt as conditions change, and build solutions that last.

The following chapters introduce the basics of systems and systems thinking, followed by a wide range of practical methods. Whether you need to map connections, address difficult problems, or plan for the future, these tools aim to make systems thinking practical and actionable.

This is a book for practice. I hope you find these methods helpful as you work with your systems challenges.

Now, let's begin.

Part 1

Systems and Systems Thinking

DOI: [10.4324/9781003658610-2](https://doi.org/10.4324/9781003658610-2)

Many tricky problems involve systems where parts connect, interact, and shift together.

In this part, I introduce how systems thinking helps frame such problems more effectively. Systems in nature, technology, and society display layers of relationships that produce outcomes we cannot predict by analysing parts in isolation.

Together, we explore how systems thinking shifts our framing of problems to see beyond isolated issues toward larger patterns and interactions that shape the world. This chapter sets the foundation for understanding how systems thinking supports better analysis, design, and decision-making when working with systems.

Understand Systems

DOI: [10.4324/9781003658610-3](https://doi.org/10.4324/9781003658610-3)

What do a tree, a weather system, and a company have in common? They're all systems but not of the same kind.

A useful first step in understanding systems is to group them into two broad types:

- *Natural systems* , like ecosystems, weather patterns, or the solar system, form and function without human design.
- *Human-made systems* , like companies, hospitals, or machines, are intentionally designed to serve specific goals.

How we describe a system depends on which type we're looking at. Human-made systems usually have clear roles, boundaries, and objectives. Natural systems show structure and interaction without designed intention.

One often-cited general definition aiming at broad applicability across many domains comes from von Bertalanffy [[30](#)]:

“A system can be defined as a complex of interacting elements.”

This is a minimal definition. It focuses on elements and the interactions between them, regardless of origin or design. In human-made and social systems, however, these elements are typically organized to serve a purpose or achieve specific goals [[31](#) , [32](#)].

Depending on the context, systems are often described by the domain they operate in: for example, biological systems (like organisms), technical systems (like machines), or social systems (like institutions). These categories help us focus on the kinds of interactions and components that matter most in each case.

Across most domains, systems typically share a few core traits that help define them, especially in human-made systems:

- *Purpose (when present)*: The system's reason for existing.
- *Components*: The individual parts or elements that form the system.
- *Interdependence*: Relationships and interactions between the components.
- *Boundaries*: Limits that define what is inside and outside of the system.
- *Environment*: External factors influencing and being influenced by the system.

One trait that often causes confusion and is often misunderstood is *purpose* . It's not the same as a goal. A goal is a specific, short-term outcome a system might try to achieve, like reducing wait times

or increasing output. Purpose is broader, it refers to the system's ongoing role or function over time. In human-made systems, purpose is often defined by design. In natural systems, purpose doesn't apply in the intentional sense because these systems aren't created with goals; they simply function.

Let's look at how this plays out in practice. Take a hospital, for example.

A hospital might set a goal of reducing patient wait times, but its actual *purpose* is reflected in what it consistently does. If its behaviour prioritizes revenue over patient care, then – regardless of stated goals – its effective purpose may be financial gain rather than community health [[33](#)].

The other traits of the system are often easier to observe:

- *Components* include doctors, nurses, equipment, and facilities.
- *Interdependence* describes how these parts interact, for example, nurses monitor patients and provide information that doctors use to make decisions.
- *Boundaries* define what belongs to the system (staff, patients, buildings) and what doesn't (insurance providers, external suppliers).
- *Environment* includes healthcare policies, public funding, and disease trends, all factors that shape how the hospital operates [[32](#)].

This example shows how each trait plays out in a real system and how *purpose* isn't always stated but is revealed by how the system operates in practice. It also highlights that understanding a system isn't just about listing parts. What matters is how those parts interact, how the system responds to its environment, and how its behaviour aligns (or doesn't) with its stated goals.

This view is central to general systems theory: a system is defined not just by its components but by how those components interact as well. Ross Ashby, Donella Meadows, and Peter Checkland each emphasized that it's the relationships and patterns of interaction that make a system. Without them, there may be no system at all, just a collection of elements [[32](#) , [33](#) and [34](#)].

Take the human heart: It doesn't work in isolation. It depends on signals from the brain, oxygen from the lungs, and coordination with other organs. Its function only makes sense within the full body. Or consider an orchestra: individual instruments make sounds, but only their interplay produces music.

Another illustrative example is the Matryoshka doll:



- *Purpose:* It serves as a decorative item representing unity.
- *Components:* A set of nested dolls of decreasing size.
- *Interdependence:* Each doll relies on the others to form a complete set.
- *Boundaries:* The outermost doll defines the system's boundary.
- *Environment:* Includes how the dolls are displayed and their cultural significance.

This example highlights how interconnected parts within a system contribute to a greater purpose, underscoring the value of understanding systems as a whole [32].

But Not Everyone Sees the Same System

What we call a system depends not just on what's physically there but on how we choose to look at it. As Ross Ashby [34] noted, any physical object – like a pendulum, a village, or a hospital – has countless variables. Which ones we focus on depends on our purpose.

This aligns with ideas from radical constructivism, as proposed by Ernst von Glasersfeld and Heinz von Foerster, which emphasize that knowledge, and system boundaries, are constructed by the observer, not simply found in the world [35 , 36]. We don't study "everything." Instead, we define a system by focusing on the elements and relationships that matter for the issue at hand.

Take a car, for example. Is it one system or many? That depends. If you're thinking about transportation, the engine, wheels, and steering might be central. If you're interested in climate control, the air conditioning system becomes relevant.

What counts as the system changes depending on what you're trying to understand or influence.

Let's take another example – a car repair shop:

- *For a customer* , the system seems simple: you bring your car, they fix it, and you pick it up. The customer focuses on the service outcome.
- *For a mechanic* , the system includes diagnostics, repair procedures, parts ordering, safety standards, and technical skills. What matters is finding and solving the technical problem.
- *For the shop manager* , the system is broader: staff schedules, finances, inventory, customer satisfaction, supplier contracts, and legal compliance all become relevant.
- *For someone developing management software* for repair shops, the system breaks down into subsystems: appointment scheduling, billing, parts inventory, customer databases, and reporting tools.

In each case, the same physical place is viewed as a different system depending on the observer's role, purpose, and knowledge. The system boundary shifts based on what questions are being asked.

But even once we've drawn a boundary, not all systems behave the same. They differ in how they respond to their environment, deal with change, or evolve over time.

To make sense of this variety, we tend to put things into mental boxes. It's how we explain our view of the world – by grouping things that seem similar. For systems, this means using categories or classifications. We group systems to spot patterns, highlight important differences, and choose better ways of working with them [37]. Without some kind of structure, we'd have to start from scratch every time we faced a new system. That's why it makes sense to begin with the basics – the common ways systems are understood and classified.

Even though every system depends on how we define it, certain recurring patterns help us work with systems more effectively. Classifications and categories give us a starting point for selecting appropriate methods and tools.

System Classification

There is a broad variety of systems. Some we call simple and predictable, like a light switch. Others are seen as dynamic and ever-changing, like the weather. Classifying systems helps us make sense of their diversity by organizing them into categories based on key characteristics [38].

There are many ways to classify systems, depending on the field or purpose. In classical systems theory, systems are seen as bounded, analysable, and made up of interacting parts with clear boundaries and purpose. In complexity science and ecology, Jean Boulton [39] describes systems as ongoing processes rather than fixed structures. She emphasizes flow, emergence, and the role of context. In economics, J. Doyne Farmer [40] shows that economies behave as complex systems that are nonlinear, uncertain, and shaped by the interaction of adaptive agents rather than by fixed rules.

To ground these ideas, we begin with one of the most accessible approaches: structural classification.

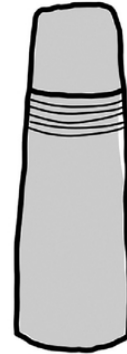
A Textbook Example

Textbooks often illustrate structural classification with a simple example: how systems interact with their environment and whether they are open, closed, or isolated. This framework, originally developed in thermodynamics, is often the starting point in system studies because it deals with observable boundaries and flows, making it useful for identifying what goes in, what comes out, and what stays contained.

This structural view divides systems into three types:

- *Open Systems* exchange matter, energy, or information with their environment. These interactions make them adaptable and responsive. In social or ecological contexts, their boundaries are often conceptual rather than physical. Examples include the human body and ecosystems [[30](#)], businesses and social systems [[32](#)], or simple physical examples like refrigerators, frying pans, or a cup of coffee, often used in systems teaching.
- *Closed Systems* exchange energy but not matter with their surroundings. Examples include a sealed water bottle, where heat passes through but water remains inside, or a pressure cooker, which transfers heat while retaining contents or a coffee cup with a lid [[32](#)].
- *Isolated Systems* neither exchange matter nor energy with their surroundings. While theoretical in nature, examples include a well-insulated thermos, effective only for a short time before heat escapes, or experimental setups in physics designed to minimize all external interactions, or the universe as a whole [[41](#)].

THERMODYNAMIC SYSTEMS



OPEN

CLOSED

ISOLATED

HEAT ✓

HEAT ✓

HEAT X

MASS ✓

MASS X

MASS X

The structural view is only one way of classifying systems. To capture a broader range of patterns, researchers also distinguish systems by their behaviour, complexity, adaptability, and hierarchy. Together, these five categories help identify key features, guide strategy, and show how systems interact with their environment [32].

Five Key Classifications

What counts as a system, and how it should be framed, depends on the field. Still, the following classifications offer a useful starting point in many practical contexts:

1. *Structural*: How systems interact with their environment (e.g., open, closed, or isolated) [34].
2. *Behavioural*: How systems change over time (e.g., static, dynamic, linear, or nonlinear) [42].
3. *Complexity-Based*: How interconnected and predictable they are (e.g., simple, complicated, complex, or chaotic) [37 , 43].
4. *Adaptability*: How systems respond to disruptions (e.g., resilient or adaptive) [44].
5. *Hierarchy*: How systems are organized (e.g., hierarchical or flat) [30 , 38].

These categories help us make sense of systems in theory. In practice, however, most systems don't fit neatly into a single category.

Real-World Systems

In theory , systems can be neatly classified – as open or closed, simple or structured, hierarchical or flat. These categories offer useful ways to study and describe them.

In practice , however, the systems encountered in everyday life rarely fit neatly into a single category. Those “*real-world systems*” don’t stay inside neat boxes. Their behaviour shifts depending on the situation, and many systems show features from more than one category at once [[44](#) , [45](#)].

Most systems we deal with are nonlinear and difficult to predict. They involve many parts that interact in often unexpected ways, with feedback loops and ongoing change.

Real systems rarely fit simple textbook definitions. Their behaviour depends not just on the parts they contain but on how those parts interact and adapt as well [[32](#) , [33](#)].

Even supposedly “closed” systems, such as a thermos or a pressure cooker, still interact with their surroundings, showing that system boundaries are not fixed but depend on our point of view.

As Donella Meadows [[33](#)] puts it:

“There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion.”

This perspective leads to three important insights:

- Systems are rarely fully isolated.
- Boundaries are defined by the observer and depend on context.
- Elements within and across systems are interconnected.

In light of this, it’s more useful to see systems not as fixed structures but as evolving patterns, shaped by feedback and outside influence. Systems that behave this way often show features like openness, emergence, self-organization, and change. These are typical of what complexity science calls *complex systems* : systems made up of many parts that interact in ways we can’t predict by looking at the parts alone. Examples include ecosystems, economies, cities, and social networks.

To capture how some of these systems change and learn over time, researchers use the concept of complex adaptive systems (CAS). This framing highlights systems that adjust continuously, with behaviour that emerges from many small interactions and shifts as conditions change [[46](#) , [47](#) and [48](#)].

Real-world systems don’t always fit neatly into this category, but the idea points to traits that are often useful when describing them. The following table shows examples and the kinds of patterns that are often observed in practice:

<i>System</i>	<i>Key Classifications</i>	<i>Description</i>
Human Body	Open, dynamic, complex, adaptive, hierarchical	Subsystems like circulatory and nervous systems work together, adapting to maintain homeostasis.
Cities	Open, dynamic, complex, adaptive, hierarchical	Interconnected infrastructure (e.g., transport, utilities) adapts to growth, crises, and disruptions.
Healthcare Systems	Open, dynamic, complex, adaptive, hierarchical	Hospitals and policymakers coordinate to address care and crises like pandemics.
Ecosystems (Forests)	Open, dynamic, nonlinear, complex, adaptive	Forests show resilience through feedback loops (e.g., regrowth after wildfires) and interdependencies.
Global Supply Chains	Open, complicated or complex, adaptive, hierarchical	Systems of suppliers and manufacturers adapt to global disruptions like COVID-19.
Social Media	Open, chaotic, adaptive, often flat	Viral content spreads unpredictably, with emergent patterns driven by user interactions.

Even though these examples show useful patterns, most systems rarely remain fully stable. Their behaviour can change over time, and many display different characteristics depending on scale, timeframe, or perspective. The same system may appear simple, complicated, or complex depending on which part is observed or which question is being asked.

That's why classifications are only a starting point. To work with real-world systems – especially under conditions of uncertainty, novelty, or unpredictability – we need practical approaches that support us understand how systems behave in specific situations.

The next section introduces ways to make systems more visible, more tangible, and more workable.

Making Systems Tangible

Knowing that real-world systems may be complex, adaptive, and unpredictable is important, but it's not enough. To work with them in practice, methods (a set of steps you follow to do something) can turn abstract understanding into concrete action. These methods support efforts to make systems more tangible, not just by naming structures or patterns but also by making them easier to see, map, and work with. They help reveal where connections form, how feedback loops work, and where small changes might matter, even in messy or uncertain systems.

For example, in dynamic systems, behaviour unfolds over time and is often shaped by delays and feedback loops. Tools such as [Causal Loop Diagrams](#) help map these cause-and-effect patterns. Methods like [Leverage Point Mapping](#) show where small changes might lead to big effects. Frameworks such as [Systems Archetypes](#), the [Iceberg Model](#), and [Cynefin](#) are intended to assist in making sense of system behaviour and help select suitable actions [[33](#) , [49](#)].

Recognizing that a system is possibly complex also means accepting its unpredictability. Methods like [Scenario Planning](#) [[50](#)], [Morphological Analysis](#) [[51](#)], and visualizations, such as the [Futures Wheel](#) [[47](#)], help explore possible developments and ripple effects. These methods don't offer control, but they help us prepare for change and uncertainty.

Some methods also make abstract system categories easier to grasp. For instance, terms like “open systems” or “resilient systems” can feel vague until paired with methods such as stakeholder mapping, causal loop diagrams, or rich pictures. These methods help bridge the gap between general ideas and practical engagement, making it easier to apply systems thinking in the real world [[32](#) , [33](#) , [52](#)].

Turning Toward Action

While many systems share similar core traits (see: “ [Understand Systems](#) ”), not all need the same attention or effort to manage. Supposedly simple systems, like light switches or mechanical levers, seem predictable and easy to handle. But most real-world challenges, such as climate change, financial instability, or organizational change, take place within systems that are interconnected, adaptive, and often unpredictable [[37](#)].

Recognizing their supposedly complex nature isn't enough. Without the right approaches, even getting started can feel overwhelming. That's why practical methods are essential: they help bridge understanding and action, linking what we know about a system with what we can actually do [[52](#)].

Systems thinking, when paired with the right approaches, helps us to do the following:

- *Reveal hidden patterns and relationships* : Spot trends and connections that aren't obvious [[33](#)].
- *Find leverage points for real change*: Identify where small shifts can make a big difference [[33](#)].
- *Deal with uncertainty and adapt as things change*: Stay flexible and adjust to new conditions [[44](#)].

After looking at how classifications, methods, and tools help us engage with systems, we now turn to the mindset that ties it all together. Tools and methods matter, but how we frame, interpret, and act on what we see matters just as much. Systems thinking gives us that lens: it helps reveal structure and patterns and helps us reflect on our role within the system.

Understand Systems Thinking

DOI: [10.4324/9781003658610-4](https://doi.org/10.4324/9781003658610-4)

There are many ways of thinking. At its core, thinking is the mental process of making sense of information, forming judgments, and guiding actions. Some kinds of thinking focus on quick fixes. Others step back and look at patterns. Some try to break things into parts. Others look at how things connect. Not all types of thinking work well in every situation. When we're dealing with something that changes over time, has many moving parts, or doesn't respond to simple fixes, a more connected kind of thinking is needed.

That's where systems thinking comes in.

Systems thinking is often described in broad or holistic terms, but those phrases can be vague and do not explain how systems actually behave. One simple way of putting it is that systems thinking is “thinking about systems.” More accurately, systems thinking focuses on how systems generate behaviour through the interactions of their components [[33](#) , [52](#) , [53](#)] or, in the case of social systems, through ongoing communication processes that reproduce the system itself [[54](#)].

Brief History

Most published histories of systems thinking focus on academic and institutional developments in Europe and North America. As a result, they often foreground modern, formalized approaches while overlooking cultural and indigenous traditions that have long emphasized connection, balance, and interdependence, even if not described using systems language. While these broader traditions exist, the historical development of systems thinking in academic literature is usually traced as follows:

Over time, different people and schools of thought have shaped how systems thinking is used and understood. It is often described that this development has happened in waves, with each wave adding new ideas and tools for addressing connected problems [[8](#) , [22](#) , [55](#)]. The wave metaphor offers a useful overview but simplifies a more complex development. In practice, many of these approaches have evolved in parallel, overlap, and continue to influence each other. There are also different ways of defining the waves, depending on which traditions and frameworks are emphasized.

The first wave (hard systems thinking) focused on structured, goal-oriented problem-solving, modelling, and control, often using formal models to analyse interrelationships between system components. One of the earliest contributions came from Russian thinker Alexander Bogdanov, who developed *Tektology* (1910–1913) – a general science of organization [[56](#)]. He argued that social and organizational systems should reflect natural systems, or they would fail. Although his work was later suppressed in the Soviet Union, it laid important conceptual groundwork for later systems theories.

This early interest in wholes and interconnection re-emerged in the West. In the 1940s and 1950s, the development of cybernetics by Norbert Wiener [[57](#)] and W. Ross Ashby [[34](#)] introduced key ideas like feedback, control, and communication – particularly in the context of machines and biological systems. Around the same time, Kenneth Boulding’s paper “General Systems Theory – The Skeleton of Science” [[58](#)] applied systems thinking to economics and social science. Later, Ludwig von Bertalanffy’s *General System Theory* (1968) [[30](#)] offered a broad conceptual framing of how systems work. It proposed that systems show properties that cannot be understood by analysing their components separately. This laid the groundwork for interdisciplinary systems thinking, emphasizing the importance of understanding wholes, patterns, and structures.

During this period, systems thinking was strongly linked to intervention and practical problem-solving, often through structured modelling approaches such as system dynamics [[59](#) , [60](#)] and the viable system model [[61](#) , [62](#)]. The goal was to optimize performance or improve planning through rational, often expert-driven methods.

The second wave (soft systems thinking) introduced the importance of perspectives. As the limits of purely technical and control-based approaches became clear, attention shifted in the 1970s and 1980s to the role of human viewpoints, interpretation, and learning. Many real-world problems were recognized as ill-structured or “messy,” involving multiple stakeholders with different goals and worldviews.

Soft Systems Methodology [[32](#)] provided a structured way to explore these different perspectives and support learning in situations where problems cannot be clearly defined in advance. Similarly, Strategic Assumption Surfacing and Testing [[63](#)] offered ways to uncover and examine the assumptions behind competing positions. The focus moved from prediction and optimization toward negotiation, participation, and collaborative sense-making, emphasizing that understanding complex situations often requires dialogue, not just technical expertise.

The third wave (critical systems thinking) introduced critical reflection on power, values, and ethics in system interventions. It emphasized that systems are not neutral or purely technical but involve decisions about boundaries, inclusion, and exclusion [[8](#) , [22](#)]. Interpretive and constructivist approaches [[64](#) , [65](#)] stressed that systems are shaped by the observer’s purpose, interests, and cultural context. Rather than assuming that system boundaries are fixed, critical systems thinking views boundaries as choices that reflect particular perspectives and serve particular interests.

Critical Systems Heuristics [[22](#)] provided a structured way to examine whose interests are being represented, which voices are included or excluded, and how power relations shape system designs. This wave shifted attention from technical solutions to issues of fairness, legitimacy, and emancipation, encouraging practitioners to reflect on the broader social and ethical consequences of system interventions.

The fourth wave (complexity and adaptive systems) addresses systems that are dynamic, nonlinear, and unpredictable. Complexity science [[46](#) , [48](#) , [66](#)] explores how large numbers of interacting elements produce emergent behaviour that cannot be explained by analysing parts in isolation.

Concepts such as self-organization, adaptation, and emergence are central to this view. Complex adaptive systems (CAS) are characterized by ongoing change, distributed control, and sensitivity to initial conditions. While this perspective is widely adopted, some thinkers instead emphasize universal structures of systems thinking, highlighting frameworks such as DSRP [[27](#)]. Alongside this work, new ideas about living and social systems also took shape, such as the concept of autopoiesis. Autopoiesis [[67](#)] describes systems as self-producing entities that maintain themselves through internal processes rather than external control. Niklas Luhmann [[54](#)] applied autopoiesis to social systems, arguing that they reproduce themselves through communication, constructing their own meaning rather than simply reacting to their environment.

Today's systems thinking has become a mix of approaches, shaped by fields as different as neuroscience, complexity science, social theory, and consciousness studies. These fields use systems terms but often in different ways.

Concepts like meaning, perception, ethics, and emergence have moved to the foreground, replacing earlier emphasis on control and prediction. The field is shifting away from managing systems from the outside and toward acting wisely within them. The real challenge now is practical and ethical: how to respond with awareness, care, and adaptability in complex, uncertain situations, where people have different values [[39](#) , [49](#) , [68](#)].

Two Strands

Systems thinking has developed across a wide range of disciplines and traditions. Within this diversity, two main strands can be distinguished:

- *Theoretical systems thinking* , which focuses on understanding what systems are and how they work. This includes describing system elements, relationships, boundaries, and purposes – the basic building blocks of systems theory. It draws on formal models, abstract concepts, and general principles that help frame complex situations. This strand is sometimes described as *conceptual*, *ontological* , or *thinking about systems* and includes work by foundational thinkers such as Ashby, von Bertalanffy, Checkland, Churchman, and Luhmann [[30](#) , [34](#) , [38](#) , [54](#) , [64](#) , [69](#)].
- *Applied systems thinking* , which focuses on how systems concepts can be used in practice – to support learning, diagnosis, planning, or intervention in complex, real-world contexts. It includes methods such as causal loop diagrams, soft systems methodology, and critical systems heuristics. This strand is often referred to as *practical*, *methodological* , or *thinking with systems* , drawing on the work of Checkland, Ison, Meadows, Midgley, and Hoverstadt [[8](#) , [33](#) , [62](#) , [64](#) , [70](#)].

This book follows the applied strand of systems thinking. It builds on the work of practitioners such as Forrester, Meadows, Midgley, Senge, and Sterman [[8](#) , [33](#) , [52](#) , [59](#) , [71](#)], who, among other things, developed approaches to support decision-making, facilitation, and systems-based inquiry.

At the same time, insights from the theoretical strand help us understand the assumptions behind these tools. Thinkers like Maturana and Varela (autopoiesis), Prigogine (self-organization), and Haken (synergetics) have shaped how we conceptualize systems in fields such as biology, sociology, and complexity science. While their contributions are foundational, they are not always directly aimed at application or intervention [[42](#) , [67](#) , [72](#)].

By making this distinction clear, the book supports readers move between theory and practice – using systems ideas not only to act in the world but also to reflect on how systems are seen, framed, and understood. It encourages practitioners to remain aware of how their own framing shapes what they notice, prioritize, and do in complex situations.

9 Core Concepts of Systems Thinking

Having clarified the historical and theoretical foundations, we now turn to the practical building blocks of systems thinking – concepts that help us understand, engage with, and influence systems in applied settings.

Systems thinking offers a way to look beyond events and linear cause-and-effect. Instead, it focuses on the patterns, structures, and mental models that shape system behaviour over time [[71](#)].

There are many ways to approach systems thinking, and different disciplines may emphasize different approaches or ideas. The concepts discussed here are among the most widely used across fields and offer a common foundation for applied work. They're not the only valid approach, but they provide a strong starting point for practice.

Concepts such as interconnectedness, feedback loops, stocks and flows, delays, nonlinearity, emergence, boundaries, perspectives, and leverage points give us practical tools for mapping systems, identifying points of intervention, and reflecting on how our framing shapes what we notice and act on. These ideas help shift the focus from isolated problems to the relationships and interdependencies that shape real-world outcomes [[33](#)].

With a foundational understanding of systems as mental constructs, we can now explore these core concepts in more detail. Feedback loops show how systems self-regulate or reinforce change. Stocks and flows represent how things build up or move over time. Delays and nonlinearity highlight how timing and scale matter. Emergence describes patterns that arise from interaction. Leverage points help identify where small changes might make the biggest difference. And boundaries and perspectives remind us that how we see the system shapes how we engage with it.

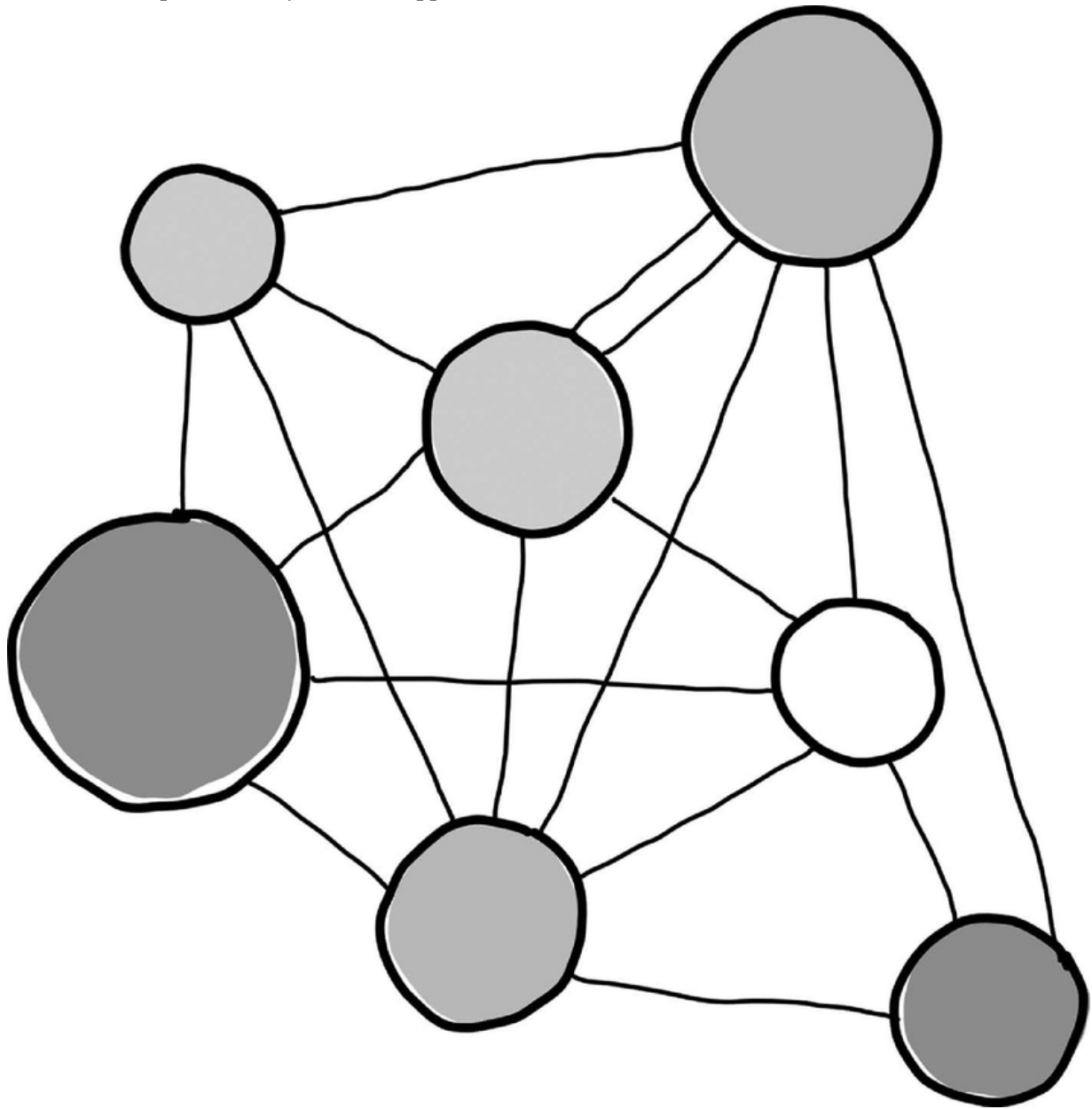
Now, we look at the core concepts in detail:

Interconnectedness

Interconnectedness describes how all parts of a system are linked, often in ways that are not immediately visible. No part functions in isolation. The behaviour of any individual element depends on its relationships with other elements [[33](#)]. This network of connections gives rise to the system's overall behaviour.

In practical terms, this means that a change in one area can lead to effects elsewhere – sometimes expected, sometimes not. For instance, in urban planning, investing in bike lanes might reduce car traffic, which then lowers air pollution, improves public health, and even affects housing demand along those routes. These chain reactions often cross traditional boundaries between sectors or domains.

Failing to consider interconnectedness can lead to short-term fixes that create long-term problems elsewhere. Systems thinking helps us zoom out, identify those connections, and understand how actions in one part of the system can ripple across others.



The following examples show how changes in one part of a system can trigger effects elsewhere.

Examples

- *Building more* bike lanes may reduce car use, which lowers pollution, improves public health, and increases housing demand near bike-friendly areas.
- *In agriculture* , using chemical fertilizers might boost crop yields short-term but over time can degrade soil, reduce biodiversity, and contaminate water sources.
- *Cutting school budgets* could save money now but might later lead to higher dropout rates, reduced job readiness, and long-term economic costs.

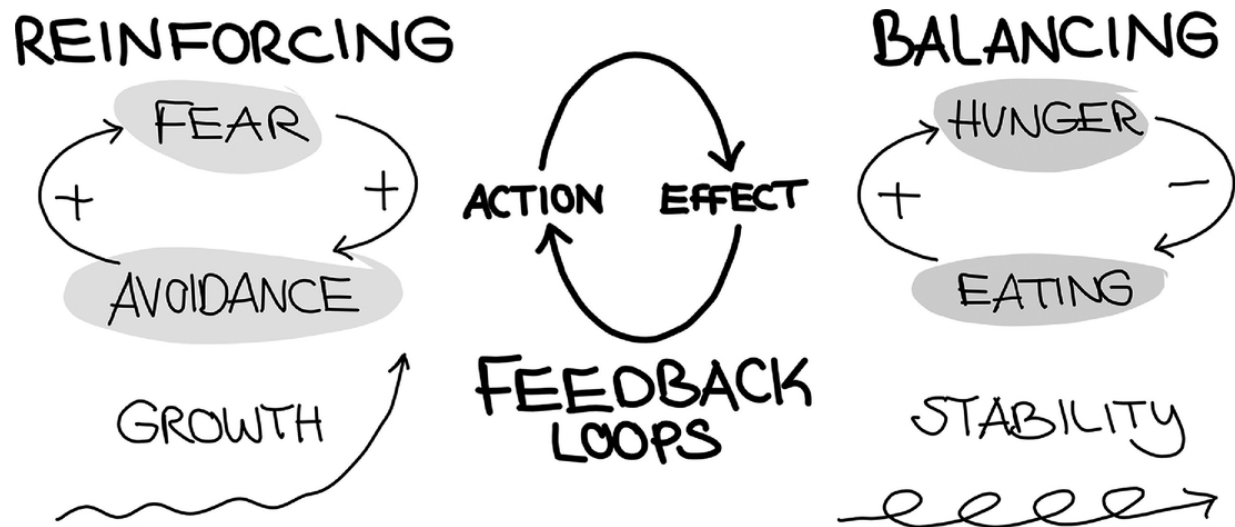
Feedback Loops

Feedback loops describe how parts of a system influence each other through circular cause-and-effect relationships. These loops can either reinforce change or balance it out over time. Understanding them helps explain why systems grow, adapt, stabilize, or spiral out of control [[33](#) , [71](#)].

There are two main types:

- *Reinforcing loops* (also called positive feedback) amplify change. Each action pushes the system further in the same direction. These loops are behind patterns like exponential growth or collapse.
- *Balancing loops* (negative feedback) work in the opposite way: they push back against change to help maintain stability or reach a goal. They're responsible for regulation and self-correction in systems.

Not all feedback is obvious or controllable. Some loops are easy to model (like thermostats), as in control systems, while others (like team motivation) involve delays, uncertainty, or effects we only see over time. In social and complex systems, feedback may not follow strict or fully predictable patterns. This can lead to delays, hidden effects, or unintended consequences, especially when multiple loops interact.



The following examples illustrate how reinforcing and balancing loops affect system behaviour over time.

Examples

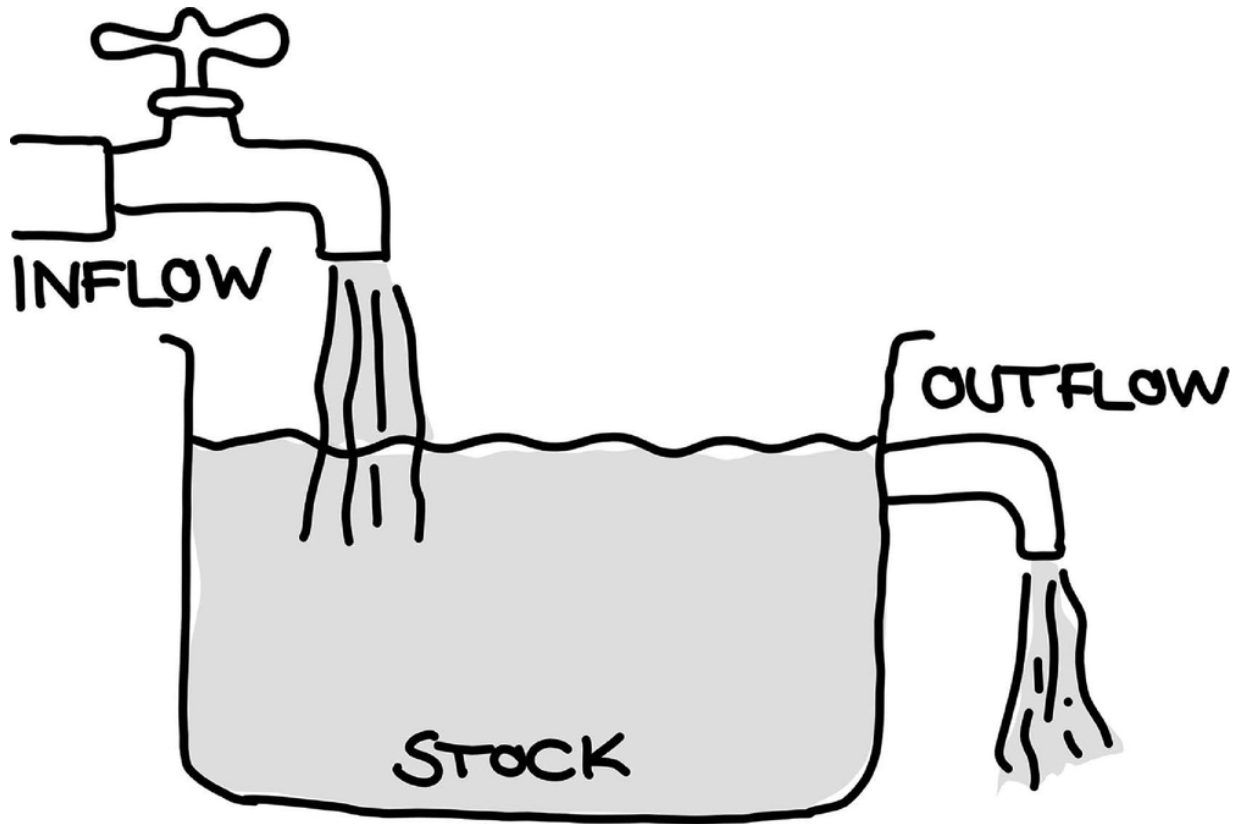
- *Population growth* is driven by a reinforcing loop: more people lead to more births, which increases the population, which then leads to even more births.
 - *A thermostat* is part of a balancing loop: when the room temperature drops below the set point, the heating turns on; once the target temperature is reached, it turns off again. This keeps the system stable.
 - *Team motivation* can be shaped by a reinforcing loop: reaching goals boosts morale, which increases motivation, making further success more likely.
-

Stocks and Flows

Stocks and flows help us understand how parts of a system grow or shrink over time – and how those parts interact [[71](#)].

- A *stock* is something that accumulates or depletes. It represents a quantity at a specific moment and tends to change gradually.
- A *flow* is what changes the stock – either adding to it (*inflow*) or reducing it (*outflow*) [[33](#)]. These two elements shape system behaviour over time.

By observing how stocks and flows behave, we can identify what drives change in a system and where interventions might be most effective. These relationships are often visualized in stock-and-flow diagrams, where stocks are shown as boxes and flows as arrows to reveal the system's structure.



The following examples show how resources build up, drain, or shift within a system.

Examples

- *Water in a reservoir* is a stock: rain and river inflow increase it; evaporation or usage decreases it.
 - *Money in a bank account* is a stock: deposits add to it; withdrawals reduce it.
 - *The number of people* in a city is a stock: births and migration increase it; deaths and emigration reduce it.
 - *Traffic congestion* is a stock of cars on the road: cars entering add to congestion; cars exiting reduce it.
-

Delays

Delays refer to the time gaps between an action and its visible effect in a system. These delays are common in both physical and social systems, and they often lead to confusion, misinterpretation, or overreactions [[71](#)].

When delays are not recognized, people may assume their actions have no effect or the “wrong” effect. This can lead to policies being reversed too soon or to actions that overshoot the goal. In

systems with strong feedback loops, delays can even cause instability or oscillations, where responses come too late and overcorrect.

Understanding delays helps us make more thoughtful decisions. It encourages patience when needed and helps avoid reacting to short-term symptoms rather than long-term trends. Recognizing delays also supports to explain why systems don't always respond immediately or predictably to interventions.



The following examples highlight how delayed responses can affect how we interpret and respond to change.

Examples

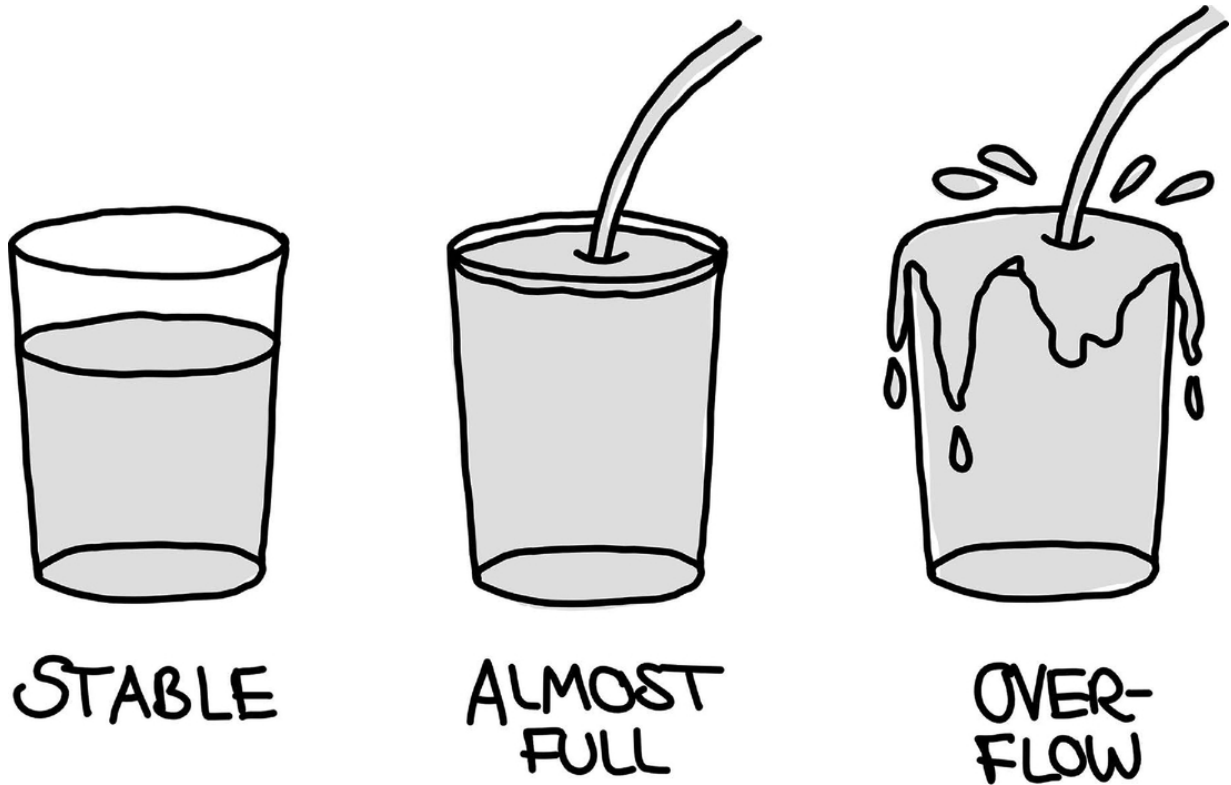
- *A government* increases healthcare funding, but improvements in health outcomes may take years to appear. Reversing the policy too soon could undo long-term gains.
- *Greenhouse gas emissions* released today may not cause visible climate effects for decades, making it difficult to generate urgency in the present.
- *A company* responds to falling sales with aggressive marketing, but due to delayed customer response, it overcompensates and floods the market.
- *In supply chains*, production adjustments take time to impact inventory, often leading to cycles of over- and understocking.

Nonlinearity

Nonlinearity means that cause and effect in systems are not always proportional. A small change might have no visible effect, or it might push the system into a new state with very different behaviour. The outcome depends on timing, context, and how close the system is to a threshold or tipping point [[33](#)].

This makes systems more difficult to predict and manage. Nonlinearity challenges the assumption that a certain level of input will always produce a matching level of output. It shows that context, thresholds, and feedback matter just as much as the action itself. In practice, this means that even well-intentioned interventions can have minimal effect or trigger major, unintended shifts.

Understanding nonlinearity helps decision-makers avoid oversimplified thinking and consider how systems might respond in unexpected ways as conditions change.



The following examples show how outcomes don't always scale with inputs; small actions may have big or no effects.

Examples

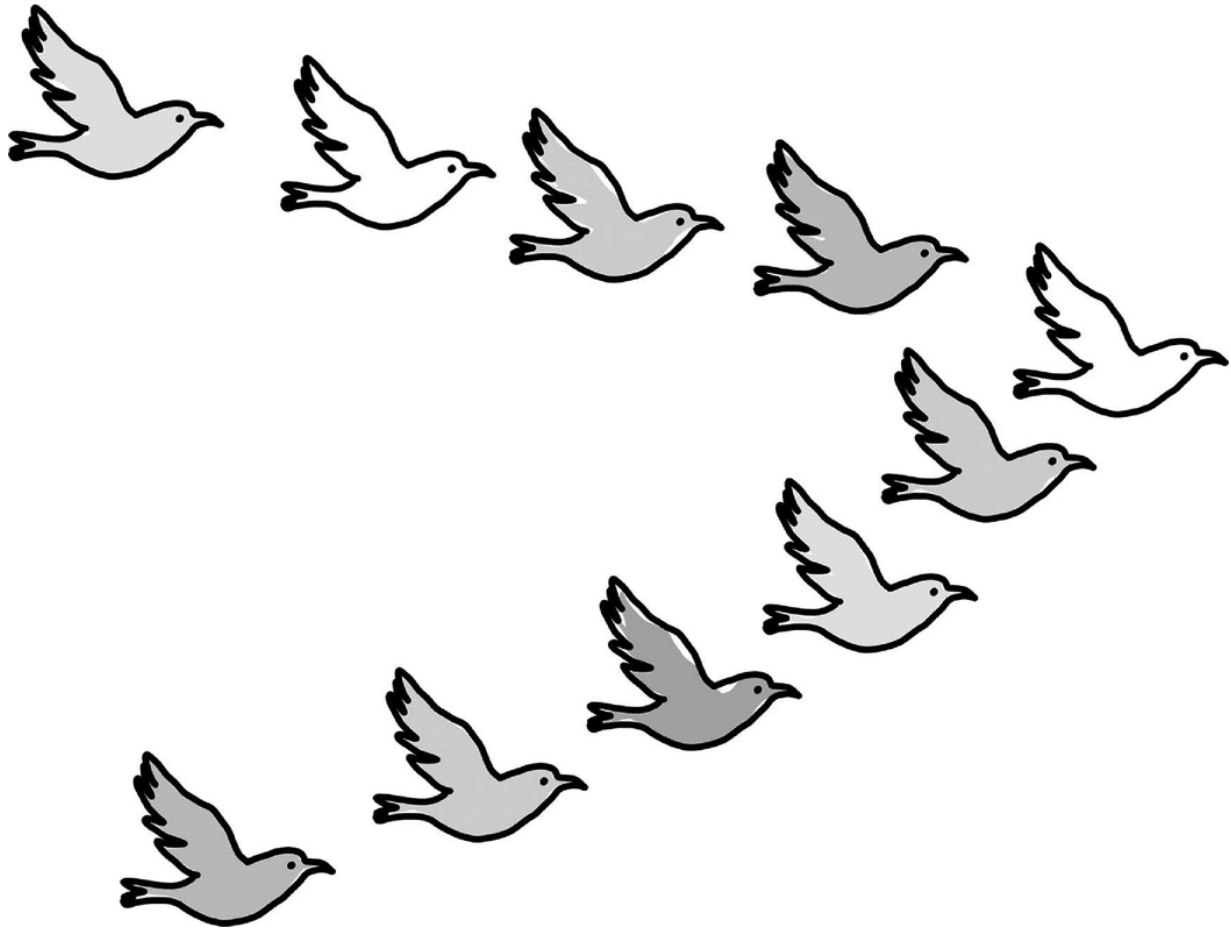
- A small *increase in pollution* may have no visible effect – until it crosses a threshold that causes rapid species collapse in an ecosystem.
 - *Reducing wait times* in a customer service setting might have little impact – unless the system is already under strain, in which case even a small improvement could shift public perception dramatically.
 - A minor *policy adjustment* might go unnoticed in a stable economy, but in a fragile one, it could trigger significant market volatility.
 - *In education*, small class size reductions may have limited effects – until they reach a point where teacher-student interaction quality shifts significantly.
-

Emergence

Emergence describes how patterns, behaviours, or properties arise from the interaction of simpler elements – without any single part containing or controlling the whole outcome [32]. This means that a system can display qualities that none of its parts have in isolation.

Emergence is often hard to spot because it can look like there's a central cause, even when there isn't. The system's behaviour "emerges" from how parts relate to each other. Studying components individually can miss what only becomes visible when everything interacts as a whole.

This concept is widely used in fields like biology, sociology, and artificial intelligence. In systems thinking, emergence explains why interventions at the component level don't always work and why system-wide behaviours can seem unpredictable. It reminds us to focus on structure, interaction, and context, not just individual parts.



The following examples illustrate how simple interactions can lead to surprising system-level patterns.

Examples

- *Consciousness* is not found in a single neuron but emerges from the interactions of billions of them.
 - *Market trends* are not caused by one decision-maker but by the combined behaviour of many individuals responding to shared signals.
 - *Traffic patterns* don't come from one driver but emerge from the timing, spacing, and flow of many vehicles interacting at once.
 - *A bird flock* moves as a coordinated group, but no single bird is in charge. The collective behaviour comes from local rules followed by each bird.
-

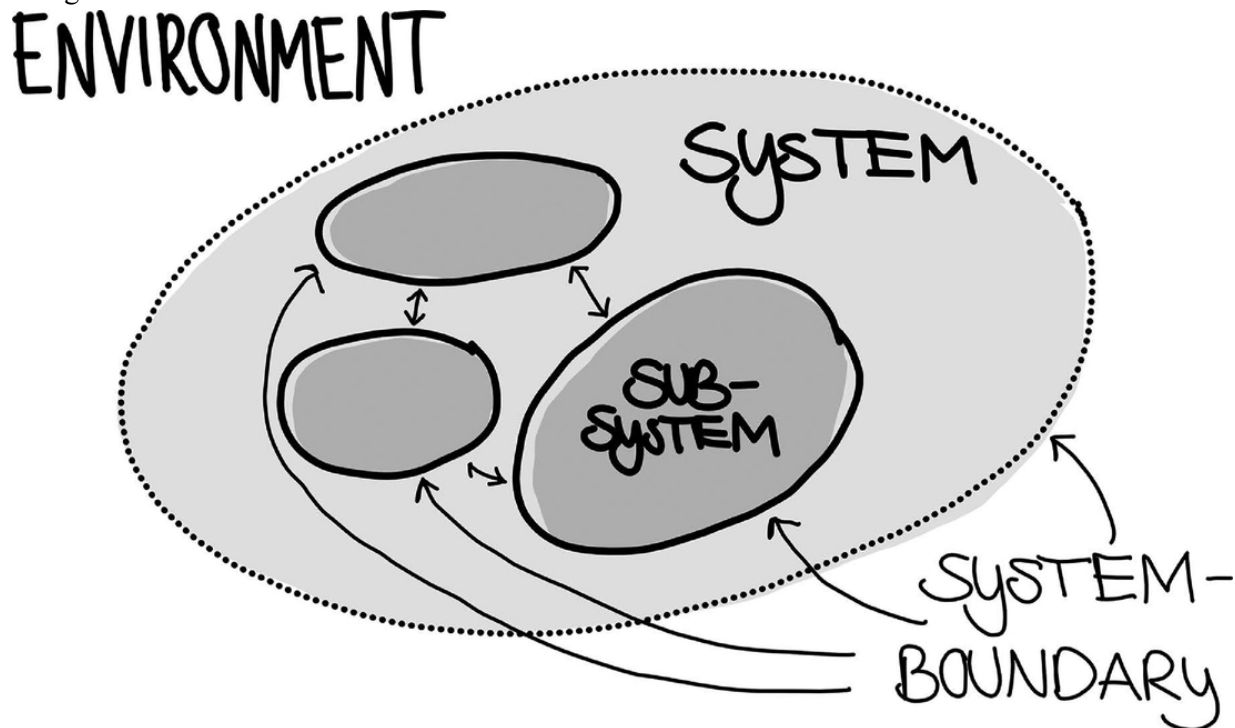
Boundaries

Boundaries define what is included and excluded when we analyse a system. They are not fixed but shaped by the perspective of the person or group doing the analysis [8]. Different stakeholders may see the same system in very different ways, depending on their values, interests, roles, and experiences.

At the same time, boundaries are also shaped by practical limits, by what we can observe, measure, or model. In complex systems, we often simplify by drawing boundaries that make the system easier to study or manage. But these choices also come with trade-offs.

Because of this, boundaries are not just technical, they are also political. Whoever defines the system's boundaries also defines what counts as relevant, what gets attention, and what is left out. These choices influence how problems are framed and which solutions are seen as legitimate.

In systems thinking, questioning and adjusting boundaries is a key part of making sure different viewpoints are considered. It helps reveal blind spots and opens up space for more inclusive, thoughtful interventions.



The following examples show how defining what's inside or outside a system affects how we understand and work with it.

Examples

- *A city's transport system* may be seen by a commuter as roads and transit routes, by an ecologist as a source of emissions, and by a policymaker as an infrastructure investment.

- *A school system* might be viewed by teachers as a learning environment, by parents as a support structure, and by budget officials as a cost centre.
- *In healthcare* , a hospital administrator might focus on operations, while a patient cares more about trust, access, and well-being – each framing defines different boundaries.

Perspectives

Perspectives describe the different ways people understand and define a system. What one person sees as a problem, another might see as a solution, or does not see as a problem at all. These differences depend on people's roles, values, experiences, and positions within or around the system [[8](#)].

In systems thinking, perspectives are not just opinions, they also shape how systems are mapped, which elements are considered important, and what outcomes are pursued. Overlooking them risks creating narrow, incomplete, or biased understandings of the system.

These views are not fixed, people may revise their understanding through dialogue, learning, or exposure to new evidence.

Recognizing these different views doesn't make things easier, but it does make our understanding of systems more honest, inclusive, and useful.



The following examples highlight how different viewpoints can shape how a system is described or understood.

Examples

-
- A patient sees the healthcare system as a lifeline. A nurse sees it as a place of work. A government administrator might see it mainly in terms of cost and efficiency.
 - A river might be viewed as a sacred site by Indigenous communities, a resource by farmers, or a hazard by flood managers.
 - A school system can be seen as a place for learning by students, a job environment by teachers, and a policy tool by education departments.
-

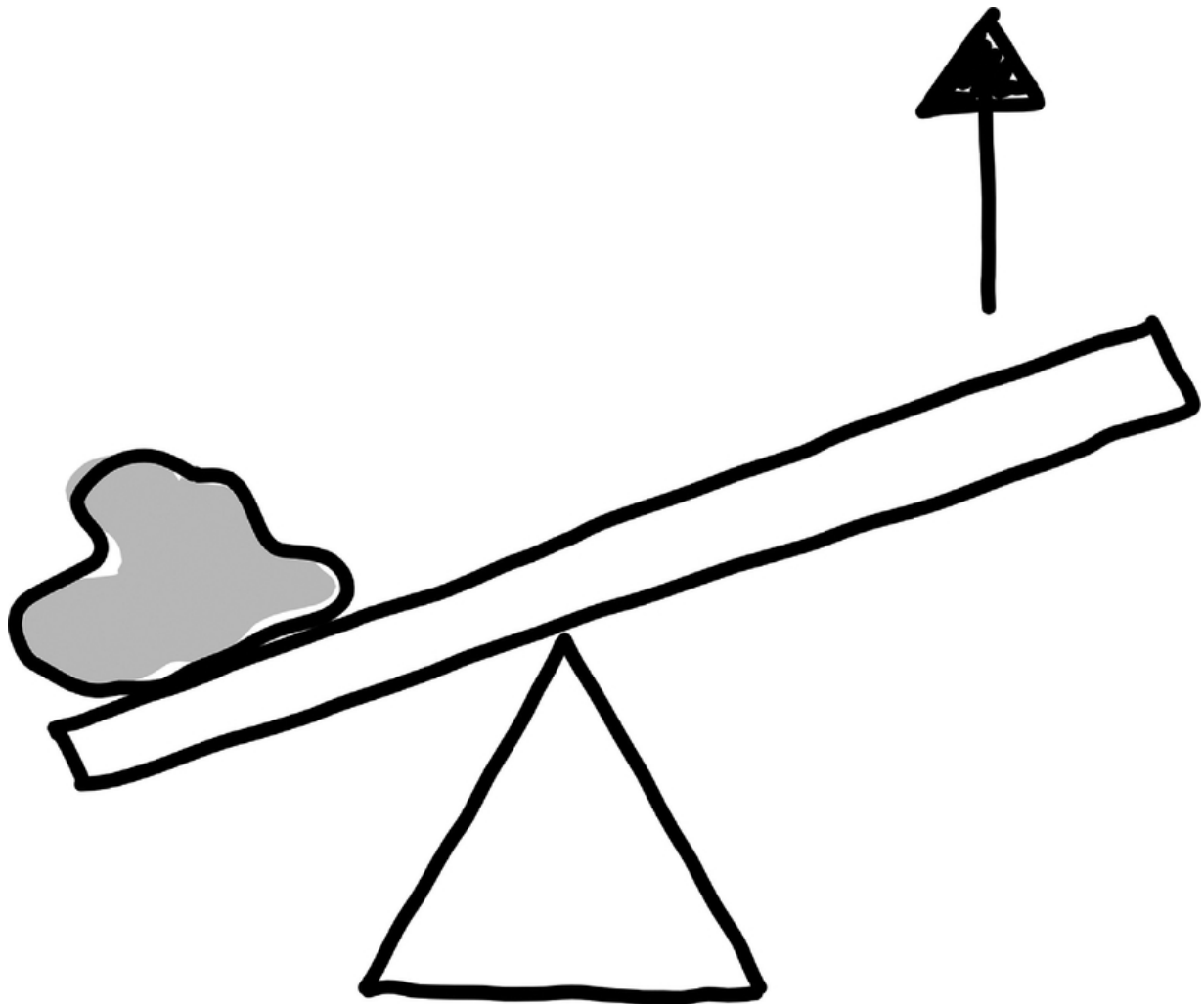
Leverage Points

Leverage points are places in a system where a small shift can lead to big, lasting change [[73](#)]. These points matter because they show us where to act if we want the most impact with the least effort, like a well-placed push on a seesaw on a children's playground.

Donella Meadows, a key voice in systems thinking, described different kinds of leverage points – some easier to change, others more powerful. For example, changing numbers (like tax rates) is a shallow leverage point. Changing how people think or what goals the system serves is much deeper – and often harder – but it can transform the whole system.

While the term “points” is widely used, it can be misleading. These aren't fixed spots in a machine. Often, they are patterns of interaction, relationships, or flows within the system – ongoing structures that shape behaviour over time.

Understanding these deeper patterns helps us move beyond surface fixes and focus on changes that truly last. It also helps avoid wasting time on adjustments that won't matter in the long run.



The following examples show how targeted changes in the right place can shift the behaviour of an entire system.

Examples

- Improving how *information flows in an organization* (e.g., clearer internal communication) can boost trust, reduce delays, and raise morale.
- *In a transport system*, changing road rules might help, but changing how people *think* about car use (e.g., encouraging bikes or public transit) can shift the entire system.
- *In education*, changing test formats might tweak outcomes. But shifting the purpose of schooling – from performance to learning – can reshape the system completely.

The principles earlier reflect core concepts commonly discussed in systems thinking literature. Different authors and schools of thought may emphasize additional principles or frame them

differently, depending on their perspective, discipline, or purpose. Still, these concepts offer widely used tools to see patterns, uncover causes, and better understand how systems behave not just in theory but also in real-world systems. Together, these concepts shift our attention away from quick fixes and isolated symptoms toward deeper structures, relationships, and dynamics.

Systems thinking is especially valuable when working with uncertainty, change, and interdependence – as found in public health, education, urban planning, environmental policy, and organizational life. It equips us to see more clearly, act more thoughtfully, and stay aware of how our own framing shapes what we notice and how we intervene.

In the end, systems thinking doesn't promise control or simple answers. Instead, it offers better questions, deeper insight, and more realistic ways to engage with the world we live in.

Think in Systems

DOI: [10.4324/9781003658610-5](https://doi.org/10.4324/9781003658610-5)

Thinking in systems starts with attention – what you notice, what you ignore, what you assume, and how you decide what something is “really” about.

In systems work, the way we frame things often *is* the work. A person who sees only parts will act on the parts. Someone who sees relationships and feedback will act very differently. This chapter is about that difference.

We’re not looking for the “right” mindset as a fixed thing. It is a way of noticing – a set of thinking habits, such as the following:

- Paying attention to what’s included and what’s excluded
- Asking what parts make up a system – and how those parts relate
- Watching for patterns, not just events
- Remembering that every view is just that – a view, from somewhere

These are subtle shifts in how people make meaning. Some of these habits have been formalized into structured models. For example, Cabrera and Cabrera [[53](#)] describe four basic habits: making distinctions, recognizing part-whole systems, identifying relationships, and taking perspectives. They call it the [DSRP Framework](#), which is also presented later in this book (cf. [Part 3](#)). This framework is a structured method for thinking that helps build the habit of pausing, slowing your immediate reaction, and looking one level deeper.

When someone says, “This process is broken,” pause:

What’s the process? Where does it begin? What’s assumed to be inside it? Who’s left out?

When someone says, “We need to fix this,” ask:

Is it a one-time event or part of a longer pattern? What’s reinforcing it? Who benefits from how it works now?

Systems thinkers do not have magic answers. They simply ask better questions – earlier. The rest of this chapter explores these habits: how they work, why they matter, and how they shape what happens next.

7 Core Habits for Systems Thinkers

Systems thinking is not limited to diagrams or terminology. It represents a shift in how we perceive and interpret the world around us. The habits discussed here are not sequential steps but cognitive

practices – ways of directing attention to aspects that often remain hidden: feedback loops, time delays, interconnections, mental models, and one's own role in shaping the systems being observed.

They are shared mental practices drawn from over six decades of systems research and application across disciplines. They synthesize recurring insights found in core systems traditions, including the following:

- System dynamics, pioneered by Jay Forrester [[59](#)] and developed by John Sterman [[71](#)];
- Organizational learning, through Peter Senge's five disciplines [[52](#)];
- Cybernetics, introduced by Norbert Wiener [[57](#)] and extended by von Foerster [[36](#)];
- Soft systems methodology, from Peter Checkland [[32](#)]
- Critical systems thinking, advanced by Churchman [[69](#)], Ulrich [[22](#)], and Midgley [[8](#)]; and
- And leverage-focused interventions, through Donella Meadows [[33](#) , [73](#)].

Different thinkers emphasize different habits – some include more, others fewer. The seven included here reflect patterns that appear across major sources. They serve as practical anchors for engaging with complex systems – supporting awareness of feedback, delays, interconnections, boundary choices, mental models, and one's role as both observer and actor.

Together, these habits form a usable foundation for systems thinking in action – not to replace existing methods but to sharpen the mindset behind them.

We now turn to the individual habits, starting with the following:

1. Look for Patterns, Not Just Events

When something happens – a missed deadline, a sudden breakdown, an unexpected success – our natural tendency is to focus on that isolated incident. Systems thinkers, however, train themselves to see beneath these surface events to the patterns generating them.

As Jay Forrester [[59](#)] demonstrated in his foundational work on system dynamics, what appears as a crisis or sudden change is often just one visible point on a longer trajectory. The isolated event isn't the story; the underlying structure producing it is what matters. These structures often involve reinforcing feedback loops, delayed effects, or accumulated pressure that eventually crosses a threshold.

In practice, this means asking:

- “Is this part of a recurring pattern we've seen before?”
- “What trends are forming over time that might explain this event?”
- “If we graphed this situation over months or years, what curve would we see?”

John Sterman [[71](#)] emphasized that graphing behaviour over time is essential for exposing system dynamics that remain invisible when we fixate on individual incidents. And as Peter Senge observed, “Seeing patterns of behaviour rather than events is the beginning of systems thinking” [[52](#)].

This shift – from reacting to individual events to recognizing underlying patterns – moves us from reactive firefighting to genuine systems insight. It’s the foundation for all other systems thinking habits.

2. Always Ask: What's the System?

Before attempting to solve a problem, systems thinkers first clarify: What system are we actually dealing with? Where does it begin and end? Who and what should be included in our analysis?

These boundary questions aren’t merely technical decisions; they’re profoundly consequential choices that determine what gets attention and what remains invisible. C. West Churchman [[69](#)] was among the first to highlight the ethical dimension of system boundary judgments, noting that how we define a system inherently privileges some perspectives while marginalizing others.

Werner Ulrich formalized this insight through his Critical Systems Heuristics [[22](#)], providing structured methods for questioning boundary assumptions. As he noted, “Every boundary judgment has ethical consequences.” Deciding what’s “in” vs. “out” of our system analysis directly shapes what solutions become possible.

When engaging with any system, ask:

- “What elements and relationships am I including in this system?”
- “What important factors might I be overlooking or excluding?”
- “Who benefits from defining the system boundaries this way?”
- “Whose perspectives or needs are being marginalized by this framing?”

Building on Ulrich’s work, Gerald Midgley [[8](#)] incorporated boundary critique as a reflexive practice – a way to systematically question how we’re defining problems and who gets to participate in finding solutions. This critical awareness of boundary judgments helps prevent the common mistake of solving the wrong problem precisely.

3. Zoom In, Zoom Out

Systems reveal different patterns depending on our level of focus. What appears as individual miscommunication at a close-up level might reveal itself as systemic understaffing or structural pressure when viewed from a broader perspective.

Systems thinkers cultivate the ability to shift their vantage point deliberately – moving between detailed examination and bird’s-eye view to gain richer understanding. This capacity to change scale perspective connects to Holling’s panarchy theory [[74](#)], which demonstrates how systems operate simultaneously at different spatial and temporal scales, with different dynamics emerging at each level.

This habit involves conscious perspective shifts:

- Zoom in: What specific interactions and behaviours are occurring in detail?

- Zoom out: What broader patterns become visible from a distance?
- Change time scales: How does this look over days vs. decades?

Peter Senge [[52](#)] emphasized this movement between the parts and the whole as essential for understanding underlying system behaviour. Similarly, Frank Geels [[75](#)] showed how innovation and transition processes can only be understood by examining interactions across micro (individual), meso (organizational), and macro (societal) layers.

When a situation seems confusing or intractable, try changing your zoom level; the problem might look entirely different from another scale.

4. Follow the Relationships

Traditional analysis breaks systems into their component parts. Systems thinking reverses this approach, recognizing that a system's behaviour emerges primarily from the relationships between elements, not from the elements themselves.

This perspective traces back to Norbert Wiener's [[57](#)] pioneering work in cybernetics, which placed feedback and communication at the centre of understanding complex systems. W. Ross Ashby [[34](#)] extended this by exploring how relationships create self-regulation and stability in natural systems. Gregory Bateson [[76](#)] further advanced this thinking, arguing that the basic unit of survival is not the individual but the relationship. His work laid the foundation for relational thinking in systems science.

For social systems, Niklas Luhmann [[54](#)] argued that communication itself forms the system. Social systems emerge through ongoing exchanges of information and meaning, rather than from individual people or fixed structures.

And Donella Meadows [[33](#)] noted, "The structure of a system is the pattern of interconnections between its components." Changing a single relationship – creating a new information channel, modifying a feedback loop, introducing a different decision rule – can transform system behaviour without changing any of the components themselves.

When analysing a system, focus your attention on:

- What's influencing what? Where do causal connections flow?
- Where is information flowing well or getting blocked?
- Are there reinforcing loops (where change accelerates) or balancing loops (where change is resisted)?
- What relationships seem missing that might make the system work better?

Fritjof Capra and Pier Luigi Luisi [[77](#)] reinforced this relational perspective from biological and cognitive science, showing how living systems exist fundamentally as relationship networks.

When you're trying to understand or change a system, don't look harder at isolated parts; look between them, at the connections.

5. Respect Delays

One of the most common mistakes in dealing with systems is expecting immediate results from our interventions. In reality, most systems have built-in delays – gaps in time between actions and their full effects, between decisions and their consequences, between problems and their visible symptoms.

Jay Forrester [[59](#)] demonstrated mathematically how even small delays in feedback loops can destabilize entire systems, leading to oscillations or unexpected outcomes. John Sterman's [[71](#)] experimental work showed that people consistently underestimate or misread delays, contributing to poor decision-making, especially in policy and organizational settings.

These time delays are particularly prominent in social, ecological, and economic systems:

- A company implements a new strategy, but results may take quarters or years to materialize
- A community adopts sustainability practices, yet environmental improvements lag behind
- A government changes policy, while effects ripple through society gradually

When working with systems, build delay-awareness by asking:

- “Where are there significant time gaps between cause and effect?”
- “How long might it reasonably take to see results from this intervention?”
- “What might happen if we act repeatedly before seeing the full effects of earlier actions?”

Meadows [[33](#)] noted, delays are one of the core system structures – and one of the most frequent sources of surprise – because they disconnect cause from effect over time.

Respecting these delays is essential for patience, appropriate timing, and avoiding the dangerous overcorrection that happens when we can't wait for feedback.

6. Notice Mental Models

Systems don't exist only in the physical world; they're also shaped by the cognitive frameworks we use to understand them. Mental models are the deep, often unconscious assumptions, beliefs, and frames through which we interpret reality. They determine what problems we recognize, what solutions we consider viable, and what metrics we value.

Peter Senge [[52](#)] identified mental models as one of five disciplines essential for building learning organizations, arguing that unexamined assumptions frequently block systemic insight. Similarly, Donella Meadows [[73](#)] placed paradigms – shared belief systems – near the top of her hierarchy of leverage points, showing how changing underlying mindsets can transform entire systems more powerfully than adjusting parameters or rules.

As Chris Argyris and Donald Schön [[78](#)] discovered, people often operate from implicit “theories-in-use” that contradict their stated intentions, creating systems that undermine the very goals they claim to pursue.

To surface these hidden models, systems thinkers regularly ask:

- “What core assumptions are we making that might not be true?”
- “Whose worldview is shaping how this problem is defined?”
- “What alternative perspectives might lead to different solutions?”
- “What are we collectively taking for granted that could be questioned?”

Derek and Laura Cabrera [[53](#)] advanced this work by developing DSRP theory (Distinctions, Systems, Relationships, Perspectives) to make mental models more explicit and workable. Their approach demonstrates that becoming aware of our conceptual frameworks is not merely philosophical; it’s practical and essential for effective systems change.

7. Stay Aware of Your Role

As a systems thinker, you are never a neutral observer standing outside the systems you study or seek to change. You are inherently part of those systems; your questions, your presence, your framing, and your interventions actively shape what emerges.

This insight stands at the heart of second-order cybernetics, developed by Heinz von Foerster [[36](#)], who insisted that “the observer must be included in the description of the system.” Humberto Maturana and Francisco Varela [[67](#)] provided biological foundations for this view, demonstrating how cognition itself is fundamentally participatory and bound within systems.

Peter Checkland [[32](#)] embedded this principle in Soft Systems Methodology, where the practitioner explicitly acknowledges their role within the inquiry process. Similarly, Werner Ulrich [[22](#)] showed how the observer’s values, interests, and position must be made transparent to ensure ethical systems practice.

This reflexive awareness raises important questions:

- “How might my presence be influencing what I’m observing in this system?”
- “What biases and blind spots am I bringing to this situation?”
- “How do my own goals and needs shape what I see as ‘the problem’?”
- “What role am I playing in how this system is evolving?”

This isn’t mere philosophical reflection; it’s practical humility. Recognizing your participation in the systems you wish to understand or change helps avoid the trap of presumed objectivity, opening space for more authentic engagement with complexity.

These seven habits aren’t acquired overnight. They represent an ongoing practice of perception, reflection, and engagement. They help us to spot patterns where others see random events, notice connections where others see separate parts, and include ourselves in the system we’re working with.

By cultivating these habits, we develop what systems pioneer Donella Meadows called “systems wisdom” – not just technical skill with models and methods but a deeper capacity to work with rather

than against the nature of systems [[33](#)].

How Systems Thinkers Make Meaning

Systems thinkers don't start with a fixed plan. They start with a different way of making sense of what's in front of them. The habits from the last section aren't just theory; they shape how people interpret real-world situations.

Where others might see confusion, contradiction, or chaos, systems thinkers ask different kinds of questions. Not because they know more – but because they're trained to look for structure, patterns, and relationships.

We might say, “It's not about having the full picture. It's about seeing enough to act wisely.”

This reflects the core principle of bounded rationality [[38](#)] combined with systems pragmatism: you never see the whole system, but you act wisely by watching structure and patterns. Also aligns with Schön's idea of “reflection-in-action” [[79](#)] and Checkland's [Soft Systems Methodology](#) [[32](#)].

Next, we look at how systems thinkers make meaning in practice:

They look for structure before they look for solutions

If a problem keeps coming back, systems thinkers don't reach for a quick fix. They pause and ask:

What's reinforcing this? What's built into the structure that makes this outcome likely?

Structure could mean:

- Rules (formal or informal)
- Information flows
- Incentives
- Habits
- Feedback loops
- Delays

They ask: *What's creating this behaviour – not just today but consistently?*

This is straight from the system dynamics tradition – especially Forrester [[59](#)] and Sterman [[71](#)]. Meadows also emphasized structure as the source of system behaviour: rules, feedback loops, delays, etc. [[33](#)].

They Delay Reaction to Observe the System

Instead of rushing to solve a problem, systems thinkers often hold back – just long enough to see what the system is actually doing. They resist the urge to respond immediately because they know that systems don't always respond in linear ways.

This doesn't mean doing nothing. It means noticing more before acting – especially:

- Time delays

- Patterns that repeat
- Unintended consequences

Similar patterns appear in Sterman's work on "worse-before-better" behaviour and decision delays [[71](#)] and in Meadows' warning that acting too early can backfire [[33](#)].

They Reflect on How They're Framing the Situation

No one is neutral. Systems thinkers are aware that *they're part of the system too*. Their role, perspective, and assumptions all influence what they see – and what they don't.

They ask themselves:

- "What story am I telling about this system?"
- "What's assumed in how I've defined the problem?"
- "Who's not in the room, and how might they see this differently?"

This reflection is not abstract theory. It helps reduce blind spots and keeps actions grounded in the real situation, not personal bias.

The idea draws on Critical Systems Thinking [[8](#) , [22](#) , [69](#)], mental models and reflection [[52](#)], and [Soft Systems Methodology](#) [[32](#)], which sees system framing as shaped by the perspectives of those involved.

They Look for Places with Leverage

Systems thinkers know that not all actions have the same effect. Some changes matter more – not because they're louder or more expensive but because of where they happen in the system. A small shift in the right place can lead to a big change.

They look for those places – where a pattern can shift, not just a symptom patched. These are called *leverage points*.

Donella Meadows [[73](#)] named 12 such points, from the shallowest (like adjusting numbers or buffers) to the deepest (like changing the system's purpose or mindset).

Systems thinkers ask:

- "What's holding this pattern in place?"
- "Where's the point that shifts the system itself – not just the surface?"
- "Am I pushing hard – or pushing smart?"

Meadows' work on leverage points [[73](#)] is being discussed in other places of this book (cf. [Part 1 – Chapters 2 and 4](#)).

The core idea is: don't just do more; look for what matters most.

They Choose Action Based on System Behaviour

There's no one-size-fits-all method. Systems thinkers choose actions based on how the system behaves – not based on habit, pressure, or urgency alone.

- Sometimes that means disrupting a loop.
- Sometimes it means slowing down.
- Sometimes it means creating space for learning or reflection.

It's not about control; it's about alignment.

This connects to adaptive management, complexity-informed design, and feedback-aware interventions. The same idea runs through Meadows on acting based on system structure [[33](#)], Snowden's [Cynefin Framework](#) on choosing actions that fit the domain [[49](#)], and Schön's work on reflective action in evolving situations [[79](#)].

It's not about having more data. It's about paying attention differently. That shift is what makes systems thinking useful – not just as a concept but in practice.

We've looked at how systems thinkers pause, notice patterns, reflect on framing, search for structure, and choose actions that fit system behaviour. Now it's your turn to see how these habits show up in your own thinking.

Are you ready for a small experiment?

Self-Check: Are You a Systems Thinker?

Here's a simple checklist to self-check your current habits.

It's not a test, just a way to notice how you tend to think, observe, and respond. No pressure to tick every box. Just notice what feels familiar – and what might be new. Just use it to reflect. The point is to start noticing your own thinking in real time.

When I look at a situation ...

- I pause before jumping to solutions.
- I look for patterns, not just isolated events.
- I ask what's reinforcing or balancing the current behaviour.
- I pay attention to what's included and what's left out.
- I try to see how parts relate and influence each other.
- I consider who is affected, even if they're not visible.
- I shift between detail (zoom in) and big picture (zoom out).
- I notice my own assumptions and framing.
- I ask how my actions might shape the system.
- I act with awareness, even when things feel uncertain.

Pick one or two that you don't usually do; you are invited to try them out this week. Nothing big. Just something small – a conversation, a meeting, a stuck moment.

In the next chapter, we shift from seeing to navigating. You'll explore tools to help act in systems that are fast-changing, uncertain, or stuck.

Navigate in Systems

DOI: [10.4324/9781003658610-6](https://doi.org/10.4324/9781003658610-6)

Understanding systems is one thing. Navigating them is another.

Real-world systems are often messy. They shift as you act. Effects don't always show up where or when expected. Goals compete, feedback loops surprise, and progress can be slow or uneven.

Many of the ideas introduced earlier – delays, nonlinearity, multiple perspectives, emergence – aren't just academic concepts. They are the reason why working in real-world systems is often difficult.

Real-world systems can't be controlled like machines. They have to be worked with – relationally and adaptively [[80](#)].

This part of the book builds on the previous chapters. It focuses on how to *navigate real-world systems* , especially when they tend to get more complex. That means combining reflection and action, using both systemic awareness and systematic methods to make sense, choose strategies, and intervene wisely.

To do this, it helps to look at two different ways of thinking: *systemic* and *systematic* . Each one plays a different role when working in challenging situations.

Systemic and Systematic Thinking in Systems

When working with real-world systems, it's helpful to distinguish between two ways of thinking that are often confused: *systemic* and *systematic* . While the terms sound similar, they describe different mental orientations, and each plays a distinct role in practice.

- *Systemic thinking* looks at relationships rather than isolated parts. It seeks to understand how parts interact, how feedback and delays shape behaviour, and how change in one place can affect outcomes elsewhere. This perspective is relational and contextual. It emphasizes patterns, connections, and unintended consequences. Grounded in the traditions of systems science and systems thinking (e.g. [8, 32, 33, 52]), systemic thinking asks: *What is influencing what? What is shaping the system's behaviour? What's missing from the frame?*
- *Systematic thinking* is methodical. It is about following clear steps to solve a problem or implement a plan. Often used in engineering, policy design, or project management, systematic approaches rely on checklists, procedures, and repeatable sequences. They are valuable for clarity, efficiency, and accountability – especially when problems are well-defined and environments are relatively stable.

Rather than choosing one over the other, we often need both. *Systemic thinking* helps us understand the situation; *systematic thinking* helps us respond to it. The challenge is switching between the two – zooming out to see the full picture, then zooming in to act in a focused way.

But before we act, we still need to be clear on what we're acting on. That's where framing comes in – shaping how we see the situation, what we focus on, and how we define success.

Framing and Sensemaking in Systems

Before jumping into action, it's worth to pause and ask:

How Are We Framing the Situation?

While diagnosis helps us understand the kind of system we're dealing with, framing shapes how we move forward – what we focus on, who we involve, and how we define success.

A number of approaches have been developed across design, systems thinking, and organizational change that support this early sensemaking phase. They come from different traditions, but many have become particularly influential in practice, not because they offer step-by-step answers but because they help teams work with ambiguity, surface assumptions, and move forward with care. This section briefly introduces several of these approaches. Many are explored in more detail later in the book, with guidance on how they can be used in practice (cf. [Part 3](#)).

Some frameworks focus on identifying the type of context:

- The [Cynefin Framework](#) distinguishes between clear, complicated, complex, and chaotic environments – each requiring a different kind of response [[49](#)].
- The [Certainty-Agreement Matrix](#) maps the level of agreement and certainty in a situation, showing when linear plans break down and adaptive strategies are needed.
- Poli's distinction between complicated and complex systems adds a helpful layer: some situations can be solved through analysis; others must be navigated relationally [[80](#)].

These frameworks don't describe the system itself. They offer a theoretical approach for how to think about a situation. A system may show features from different categories at the same time. The frameworks support choosing which approaches might fit best to start with, depending on uncertainty, dynamics, and the questions being asked.

Other approaches focus more on how to explore and reframe problems:

- [Soft Systems Methodology](#) [[32](#)]: Helps structure conversations across different stakeholder views, without forcing a single problem definition.
- [DSRP](#) [[53](#)]: Offers a way to reflect on how meaning is constructed – by noticing distinctions, systems, relationships, and perspectives.
- [Critical Systems Heuristics](#) [[22](#)]: Surfaces boundary judgments – who is included, whose views count, and what values shape the problem definition.

- [Rich Pictures](#) [64]: A visual tool to map out different perspectives, relationships, and concerns early in the process.

Still others come from participatory and exploratory practice:

- Design Thinking [81]: Supports user-centred exploration through iterative prototyping and testing.
- Double Diamond [82]: Structures problem-solving into phases of divergence and convergence – exploring the problem before defining solutions.
- Design Journey [83]: Guides teams through reflective, participatory exploration to frame complex challenges.
- Theory U [84]: Helps teams sense emerging futures through dialogue, deep reflection, and co-creation.
- [Appreciative Inquiry](#) [85]: Uses strength-based inquiry to surface shared values, hopes, and possibilities for change.

Despite their differences – or shared roots – what unites these methods is a common rhythm. They help people pause, sense, and reflect before acting.

Most follow a similar structure:

- *Open up* – explore the landscape, listen widely, and suspend assumptions
- *Make sense* – identify patterns, reframe the challenge, and clarify the system
- *Align and act* – converge on insights, test directions, and reflect together

Used well, these approaches support more thoughtful and inclusive action. They don't simplify the complex nature of real-world systems, but they help us work with it more wisely.

In the next section, we connect this framing work to strategic thinking and leverage points – the tools that turn insight into action.

Preparing to Act in Systems

Once you've seen the system and framed the situation, the next question is this:

Where Do You Start?

We've learned, in systems, you rarely know the full answer up front. That's not a problem. Systems thinking isn't about finding certainty; it's about acting wisely while staying open to what the system reveals.

This means:

- Acting with the system, not against it
- Expecting unintended consequences

- Testing small changes before scaling
- Involving people who are affected
- Being ready to adapt as you learn

You don't need a master plan. You need a clear direction, a good place to begin, and the flexibility to adjust as the system responds.

Where action is most effectively is focus of our next section.

Diagnosing the Problem

Before action can be taken in systems, it is essential to pause and ask:

What Kind of Problem Are We Working on?

Karl Popper [[86](#)] used a metaphor to explain different types of systems and predictability. He described two types: *clocks* and *clouds* .

- A *clock problem* is structured and predictable; you can break it into parts and solve it.
- A *cloud problem* is messy and unpredictable; it shifts while you're trying to define it.

Why this matters: Different problems need different tools. If you treat a cloud like a clock, you'll over-analyse and get stuck. If you treat a clock like a cloud, you'll waste time exploring what's already clear.

Use the following criteria to help choose the right method for your situation:

- *Problem Type*: Is it from your perspective: simple, complicated, or complex? Is it structured and clear, or messy and uncertain?
- *Purpose*: What do you need to achieve – understanding, action, planning, learning?
- *People*: Who needs to be involved? How much input or participation is needed?
- *Resources*: How much time, skill, and capacity do you have?
- *Evidence*: Do you need stories and insights, numbers and data, or both?

Unfortunately, there is no perfect formula for addressing cloud problems. Different situations call for different approaches. Instead of searching for a single correct answer, systems thinkers stay open, observe carefully, try approaches that fit, and adjust as the situation develops.

Trying to apply a fixed recipe would narrow your thinking rather than broaden it. Use the problem characteristics as a guide: notice the type of problem, apply a fitting approach, see what it reveals – and adjust. That's systems thinking in practice.

Now, once the nature of the problem is clearer, the next question is where change might have the greatest effect within the system. This leads to the idea of leverage points – places where small shifts can produce larger system-wide impact.

Finding Leverage and Acting in Systems

Not all actions in a system are equal. Some changes adjust the surface. Others reshape how the system behaves. A few can shift the system's purpose entirely. So it's important to clarify:

Where to Intervene to Create Meaningful Change?

Donella Meadows [[73](#)] described 12 *leverage points* – places where a small change can produce big results. They range from basic tweaks to deep shifts in purpose and mindset. Knowing where you're intervening helps clarify what kind of change you're aiming for – and what kind of tools you'll need.

For clarity and ease of use, I organized the 12 leverage points into three levels – tweaks, structures, and mindsets – ranging from surface adjustments to deep transformation.

The hospital example introduced earlier ([Part 1 – Understand Systems](#)) is used throughout this section to illustrate each leverage point with practical examples and explanations.

Tweaks

These are the most visible and often easiest types of changes – adjusting parameters, increasing capacity, or speeding up response times. They affect how the system operates on the surface but usually don't shift underlying patterns. Their impact tends to be short-term unless supported by deeper change.

#	Leverage Point	Example
12	Parameters	Adjusting nurse-to-patient ratio
11	Buffers	Adding more intensive care beds
10	Stocks and flows	Redesigning hospital layout to improve flow
9	Delays	Reducing time for lab analysis

Explanations

- Point 12: Adjusting nurse-to-patient ratios can improve care quality and reduce stress, but effects depend on staffing models, funding, and overall system goals.
 - Point 11: Expanding critical care capacity provides resilience during surges, though long-term effectiveness depends on patient flow and demand patterns.
 - Point 10: Rethinking the physical layout to support smoother patient flow can reduce delays and improve coordination across units.
 - Point 9: Speeding up lab turnaround enables faster decisions, especially when supported by aligned processes and staffing.
-

Structures and Rules

These points shape the internal logic of the system – what it responds to, how it adapts, what flows where, and who makes decisions. Intervening here means working with the feedback loops, rules, and flows of information that govern system behaviour. Changes at this level are harder to make but often more durable and far-reaching.

#	<i>Leverage Point</i>	<i>Example</i>
8	Balancing feedback loops	Use infection control to prevent outbreaks
7	Reinforcing feedback loops	Patient reviews attracting more patients
6	Information flows	Sharing real-time bed availability with staff
5	Rules	Changing how patients are admitted

Explanations

- Point 8: Disinfection routines act as balancing feedback – limiting the spread of infection and helping the system maintain safe, stable conditions.
- Point 7: When positive patient experiences are shared publicly, they can draw in more patients, reinforcing system growth and influencing demand patterns.
- Point 6: Giving staff access to live data on bed availability supports faster, better decisions, especially when that information is accurate, timely, and actionable.
- Point 5: Revising how patients are accepted for care (e.g., triage criteria) shifts who receives attention and when, affecting the system's internal priorities and flow.

Mindsets and Purpose

These are the deepest leverage points – the beliefs, values, and goals that define what the system is for. Changes at this level affect how the system sees itself and what it aims to do. While these shifts are the hardest to reach and often slow to unfold, they can lead to the most powerful and lasting transformations.

#	<i>Leverage Point</i>	<i>Example</i>
4	Self-organization	Staff teams designing their own workflows
3	System goals	Focusing on patient well-being, not throughput

#	Leverage Point	Example
2	Mindsets or paradigms	Seeing patients as partners, not cases
1	Transcending paradigms	Combining medical care with community healing

Explanations

- Point 4: When staff teams co-design their workflows, the system becomes more adaptive and grounded in real-world needs, allowing for more responsive and resilient operations.
- Point 3: Shifting the hospital's goal from processing volume to improving patient well-being reorients decisions, success metrics, and care strategies across the system.
- Point 2: Viewing patients as partners in care challenges traditional hierarchies and enables more collaborative, trust-based approaches that influence outcomes and relationships.
- Point 1: Transcending a single medical model makes space for integrating broader definitions of health, such as including social, cultural, or spiritual dimensions alongside clinical care.

Often, change efforts stay near the surface – adjusting parameters, incentives, or capacity. These changes can help in the short term but usually don't shift the system's underlying patterns. More durable change often requires working at deeper levels: revising rules, changing goals, or challenging mindsets.

Similar ideas to Meadows' approach appear in Goldratt's [Theory of Constraints](#) [100] which targets the key bottleneck, Beer's [Viable System Model](#) [61] which identifies weak subsystems, Checkland's [Soft Systems Methodology](#) [32] which builds accommodation between different worldviews, and Churchman's critical systems thinking [69] which brings forward voices that are usually marginalized. But knowing where to intervene is only part of the work. The next challenge is how, which methods to use, who to involve, and what kind of change is possible.

Some Caution Is Needed

Meadows' list is an incredibly helpful set of points for identifying *where to intervene*. At the same time, it doesn't fully address the next challenge:

How to Intervene?

As real-world systems are often messy, adaptive, and unpredictable, a leverage point at one scale may not exist, or may backfire. In some cases, changing mindsets or goals directly may not be possible.

That's why it's often helpful to start with small experiments – testing changes, watching how the system responds, and adjusting based on what emerges. Involving diverse perspectives also helps since no one person sees the full picture.

To support this, the methods in this book are grouped into five categories – the *5M Structure*. It's not a fixed process but as a simple structure to help you choose what might be useful depending on your situation.

The 5Ms are: Motivate, Meet, Map, Make, Manage.

Each group includes approaches you can explore and apply, while staying aware of the system as a whole.

In the next chapter, we explore how to choose methods and approaches that fit your situation and support effective action.

Part 2

Select Methods for Systems Practice

DOI: [10.4324/9781003658610-7](https://doi.org/10.4324/9781003658610-7)

This part presents how the methods in this book are structured to support systems practice to explore situations, engage people, develop interventions, and learn from the outcomes. The methods support different stages of systems work, depending on the situation, the people involved, and the questions at hand.

First, we'll look at why these methods were selected, where they come from, and how they are organized. Then you'll find guidance for selecting which methods to apply depending on your situation.

Why This Set of Methods

Asking why a set of methods was chosen or not can start useful conversations about completeness and incompleteness. From a systems perspective, any view of a situation depends on the lens used to look at it. For some systems thinkers, approaches not included in this book may still appear relevant or feel more appropriate than others. Recognizing that no collection can ever be complete is part of the practice itself, keeping the work open to ongoing revision and growth.

Its purpose is to offer a practical set of approaches for systems thinking and decision-making. Some focus on understanding relationships and power dynamics. Others help visualize complex challenges, develop creative solutions, or anticipate long-term consequences.

Each method can be used alone or combined, depending on the specific challenges with and in the system. The goal is to give practitioners approaches they can apply both strategically and operationally.

Together, these methods provide a structured, interactive, and action-oriented way to work in systems – supporting readers make better decisions, foster new solutions, and create change that lasts.

Where These Methods Come From

The methods in this book aren't drawn from a single school of thought or framework. They come from a mix of sources: some grounded in academic research or widely used professional practice –

like [Causal Loop Diagrams](#) , [Appreciative Inquiry](#) , or the [Balanced Scorecard](#) – and others drawn from facilitation work, systems practice, and creative group processes.

Some communities, like the Systems and Complexity in Organisation (SCiO) [[87](#)], highlight methods commonly used in systemic practice through their competency framework. Similarly, Jackson’s System of Systems Methodologies (SSM) [[22](#)] groups a set of well-established systems approaches based on his view of different problem situations. Both provide guidance for method selection, but neither sets a strict boundary around what counts as a systemic method.

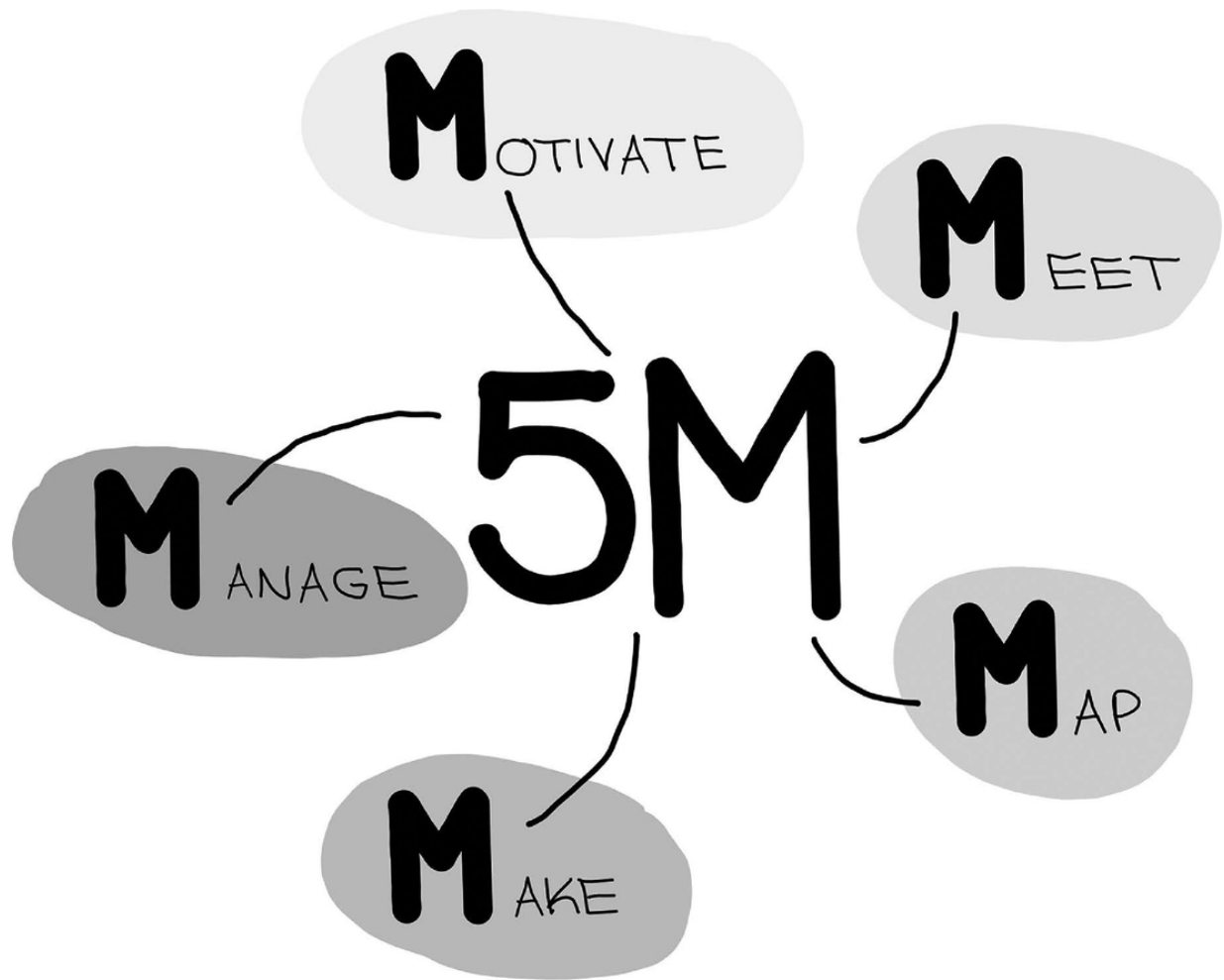
The methods in this book reflect a broad, practice-based view: Not all included methods are recognized in formal frameworks, but all may be used by systems thinkers to explore complexity, reflect, and act in real-world settings. This includes tools from facilitation, simulation, group dynamics, and related fields. Some are analytical or experiential. Others support learning, planning, or collaborative sensemaking.

None of these methods are presented as rigid solutions. They are not all “evidence-based” in a strict academic sense, but they are evidence-informed, which means tested by teams, communities, and organizations navigating challenging situations.

Use what fits. Adapt what helps. These aren’t rigid formulas, they’re approaches to spark thinking, sensing, making, and adjusting in systems that keep changing.

The 5M Structure

In this book, the methods are organized into five categories, the *5M Structure* , where the *Ms* stand for: *Motivate*, *Meet*, *Map*, *Make* , and *Manage*.



This structure offers a simple, practical way to organize, select, and apply methods depending on the situation. Each category supports a different type of work – from deciding whether to intervene, to engaging people, understanding systems, taking action, and adapting over time. It's a flexible way to organize methods and choose useful approaches depending on the situation. Each category includes a range of methods – from simple to advanced – covering different levels of cognitive effort and creativity. In real work, you may enter at any point or move back and forth between categories and approaches.

In organizations and other complex systems, isolated fixes rarely work. We need to recognize patterns, understand relationships, design smart responses, and track effects over time. That's why the methods are categorized this way – not just to analyse systems but also to engage with them and create change.

Let's take a quick walk through the 5Ms and how they support your work:

- Motivate: Why and What For?

Clarifies why intervention is needed and what purpose it serves. Helps teams assess motivation, urgency, and alignment with larger goals.

Example methods: [Deciding to Act](#) , [Guiding Star and Near Star](#) .

- Meet: Engage Stakeholders and Perspectives

Focuses on identifying key stakeholders, facilitating discussions, and surfacing different perspectives. Brings people together to build dialogue, collaboration, and shared understanding.

Example methods: [Stakeholder Mapping](#) , [World Café](#) , [Cluster Mapping](#) .

- Map: Understand the System

Supports teams in visualizing structures, dependencies, recurring patterns, and leverage points. Supports a deeper understanding of system dynamics and where interventions may have the greatest effect.

Example methods: [Causal Loop Diagrams](#) , [Rich Pictures](#) .

- Make: Take Action and Create Solutions

Supports improving processes, testing ideas, and developing solutions. Encourages teams to challenge existing structures, experiment with new approaches, and refine solutions iteratively.

Example methods: [Paper Airplane Factory](#) , [Process Hacking](#) , [Prototyping Sprints](#) .

- Manage: Evaluate and Adapt Over Time

Enables teams to track changes, measure progress, and respond to emerging patterns. Supports organizations monitor outcomes, evaluate effectiveness, and adjust as conditions evolve.

Example methods: [Balanced Scorecard](#) , [Scenario Stress Testing](#) .

Focus Areas of Methods

Each method also links to focus areas, which describe what the method is most effective at achieving. While *5M* organizes methods by type of work, focus areas are intended to support matching methods to goals.

The five focus areas are as follows:

- *Understand*: Visualize, map, and make sense of systems – their parts, connections, and structure – to find causes and relationships.
- *Collaborate*: Involve people, gather different views, create shared understanding, and align stakeholders toward common goals.
- *Strategize*: Plan solutions that address system complexity while considering long-term outcomes.
- *Innovate*: Support creative thinking and find unique solutions when usual approaches aren't enough.
- *Adapt*: Monitor, evaluate, and refine processes as conditions change and new information appears.

In *The 5M Methods Matrix* , focus areas are indicated by check marks.

With these focus areas defined, you can now select methods that fit your situation.

The 5M Methods Matrix

DOI: [10.4324/9781003658610-8](https://doi.org/10.4324/9781003658610-8)

The 5M Methods Matrix supports readers in matching appropriate methods to challenges. It provides a practical way to select methods based on where you are in your systems work, what you want to achieve, and who is involved.

The *5M Methods Matrix* is organized in the following categories: *Motivate*, *Map*, *Meet*, *Make*, and *Manage*.

You can use the following steps to select methods that fit your situation:

1. *Identify relevant “M”*: Consider which of the five areas are most relevant to your current challenge.
2. *Review the purpose*: Look at the specific purpose of each method to see which matches your goals.
3. *Consider the focus area*: Check which aspects (Understand, Collaborate, Strategize, Innovate, Adapt) each method supports.
4. *Select appropriate method*: Choose one or more methods that fit your situation and priorities.

With these steps in mind, we now turn to the matrix itself.

Motivate: Why and What For?

This section focuses on methods that help practitioners assess the need for systemic intervention and define strategic directions for meaningful change.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Deciding to Act	Assess the necessity and urgency of intervention	✓		✓		✓
Readiness Assessment	Evaluate system readiness for intervention	✓	✓	✓		✓
Guiding Star and Near Star	Define vision and milestones for intervention	✓	✓	✓		✓
Cynefin Framework	Categorize and understand system complexity	✓		✓		✓
Certainty-Agreement Matrix	Align decisions with levels of certainty and agreement	✓	✓	✓		✓
Power Mapping	Analyse power dynamics and influence in systems	✓	✓	✓		✓

Meet: Engage Stakeholders and Perspectives

This section emphasizes stakeholder involvement, collaboration, and capturing different perspectives to build shared understanding and alignment.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Silent Signal	Explore how messages change without words	✓	✓			✓
Invisible Connections	Experience interdependence through movement	✓	✓			✓
Collective Pulse	Demonstrate self-organization without leadership	✓	✓			✓
Speed Framing	Expose bias by quickly reframing problems	✓	✓	✓	✓	
Invisible Negotiation	Reveal how hidden goals influence group behaviour and decisions	✓	✓		✓	✓
Ladder of Inference	Reveal how unconscious thinking shapes beliefs and actions	✓	✓	✓	✓	
Fishbowl Discussion	Facilitate inclusive group dialogue		✓			✓
Reverse Fishbowl	Practice adapting discussions under disruption		✓			✓
Stakeholder Mapping	Identify and prioritize key stakeholders	✓	✓	✓		
Cluster Map	Explore and connect ideas around a topic	✓	✓			
CATWOE Analysis	Clarify system purpose from multiple angles	✓	✓	✓		
Boundary Critique (BC)	Define and challenge system boundaries	✓	✓	✓		
Appreciative Inquiry	Identify and build on system strengths	✓	✓	✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
World Café	Enable rotating conversations on shared topics		✓	✓		

Map: Understand and Visualize the System

This section focuses on methods that help practitioners explore, visualize, and map systems to gain deeper insights into their structures and dynamics.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Air Circles	Show how perspective shifts change interpretation	✓	✓			
Adaptive Pen Control	Visualize interdependence, adaption, and dynamics	✓	✓			✓
Group Juggle	Explore how systems grow more complex	✓	✓			✓
Triangles	Show interdependence within systems	✓				✓
Live Systems Mapping	Physically map evolving system relationships	✓	✓	✓		✓
Bathtub Game	Visualize system accumulation and delays	✓				✓
DSRP Framework	Thinking patterns to understand complexity and make better decisions	✓	✓	✓	✓	✓
Behaviour Over Time Graphs	Plot and analyse variable trends over time	✓		✓		
Paper Computer	Identify influence patterns and leverage in complex systems	✓	✓	✓	✓	✓
Refrigeration Game	Experience how delays and local decisions cause instability	✓	✓			✓
Fishbanks Ltd.	Experience how individual actions and delays lead to resource collapse	✓	✓	✓		✓
Sankey Diagrams	Show flows of resources across systems	✓		✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
System in Focus	Define the system, its boundaries, and external interactions	✓	✓	✓		✓
Rich Pictures	Capture complexity using visual storytelling	✓	✓			
Double Q-Diagram	Map hard and soft causes of problems to support balanced thinking	✓	✓	✓		✓
Impact Mapping	Align actions with strategic goals	✓	✓	✓		
Connected Circles	Reveal relationships between system variables	✓		✓		
Causal Loop Diagrams (CLD)	Identify feedback loops in systems	✓				
Systems Archetypes	Recognize patterns in system behaviour	✓		✓		✓
Leverage Point Mapping	Identify high-impact areas for systemic change	✓	✓	✓		✓
Scenario Planning	Plan for future uncertainties	✓	✓	✓		✓
World Game	Explore global challenges and interdependencies through cooperative, systems-based simulation	✓	✓	✓	✓	✓
Soft Systems Methodology (SSM)	Explore messy, contested situations by comparing perspectives and finding meaningful change	✓	✓	✓		✓

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Viable System Model (VSM)	Diagnose system structure and organizational viability	✓	✓	✓		✓

Make: Take Action and Create Solutions

This section covers methods that guide practitioners in moving from planning to execution, fostering innovation, and applying strategies to implement solutions effectively.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Human Knot	Build teamwork and collaboration		✓			✓
Paper Airplane Factory	Simulate and improve processes		✓		✓	✓
Forced Prioritization	Rank and cut options under pressure		✓	✓		✓
Resource Tree	Map needed resources to reach a goal, clarify dependencies, and spot constraints	✓	✓	✓	✓	✓
Kano Model	Prioritize features based on user satisfaction		✓	✓	✓	
Theory of Constraints (TOC)	Identify and manage system bottlenecks	✓	✓	✓		✓
Prototyping Sprints	Rapidly test and improve early-stage ideas		✓		✓	
Process Hacking	Redesign broken processes for better performance	✓		✓	✓	
Backcasting	Plan strategically from future goals	✓		✓		✓
Synectics	Solve problems using analogies		✓		✓	
Morphological Analysis	Generate creative solutions	✓		✓	✓	
Futures Wheel	Map and evaluate long-term impacts	✓		✓	✓	✓

Manage: Evaluate and Adapt Over Time

This section highlights methods for overseeing processes, tracking performance, and adapting strategies to ensure continuous improvement and resilience within systems.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Boom and Bust	Monitor and understand growth cycles	✓		✓		✓
Most Significant Change (MSC)	Capture significant outcomes and changes	✓	✓	✓	✓	✓
Outcomes Mapping	Track behavioural change and impact	✓	✓	✓		✓
Lag vs. Lead Indicator Tracking	Spot early signs vs. results	✓		✓	✓	✓
Balanced Scorecard	Measure and align strategic objectives			✓		✓
Iceberg Model	Reveal underlying system structures	✓				✓
Scenario Stress Testing	Test system response to shocks	✓	✓	✓	✓	✓
Fuzzy Cognitive Mapping (FCM)	Visualize and analyse causal relationships	✓				✓
Critical Systems Heuristics (CSH)	Evaluate system boundaries ethically	✓		✓		✓

Part 3

Apply 65+ Methods for Systems Practice

DOI: [10.4324/9781003658610-9](https://doi.org/10.4324/9781003658610-9)

In this part, 65+ methods are introduced that support systems thinking in practice. Each method is designed to help individuals and teams better understand systems challenges, act more effectively within dynamic environments, and reflect on what works – and why. The methods are grouped into five focus areas (Motivate, Meet, Map, Make, and Manage) and are intended to be practical, adaptable, and easy to apply across a wide range of contexts.

Integration with Systems Thinking Principles

Each method builds on several core concepts of systems thinking introduced earlier in the book – such as interconnection, feedback, delay, and perspective (cf. [Part 1](#)). They are grounded in real-world practice, not just theory. The methods offer ways to translate systems thinking into action: making invisible structures more visible, helping teams surface assumptions, exploring boundaries, and testing decisions before they are made.

These methods offer step-by-step approaches to guide thinking and action, but they are not rigid templates. Each one can and should be adjusted to fit the people, challenges, and context at hand. They are meant to support flexible, adaptive practice, not impose fixed routines. Think of them as scaffolds: they provide structure, but you choose how to build with them.

You can adapt them for quick sessions or extended projects, apply them individually or in combination, and use them across many settings: education, policy, organizations, communities, and more. They support both solo reflection and collaborative work.

By offering methods that can be applied to real design and decision-making challenges, this chapter supports more structured action and continuous learning.

What's in Each Method

Each method is presented in a consistent format:

- Purpose: What the method helps participants achieve.
- How It Works: The underlying process and logic.
- Applications: When and where the method is especially useful.

- Exercise: How to run the method in practice.
 - Participants/time/equipment/space
 - Setup
 - Instructional steps
- Tips for Facilitators: How to run the exercise effectively.
- Tips for Debriefing: How to reflect and guide learning after the exercise.
- Variations: Optional adaptations for different situations.

Together, these methods offer a flexible set of approaches for systems practice. Each method is described with clear steps and structure, based on principles that support effective learning and group work. But the steps are not fixed rules. As a facilitator, you can adjust, skip, or reorder parts depending on the situation. The goal is to support clear thinking, bring in diverse perspectives, and guide good decisions in complex situations.

Motivate

Why and What For?

DOI: [10.4324/9781003658610-10](https://doi.org/10.4324/9781003658610-10)

Intervening in a system is not just about fixing problems; it is about disrupting the structures that create and sustain them. Many interventions fail by addressing symptoms rather than deeper forces. Before acting, it is critical to understand both why intervention is necessary and what for – clarifying motivation and purpose.

“*Why*” and “*What for*” serve different but complementary purposes:

- “*Why*” questions look backward, helping to uncover the causes, motivations, and justifications for action. They help clarify the reasons to intervene and assess whether the timing and approach are appropriate.
- “*What for*” questions look forward, focusing on the purpose, function, and intended outcomes of your intervention. They ensure that your actions align with the broader goals of the system and address the right issues.

Some systems persist despite being harmful because they serve certain interests, are reinforced by policies, or are protected by cultural norms. Others remain unchanged because the risks of intervention seem greater than the risks of maintaining the status quo. Without understanding both the reasons for intervention and the purpose it serves, your actions may be misdirected or ineffective.

Use “why” and “what for” questions early in the intervention process – during problem diagnosis, strategy development, and stakeholder engagement – to build a shared understanding of both the justification and purpose of your actions. Encourage participants to reflect on these questions individually and collectively to ensure clarity and alignment.

The following questions support participants in justifying and defining a strategic intervention:

“*Why*” questions:

- Why is intervention necessary?
- Why does the system resist change?
- Why intervene now?
- Why are we the ones to intervene?
- Why this approach?

“*What for*” questions:

- What is this intervention for?
- What purpose does it serve?
- What function does it fulfil?
- What is the intended outcome?

By thoroughly exploring both “why” and “what for” questions and assessing system readiness before moving into action, participants ensure that interventions are justified, timely, well-targeted, and positioned for meaningful impact.

Deciding to Act

Boundaries | Perspectives | Leverage Points

Purpose

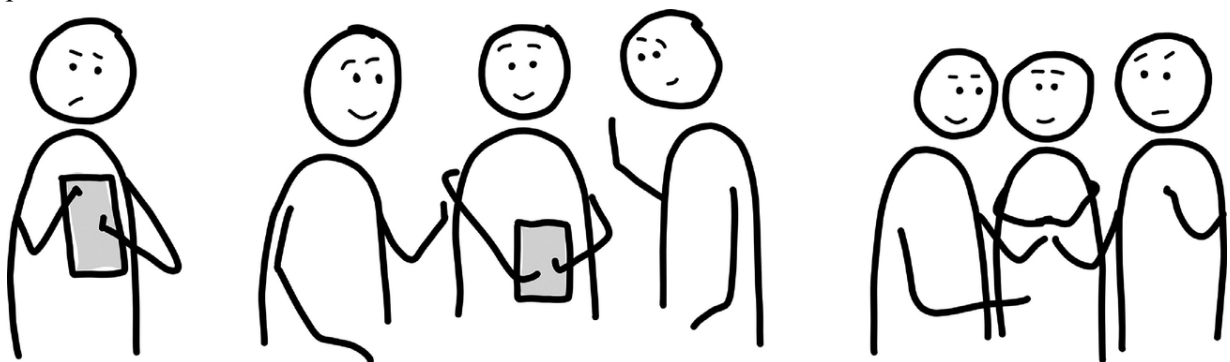
This exercise supports participants in critically assessing whether intervention is necessary and in clearly defining the real problem they seek to address. Instead of rushing into action, it encourages reflection on system resistance, urgency, risks of inaction, and possible impacts of change.

How It Works

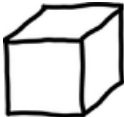
Participants work individually or in small groups to examine a system they are involved with or wish to influence. They reflect on whether intervention is needed, who benefits from the current system, and what would happen if no action is taken. They then define the core problem, focusing on what must change and who is most affected.

Applications

This exercise is useful for system change teams, policymakers, leaders, and project groups starting new initiatives. It is especially helpful when there is uncertainty about whether to act or when previous interventions have failed.



Exercise: “Deciding to Act”

Participants 	Time 	Equipment 
2–20	60–90 minutes	Paper, markers, sticky notes
Space  : An open room with space for participants move around comfortably.		

Setup

1. Participants work alone or in small groups.
2. Provide space for brainstorming and discussion.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that this exercise helps test whether intervention is justified and defines the real issue to address.
 - Emphasize that disciplined thinking early on strengthens later interventions.
2. Identify the system (15 minutes)
 - Ask participants to select a system they are involved in or wish to change.
 - This could be an industry practice, organizational structure, or a social norm.
 - If participants are unsure, a *system mapping* can help clarify the system.
3. Reflect on the need for intervention (15 minutes)
 - List possible causes, not just symptoms. Name factors you can influence.
 - Individually, participants answer:
 - i. Why intervene now?
 - ii. What happens if no action is taken?
 - iii. Who benefits from maintaining the current status quo?
4. Frame the core problem (15 minutes)
 - Encourage participants identify:
 - i. What is happening what should not happen?
 - ii. Who is most affected?
 - iii. What would success look like?
5. Small group sharing and refinement (10 minutes)
 - Small groups work together to create a combined “Why and What” statement linking the need for action and the core problem definition.

- **Example:** “*We believe intervention is necessary because [reason why now]. If nothing changes, [risk or harm will increase]. Currently, [describe the problem]. This affects [who is harmed]. Success would mean [what changes].*”

6. Debriefing (15 minutes)

- Ask participants to share their insights with the group.
- Facilitate a discussion on how clarity about motivation and problem framing strengthens system change efforts.

Tips for Facilitators

Encourage participants to critically reflect on both the need for intervention and the clarity of the problem. Remind them that it is better to delay action than to rush into a poorly defined challenge. Push them to ground their reflections in real-world systems rather than theoretical problems. Guide them to stay focused on current conditions and affected groups rather than jumping ahead to possible solutions. Help participants recognize that strategic timing and clear framing are essential foundations for effective interventions.

Tips for Debriefing

Create a space where participants can reflect on how their understanding of intervention and problem clarity evolved through the exercise. Use these questions to guide the discussion:

- What made deciding whether to intervene difficult or easy?
- How did framing the problem affect your thinking about possible actions?
- Were there disagreements about whether intervention was justified?
- What risks can arise from acting without a clear problem focus?
- How did connecting urgency and problem definition strengthen your plan for change?

Summarize key takeaways, focusing on how disciplined decision-making and clear framing create a stronger foundation for future interventions.

Variations

The “Deciding to Act” exercise can be adapted for different contexts, group sizes, or system challenges while maintaining its focus on strategic decision-making and clear framing.

- *Silent reflection:* Participants complete the full template individually before any group discussion to encourage deeper independent thinking.
- *Stakeholder perspective framing:* Groups create separate “Why and What” statements from the viewpoint of different key stakeholders to uncover hidden biases or conflicts.
- *Challenge and defend:* After drafting their statements, groups switch and critique another group’s work, questioning assumptions and sharpening clarity.

- *Timing scenario*: Participants explore how the urgency of intervention might change under different future conditions (e.g., political shifts, social movements).
- *Combined decision wall*: Groups post their final statements on a wall and vote on which ones show the clearest justification and most focused problem framing.

Readiness Assessment

Boundaries | Perspectives

Purpose

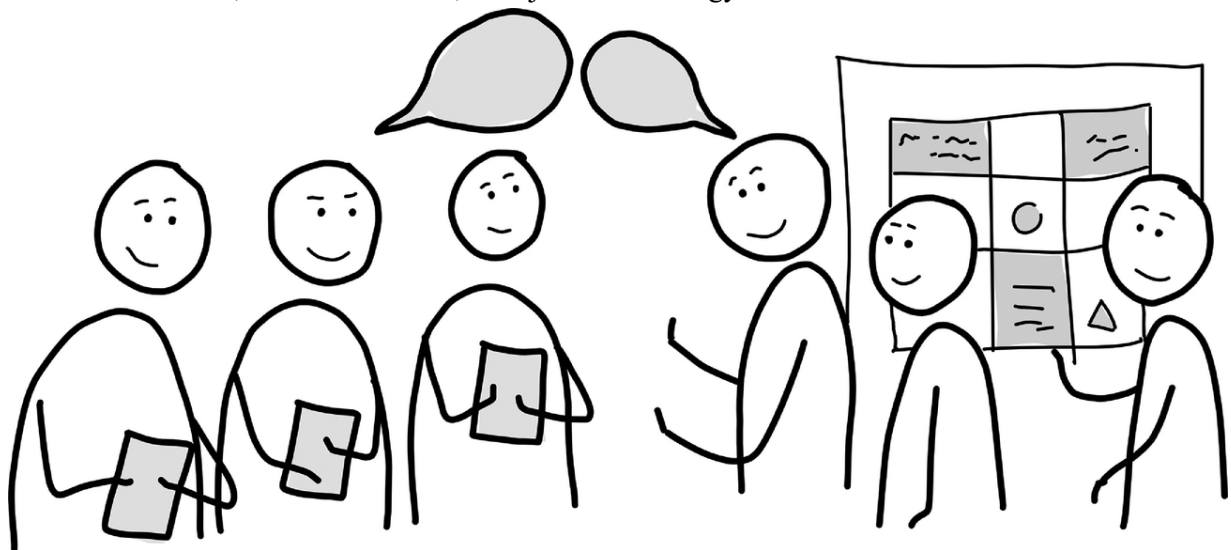
This exercise helps participants assess whether a system is ready for intervention by analysing key factors such as stakeholder support, structural barriers, and timing. Instead of pushing change without understanding potential resistance, this method ensures that interventions are well-timed and positioned for impact.

How It Works

Participants evaluate a system's readiness for change using a structured assessment framework. They analyse factors like urgency, stakeholder alignment, resources, and external conditions. By scoring these elements, they identify whether an intervention is likely to succeed, needs more preparation, or requires a shift in approach.

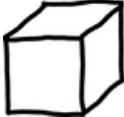
Applications

This exercise is valuable for change-makers, policymakers, and teams working on complex transformations. It helps organizations avoid premature or ineffective interventions by ensuring that systemic conditions are favourable for change. Participants leave with a clearer understanding of whether to act now, build momentum, or adjust their strategy.



Exercise: “Readiness Assessment”

Participants 	Time 	Equipment 
2–20	45–60 minutes	Paper, markers, sticky notes, assessment templates

Space  : An open room with space for discussion and reflection.

Setup

1. Participants work individually or in small teams.
2. Provide assessment templates with key readiness factors.
3. Ensure space for discussion and scoring.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that the goal is to assess whether the system is ready for intervention.
 - Encourage participants to approach the assessment critically rather than assuming action is always the next step.
2. Identify Readiness Factors (10 minutes)
 - Introduce key assessment criteria, such as the following:
 - i. Urgency: Is there a pressing need for change?
 - ii. Stakeholder Alignment: Are key actors supportive or resistant?
 - iii. Resources: Are funding, knowledge, and capacity available?
 - iv. External Conditions: Are policy, social, or market conditions favourable?
 - v. Past Efforts: Have previous interventions succeeded or failed?
3. Score the system (15 minutes)
 - Participants rate each factor on a scale (e.g., 1–5) and discuss their scores.
 - High scores indicate readiness, while low scores suggest obstacles that need addressing before action.
4. Analyse results (5 minutes)
 - Facilitate a discussion on overall readiness.
 - Discuss where the system is ready, where gaps exist, and what steps could strengthen readiness.
5. Debriefing (15 minutes)
 - Reflect on how this readiness assessment shapes the planned intervention.

- Encourage participants to consider timing, risks, and areas for preparation.

Tips for Facilitators

Encourage participants to be honest in their scoring rather than overly optimistic. Help them recognize that waiting and preparing can sometimes be more strategic than acting immediately. Push for evidence-based reasoning, ensuring scores are backed by real conditions rather than assumptions. Guide discussions toward what can be done to improve readiness if conditions aren't yet favourable.

Tips for Debriefing

Create a space for critical reflection and strategic thinking. Use these questions to guide the discussion:

- What readiness factors scored the lowest, and why?
- How does readiness influence the likelihood of success?
- What would need to shift to increase system readiness?
- Are there risks in intervening too soon?
- If the system is not ready, what next steps can help prepare for intervention?

Summarize key takeaways, emphasizing that systemic change requires the right timing and that building readiness can be a valuable intervention itself.

Variations

Readiness Assessment can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Fast-track version:* Participants use a simplified three-category scale, e.g., “ready, needs work, not ready,” for a quicker decision-making process.
- *Stakeholder perspectives:* Instead of assessing readiness from a single viewpoint, participants evaluate it from multiple system actors' perspectives (e.g., policymakers, funders, affected communities) to uncover potential misalignments.
- *Scenario-based readiness:* Participants test system readiness under different future scenarios (e.g., policy changes, economic shifts) to explore how external conditions might impact intervention success.
- *Barrier identification:* Rather than scoring readiness, participants identify the biggest obstacles to change and brainstorm targeted strategies to address them before moving forward.
- *Comparative readiness:* Participants assess multiple systems or potential intervention areas side by side to determine where action is most feasible and impactful.

Guiding Star and Near Star

Leverage Points | Perspectives

Purpose

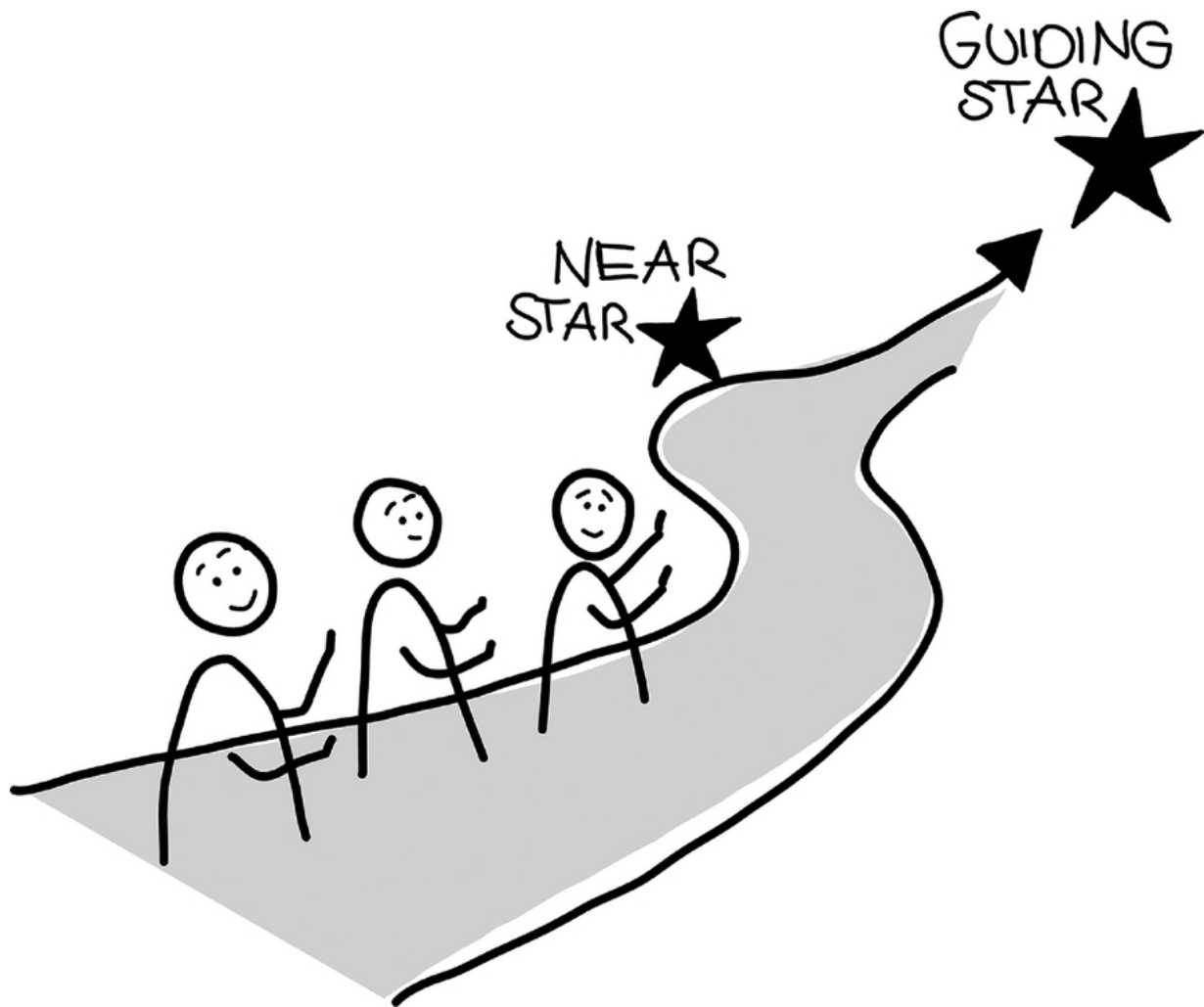
This exercise helps participants define a clear direction for systemic intervention by establishing a Guiding Star (long-term vision) and a Near Star (achievable milestone). By shifting focus from immediate fixes to systemic change, participants develop a structured, strategic approach. Instead of reacting to symptoms, this method encourages them to identify root causes and leverage points, ensuring that interventions are purposeful and impactful.

How It Works

Participants begin by envisioning a Guiding Star, a long-term vision that defines how the system should function if transformation is fully realized. They then establish a Near Star, a concrete and measurable milestone within 5–10 years that signals meaningful progress toward that vision. By clarifying both, participants create a bridge between ambition and action, ensuring that their intervention is both aspirational and achievable.

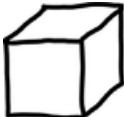
Applications

This exercise is ideal for teams working in policymaking, social impact, business transformation, and organizational change. It helps ensure that interventions are strategic, timely, and focused on deeper system shifts rather than temporary fixes. Participants gain clarity on why action is needed, how to measure progress, and what structural forces must be engaged to sustain long-term change.



Exercise: “Guiding Star and Near Star”

Participants 	Time 	Equipment 
2–20	45–75 minutes	Paper, markers, sticky notes

Space  : An open room with space for participants move around comfortably.

Setup

1. Participants work individually or in small teams.
2. Provide a workspace with flip charts, markers, or sticky notes for brainstorming.

Instructional Steps

1. Introduction (5 minutes)

- Explain that this exercise helps participants define a long-term vision for system change (Guiding Star) and a key milestone toward it (Near Star).
- Shift focus from short-term fixes to long-term system interventions.

2. Define the Guiding Star (15 minutes)

- Participants describe the *ideal future state* of the system:
What does a transformed system look like? What principles guide it, and how would people experience it differently?
- Prompt: “Our Guiding Star is a [name of system] that produces [desired condition].”
- Example: “Our Guiding Star is a global supply chain that eliminates labour exploitation and ensures fair wages.”

3. Define the Near Star (15 minutes)

- Participants identify a measurable milestone within 5–10 years:
What structural, policy, or behavioural shift signals progress? What measurable outcome is achievable?
- Prompt: “Our Near Star is a [specific achievement] that enables [broader system improvement].”
- Example: “Our Near Star is a corporate accountability standard that requires companies to verify fair wages across their supply chains.”

4. Share and refine (15 minutes)

- Teams present their Guiding Star and Near Star to the group.
- Facilitate discussion to refine clarity, alignment, and feasibility.

5. Debriefing (15 minutes)

- Ask participants to reflect on challenges in defining the Guiding Star and Near Star and how it helps guide systemic interventions.
- Facilitate a discussion on key next steps to move toward it.

Tips for Facilitators

Encourage participants to think beyond immediate solutions and focus on long-term system transformation. Guide discussions to ensure that both the Guiding Star and Near Star remain ambitious yet realistic. Push participants to refine their Near Star into a clear, measurable milestone that shows real progress. Keep the conversation grounded in systemic change rather than individual actions, and help participants identify key leverage points within the system.

Tips for Debriefing

Create a reflective space and encourage participants to connect the exercise with real-world system interventions. Use these questions to guide the discussion:

- What challenges did you face in defining your Guiding Star?
- Was it difficult to identify a Near Star that feels both ambitious and achievable?
- How does this approach shift your thinking about systemic interventions?
- What are potential barriers to achieving the Near Star, and how can they be addressed?
- What first steps can be taken to move toward the Near Star?

After gathering responses, summarize key takeaways, focusing on strategic direction, system evolution, and the balance between ambition and feasibility. Encourage participants to consider how these insights apply to their own interventions, organizations, or projects.

Variations

The Guiding Star and Near Star exercise can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Backcasting approach*: Instead of setting the Near Star first, participants work backward from the Guiding Star, identifying key milestones along the way.
- *Stakeholder perspectives*: Participants consider how different system actors (e.g., policymakers, businesses, communities) might define the Near Star differently.
- *Multiple Near Stars*: Instead of defining just one, participants identify several Near Stars to map how different interventions contribute to the same long-term vision

Cynefin Framework

Boundaries | Perspectives

Purpose

The Cynefin Framework is a sense-making tool for classifying situations based on how cause and effect are perceived. It is used when the path forward is unclear and adaptive strategies are needed. The framework helps identify the nature of a situation to guide appropriate action in complex or uncertain systems.

How It Works

Developed by Dave Snowden [[49](#)], the Cynefin Framework classifies situations into five domains depending on how predictable relationships appear at the time of assessment:

- *Clear*: Cause and effect are obvious; apply best practice.

→ *Sense – Categorize – Respond*

- *Complicated*: Cause and effect exist but require expert analysis.

→ *Sense – Analyse – Respond*

- *Complex*: Cause and effect only clear in hindsight; patterns emerge.

→ *Probe – Sense – Respond*

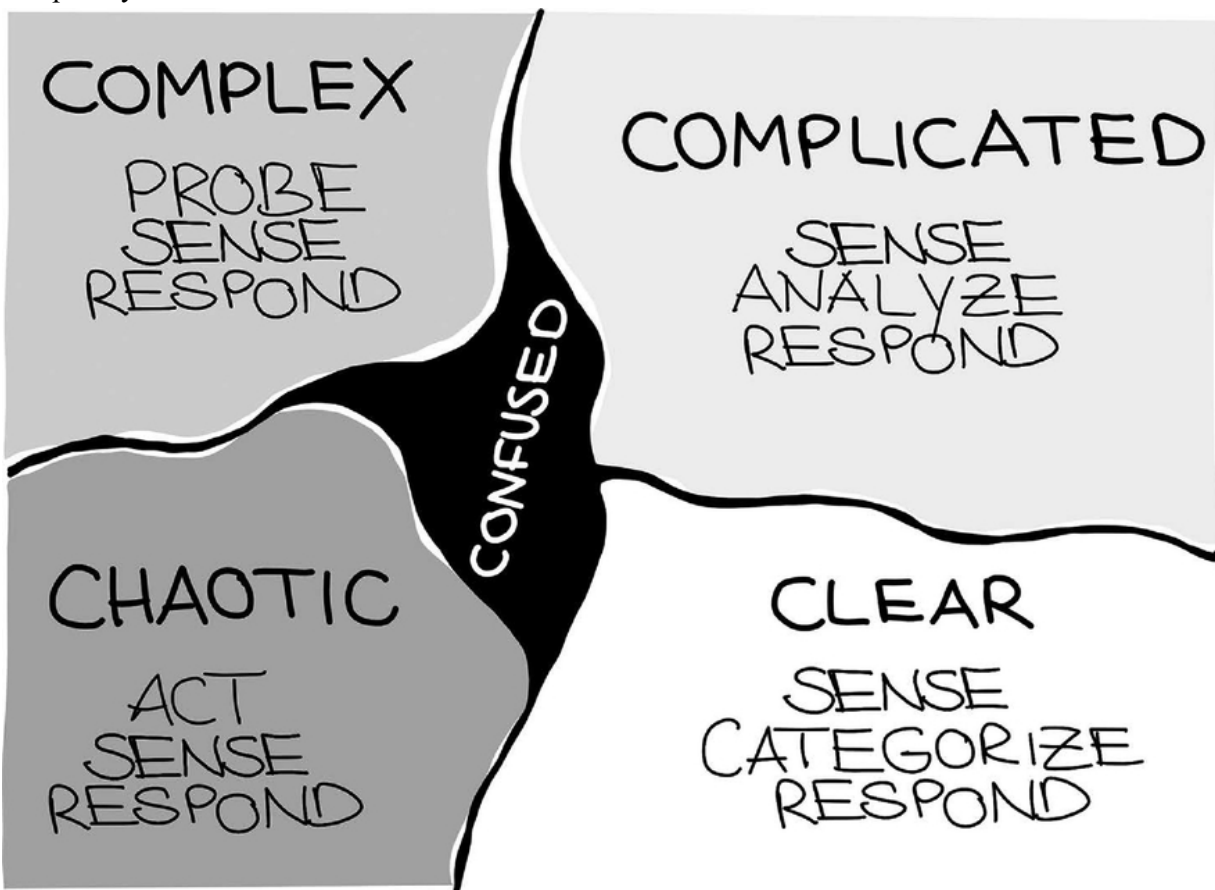
- *Chaotic*: No stability; immediate action is required to establish order.

→ *Act – Sense – Respond*

- *Confused*: Unclear situation; clarify which domain applies.

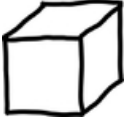
Applications

The Cynefin Framework is used in strategy, crisis response, policy, and organisational development. It supports decision-makers understand the context and choose how to act based on perceived complexity.



Exercise: “Cynefin Framework”

Participants 	Time 	Equipment 
1–10	60–90 minutes	Large sheets of paper or whiteboards, markers

Space  : A room with ample space for group discussion and visual brainstorming.

Setup

1. Set up large sheets of paper or whiteboards for group discussions.
2. Provide markers and reference materials for the Cynefin Framework.
3. Ensure space for breakout groups and group presentations.

Instructional Steps

1. Introduction (5 minutes)
 - Explain the Cynefin Framework and its role in framing situations and guiding decision-making for different types of situations.
 - Provide an overview of the five domains: Clear, Complicated, Complex, Chaotic, and Confusion.
2. Forming groups and initial discussion (10 minutes)
 - Divide participants into small groups, and explain that they will use their experiences to identify examples for each Cynefin domain.
3. Domain exploration (20 minutes)
 - Guide each group to discuss and document examples from their own work or real-life situations that fit into each Cynefin domain.
 - Encourage groups to talk through their reasoning and identify why each example belongs in a specific domain.
4. Group sharing and comparisons (20 minutes)
 - Have each group present their examples and reasoning.
 - Facilitate discussion to compare differing perspectives and framings.
5. Discussion and insights (15 minutes)
 - Encourage participants to discuss any challenges they faced in categorizing situations and what insights they gained from the exercise.
 - Allow groups to adjust their examples or reasoning based on what they learned from others.

6. Debriefing and application (15 minutes)

- Conclude with a reflection on how the Cynefin Framework applies to real-world decision-making and what steps to take next.
- Discuss how participants can use their understanding of the framework and apply the suggested strategies.

Tips for Facilitators

Make sure participants understand each Cynefin domain before starting. Use real-world examples they can relate to. Encourage open, collaborative discussion and remind them there's no single right answer when categorizing complex situations. Step in only when needed; let groups lead their own analysis. Summarize key points now and then to keep focus.

Tips for Debriefing

Ask participants to reflect on their experiences with questions like the following:

- What insights were gained from framing situations into different Cynefin domains?
- How did using the framework change your approach to understanding problems and developing strategies?
- What lessons or takeaways can you apply to improve decision-making in complex or uncertain environments?

Encourage participants to share specific examples of how their thinking shifted and discuss potential applications of the framework in their work. Highlight any common themes or new perspectives that emerged during the exercise to help solidify understanding. This process supports integrating the Cynefin Framework into daily practices and underscores its importance in sense-making and strategic planning.

Variations

- *Simplified domain exploration:* Focus on only a few key domains for a more manageable session, ideal for beginners or short workshops.
- *Digital Cynefin workshop:* Leverage online collaboration tools, such as virtual whiteboards, for remote sessions where participants can engage and contribute their insights.
- *Case study analysis:* Use a shared real-world case study that participants can categorize and discuss, providing practical context for applying the framework.

Note

This framework was developed by Dave Snowden in the early 2000s [[49](#)]. The framework has continued to evolve over time, including refinements such as a liminal zone and the aporetic state,

introducing more nuanced distinctions. This version keeps the focus on practical application and accessibility.

Certainty-Agreement Matrix

Boundaries | Perspectives

Purpose

The Certainty-Agreement Matrix provides a practical tool to reflect on situations based on two dimensions: certainty and agreement. Use it when perspectives differ or the problem feels unclear. It is intended to support choosing suitable ways of working by framing the perceived clarity and alignment.

How It Works

The Certainty-Agreement Matrix uses two dimensions:

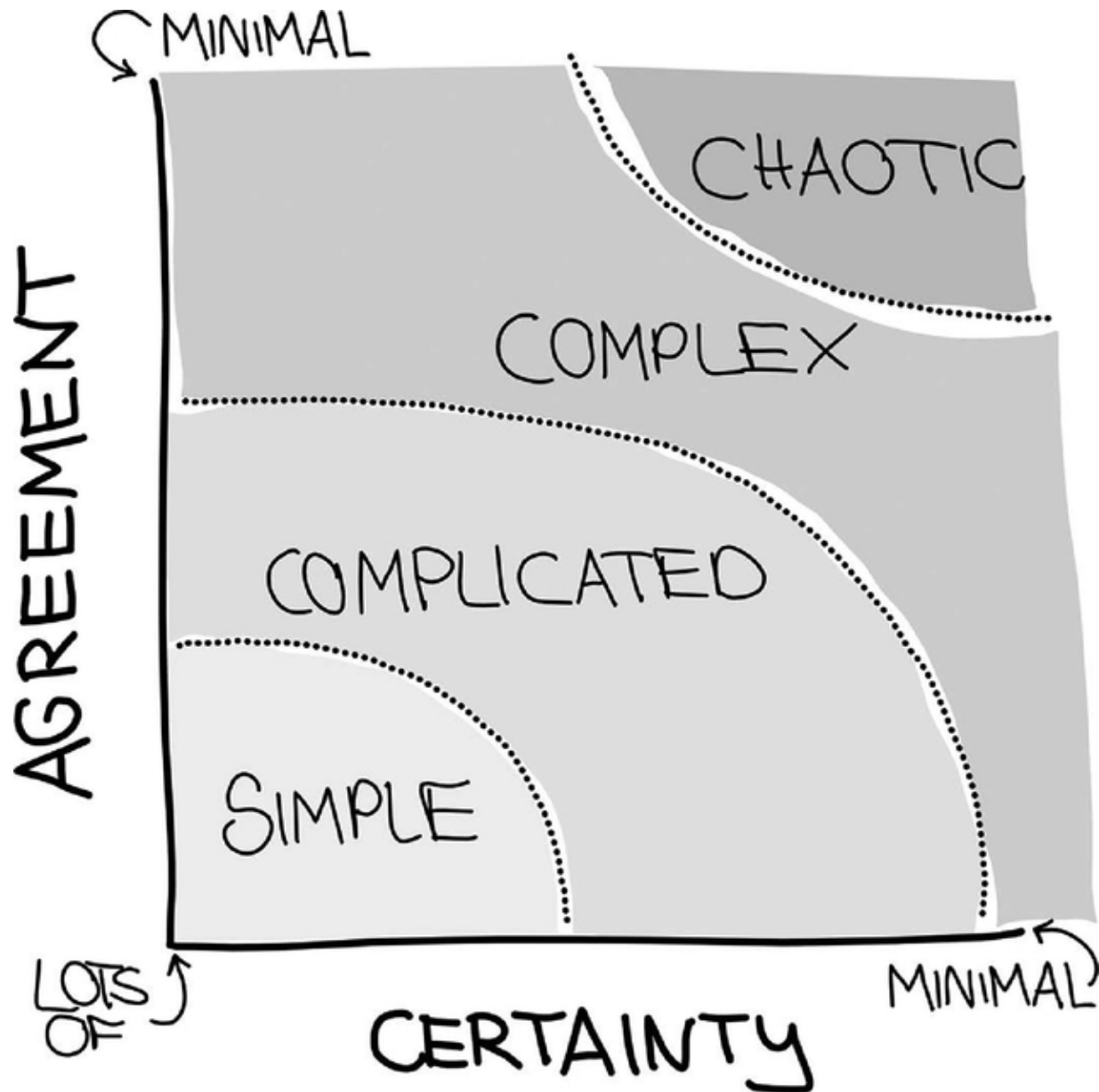
- *Certainty* – how well cause and effect are understood.
- *Agreement* – how much stakeholders align on goals or solutions.

Depending on where the situation falls, it suggests different modes of working:

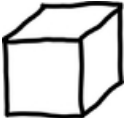
- *Simple*: Cause and effect are clear; follow standard procedures.
- *Complicated*: Cause and effect are knowable but may require expert analysis; apply expert knowledge and planning.
- *Complex*: Cause and effect are unclear and evolve over time; experiment, observe patterns, and adapt.
- *Chaotic*: No clear cause and effect; act fast to stabilize then assess.

Applications

The Matrix is used in leadership, project planning, group facilitation, conflict resolution, and strategic decision-making. It helps teams reflect on how they perceive a situation and choose approaches that match those perceptions.



Exercise: "Certainty-Agreement Matrix"

Participants 	Time 	Equipment 
10-30	60-90 minutes	Large sheets of paper or whiteboards, markers
Space  : A room with enough space for group discussions and visual work.		

Setup

1. Draw the Certainty-Agreement Matrix (two axes: Certainty and Agreement) on whiteboards or paper.
2. Provide markers and reference guides on the Certainty-Agreement Matrix for participants.

Instructional Steps

1. Introduction (10 minutes)

- Explain the Certainty-Agreement Matrix and its purpose.
- Walk through the four areas: Simple (high certainty, high agreement), Complicated (some uncertainty, but agreement), Complex (low agreement, some certainty), Chaotic (low agreement, low certainty).

2. Forming groups and initial discussion (10 minutes)

- Break participants into small groups.
- Brief them on brainstorming real-world situations and placing them onto the matrix.

3. Mapping exercise (20 minutes)

- Groups discuss examples and decide where they fit on the matrix.
- Encourage them to talk through why they chose specific spots.

4. Group sharing and comparisons (20 minutes)

- Each group presents their map.
- Facilitate discussion around different interpretations and placements.

5. Discussion and insights (15 minutes)

- Ask participants about challenges in placement and new insights gained.
- Allow groups to move examples if they change their mind after discussion.

6. Debriefing and application (15 minutes)

- Reflect on the usefulness of the Certainty-Agreement Matrix for decision-making.
- Discuss ways participants can use the matrix in everyday situations at work.

Tips for Facilitators

Ensure participants understand the Certainty and Agreement axes before starting. Use simple, relatable examples to illustrate the different zones. Emphasise that not all situations fit neatly, and differing views are part of the process. Let groups explain their reasoning and guide rather than provide answers. Summarize key points to maintain focus. Encourage open questioning and exploration.

Tips for Debriefing

Ask participants reflective questions such as the following:

- What did you learn from placing situations onto the Certainty-Agreement Matrix?
- How did thinking about Certainty and Agreement affect your understanding of the problems?
- What changes would you make to how you approach decision-making after this exercise?

Encourage participants to share real examples of shifts in thinking. Highlight surprising insights or common patterns. Discuss how complexity and uncertainty affect leadership and planning. Emphasise that the Certainty–Agreement Matrix can be used regularly in strategy or project sessions to build confidence in navigating complex, uncertain situations.

Variations

- *Whole group mapping* : Have everyone work together on one large matrix to encourage shared discussion and diverse examples.
- *Digital session* : Use online whiteboards like Miro or Jamboard for remote workshops; participants can map situations together in real time.
- *Case study* : Use a real-world scenario for participants to practice placing examples on the matrix.
- *Regular use* : Bring the matrix into regular meetings or reviews to help teams recognize and adapt to different problem types.

Note

This activity is based on concepts introduced by Ralph D. Stacey in the 1990s [[88](#)]. The version used here – with labelled areas like “Simple,” “Complicated,” “Complex,” and “Chaotic” – is an adaptation developed later by practitioners in leadership, systems thinking, and agile. Stacey did not present the model in this exact form. It’s not a diagnostic tool but a reflection aid to explore how a group sees a problem.

Power Mapping

Perspectives | Boundaries | Leverage Points

Purpose

This exercise helps participants analyse power structures within a system by mapping key actors, their influence, and their relationships. Instead of assuming change happens through direct action alone, participants uncover who holds power, who resists change, and where influence can be leveraged to drive systemic transformation.

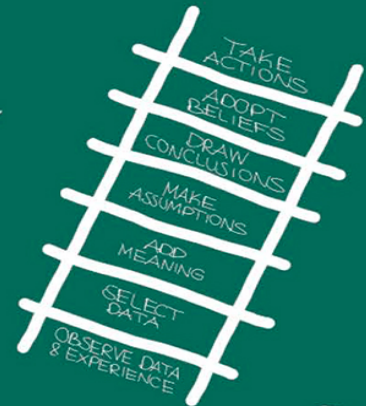
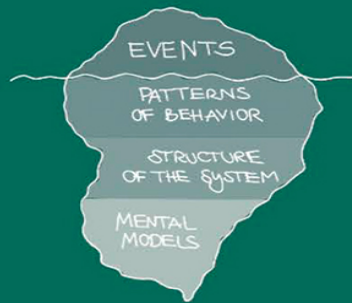
How It Works

Participants create a power map by identifying stakeholders within a system and categorizing them based on their level of influence and stance toward change. They then assess power dynamics to

CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR EXPLORING SYSTEMS, PERSPECTIVES, AND COMPLEXITY



CONNECTIONS



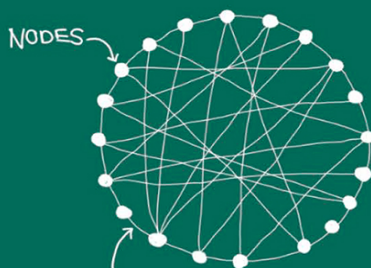
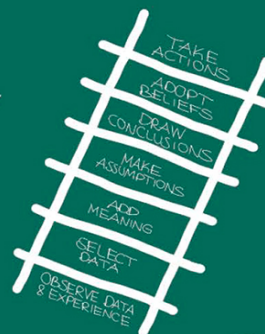
»IS« — ACTUAL SITUATION	»OUGHT« — IDEAL SITUATION



CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR
EXPLORING SYSTEMS, PERSPECTIVES,
AND COMPLEXITY



CONNECTIONS

•IS•—ACTUAL SITUATION	•OUGHT•—IDEAL SITUATION



Methods for Systems Thinking

Methods for Systems Thinking is a practical workbook with more than 65 methods you can apply right away. It helps you explore complex systems, involve the right people, and respond effectively to change.

The QuickStart Guide shows you where to begin. You can start with the short theory section, use the 5M Methods Matrix to choose an approach, or jump straight to a method. Methods are organized by the 5M Structure (Motivate, Meet, Map, Make, and Manage) so you can quickly find what fits your purpose, whether clarifying goals, engaging stakeholders, mapping connections, shaping responses, or adapting over time.

Each method spans three pages and gives you a description, purpose, application, illustration, and step-by-step guidance. You also get tips for facilitation, debriefing, and variations. The focus is on action, turning reflection into results.

Christian Baron , PhD, is a consultant, trainer, and systemic coach. He uses systems thinking to make complexity manageable, with a focus on clarity, collaboration, and lasting impact.

Methods for Systems Thinking

65+ Practical Approaches for Exploring Systems,
Perspectives, and Complexity

Christian Baron



Designed cover image: © Anna Frank

First published 2026

by Routledge

605 Third Avenue, New York, NY 10158

and by Routledge

4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2026 Christian Baron

The right of Christian Baron to be identified as author of this work has been asserted in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice : Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

ISBN: 978-1-041-11170-2 (hbk)

ISBN: 978-1-041-11171-9 (pbk)

ISBN: 978-1-003-65861-0 (ebk)

DOI: [10.4324/9781003658610](https://doi.org/10.4324/9781003658610)

For Product Safety Concerns and Information please contact our EU representative GPSR@taylorandfrancis.com . Taylor & Francis Verlag GmbH, Kaufingerstraße 24, 80331 München, Germany.

Contents

[*Foreword*](#)

[*Preface*](#)

[*About the Author*](#)

[*About This Book*](#)

[*QuickStart Guide*](#)

[Introduction](#)

[PART 1 Systems and Systems Thinking](#)

[Understand Systems](#)

[*But Not Everyone Sees the Same System*](#)

[*System Classification*](#)

[*Real-World Systems*](#)

[*Making Systems Tangible*](#)

[*Turning Toward Action*](#)

[Understand Systems Thinking](#)

[*Brief History*](#)

[*Two Strands*](#)

[*9 Core Concepts of Systems Thinking*](#)

[Think in Systems](#)

[*7 Core Habits for Systems Thinkers*](#)

[*How Systems Thinkers Make Meaning*](#)

[*Self-Check: Are You a Systems Thinker?*](#)

[Navigate in Systems](#)

[*Systemic and Systematic Thinking in Systems*](#)

[*Framing and Sensemaking in Systems*](#)

[*Preparing to Act in Systems*](#)

[*Diagnosing the Problem*](#)

[*Finding Leverage and Acting in Systems*](#)

[PART 2 Select Methods for Systems Practice](#)

[*Why This Set of Methods*](#)

[*Where These Methods Come From*](#)

[*The 5M Structure*](#)

[*Focus Areas of Methods*](#)

[The 5M Methods Matrix](#)

[*Motivate: Why and What For?*](#)

Meet: Engage Stakeholders and Perspectives

Map: Understand and Visualize the System

Make: Take Action and Create Solutions

Manage: Evaluate and Adapt Over Time

PART 3 Apply 65+ Methods for Systems Practice

Integration with Systems Thinking Principles

What's in Each Method

Motivate: Why and What For?

Deciding to Act

Readiness Assessment

Guiding Star and Near Star

Cynefin Framework

Certainty-Agreement Matrix

Power Mapping

Meet: Engage Stakeholders and Perspectives

Silent Signal

Invisible Connections

Collective Pulse

Speed Framing

Invisible Negotiation

Ladder of Inference

Fishbowl Discussion

Reverse Fishbowl

Stakeholder Mapping

Cluster Mapping

CATWOE Analysis

Boundary Critique (BC)

Appreciative Inquiry

World Café

Map: Understanding the System

Air Circles

Adaptive Pen Control

Group Juggle

Triangles

Live Systems Mapping

Bathtub Game

DSRP Framework

Behaviour Over Time Graphs

Paper Computer

Refrigeration Game

Fishbanks Ltd.

Sankey Diagrams

System in Focus

Rich Pictures

Double-Q Diagram

Impact Mapping

Connected Circles Map

Causal Loop Diagram (CLD)

Systems Archetypes

Leverage Point Mapping

Scenario Planning

World Game

Soft Systems Methodology (SSM)

Viable System Model (VSM)

Make: Take Action and Create Solutions

Human Knot

Paper Airplane Factory

Forced Prioritization

Resource Tree

Kano Model

Theory of Constraints (TOC)

Prototyping Sprints

Process Hacking

Backcasting

Synectics

Morphological Analysis

Futures Wheel

Manage: Evaluating and Adapting Over Time

Boom and Bust

Most Significant Change (MSC)

Outcomes Mapping

Lag vs. Lead Indicator Tracking

Balanced Scorecard

Iceberg Model

Scenario Stress Testing

Fuzzy Cognitive Mapping (FCM)

Critical Systems Heuristics (CSH)

Final Thoughts

Reference

Index

Foreword

Christian Baron's book points in a new direction for systems thinking resources. Let me explain with the aid of a brief reflection on systems thinking since the 1980s, including one of my own contributions, as this will make it clear why I see this book as an important new development.

Back in the early 1980s, there was a “paradigm war” (two competing understandings of what systems thinking is, underpinned by very different assumptions about the nature of reality and our knowledge of it) that threatened to tear our research community apart. Some people were concerned with enhancing objectivity, optimization, and expert analysis, while others emphasized intersubjectivity, stakeholder participation, and facilitated dialogue. Those seeking objectivity viewed systems as things we can know in the real world [1], while those facilitating intersubjectivity thought of systems as being useful interpretations (i.e., in the mind), constructed through processes of collaborative inquiry [2]. The paradigm war became entrenched, and there were almost no points of agreement between the two sides, making mutual appreciation very difficult [3].

In this context, Jackson and Keys [4] observed that, when it came to practice, the two different visions of systems thinking made fundamentally different assumptions about the nature of organizations and the relationships between stakeholders, which makes them useful in different contexts. At the risk of oversimplifying their argument, it's useful to pursue objectivity, optimization, and expert analysis when there is agreement between stakeholders on the issues being tackled. However, when there is disagreement, then stakeholder participation, dialogue, and a search for mutual understanding are more valuable. Building on this argument, Jackson [5] advocated methodological pluralism: treating different methodologies, which are grounded in the different paradigms, as complementary rather than competing.

This was a critically important contribution to systems thinking not just because it offered a way to save the systems research community from being riven in two but also because it offered a more flexible and responsive systems practice than either of the earlier versions of systems thinking. Essentially, it made clear that we can have the best of both worlds.

During the late 1980s and throughout the 1990s, over 100 authors contributed to our understanding of methodological pluralism [6] until, in the year 2000, two books consolidated contrasting understandings of what it involves. Jackson [7] emphasized the use of multiple methodologies based in four different paradigms (going beyond the original two from the early 1980s), and he argued that we can usefully switch from one methodological rationale to another – including movement between one set of philosophical assumptions about reality and our knowledge of it to a different set of assumptions. This appeared to assume there is a “neutral,” meta perspective from which methodologies and paradigms can be observed and understood [6 , 8]. Jackson was very clear that methods shouldn't be divorced from methodologies, as it is methodologies that provide philosophy and theory explaining why methods are valid and how they work. In contrast, I wrote a

book [8] arguing that there is no “neutral” place “above” the methodologies and their paradigms from which to observe and use them: methodologies come to be interpreted through the practitioner’s own paradigmatic lens, which cannot be transcended but can evolve over time through processes of learning with others. Also, I claimed that it is more useful to mix methods in practice than deploy whole methodologies, with methods being drawn from multiple methodological sources and reinterpreted by the practitioner. Thus, methods can be detached from their original methodological rationales and can be deployed in new ways, different from those that their creators intended. Indeed, I argue that whole methodologies are relatively blunt instruments: we need to be able to explore problem contexts (especially taken for granted value and boundary judgments, conflicts, and marginalization processes) to see more of the complexity than we (or a client, or any given stakeholder) might initially be aware of [9], and this most often results in the development of a bespoke intervention design, creatively mixing methods from multiple sources, as no single methodology is usually sufficient [6 , 10].

Intellectually, I regard both the contributions from Jackson and myself as credible. Indeed, I recognize a significant benefit of Jackson’s work [11]: by insisting on the teaching of multiple methodologies, Jackson provides an antidote to a common problem – practitioners discovering just one methodology and believing this is all systems thinking consists of. However, I argue that, when it comes to practice, mixing methods offers a great deal more flexibility and responsiveness than the use of whole methodologies, or keeping methods tied to the methodological rationales of their creators [12]. In addition, my approach doesn’t say that practitioners are paradigmatically neutral, so it asks them to learn from others with different perspectives on an ongoing basis [13], thus providing another antidote to them thinking that systems thinking is just one methodology. Through ongoing learning, practitioners come to see more of their own methodological blind spots, and thereby, over time, they enhance their capabilities for exploring complexity, as well as for designing and undertaking systemic interventions in the context of that complexity.

While I have long believed that mixing methods is the most practically advantageous approach (my writings on this go back to 1989 [14]), I suggest that, in recent years, we have witnessed considerable changes in how people in organizations work that magnify the practical difference between using whole methodologies and mixing methods. Work is becoming ever more intense, with high pressure decisions needing to be made increasingly quickly [15]. Also, since the COVID-19 pandemic, working from home has become much more common [16]. Both these changes to working practices make it hard for people to find time for special projects structured by a whole systems methodology [17], and in particular, convening workshops (a practice that is often advocated in the more participative and dialogical approaches) is increasingly resisted because of the difficulty of bringing everyone together in the same place at the same time [18]. While there is undoubtedly a case for rethinking how we run our organizations [19 , 20], we cannot afford to sit on our hands and wait for organizational environments to become more propitious for systems thinking; there are just too many complex and urgent issues that need tackling. If we are able and willing to

detach methods from their original methodological rationales, then they can be adapted for use in new ways, for day-to-day thinking and conversation [[17](#) , [21](#)], as well as for special projects and workshops when these are possible. This adaptation can happen without losing the idea that methods need to be understood by the practitioner in the context of his or her own evolving systems perspective.

Despite this argument for mixing methods being widely appreciated in the systems community, and despite recent changes in working practices, most contemporary, multifaceted resources for systems thinking [e.g., 11, 22–24] have continued to present systems methods in the context of whole methodologies. This is where the book you are reading is different, and it points to a new way forward.

I am not aware of another systems thinking book that presents as many methods as this one (65+), drawn from such a diversity of sources, offering the potential to be adapted for use in a multitude of situations. However, a list of methods alone would not be very useful: it would overwhelm the average reader who is approaching systems thinking for the first time. Two additional elements of this book are key:

First, Baron explains the importance of using the methods in the context of a systemic mindset: the unsystemic use of systems methods can lead to fundamental misunderstandings of systems thinking [[25](#)]. I would argue that it can do significant harm, too, as without a systemic mindset, there is nothing beyond the limited method at hand to support the practitioner in exploring boundaries, mapping relationships, appreciating different perspectives, and understanding emergent properties during interventions. These are all key systemic skills for engaging with complexity and enhancing critique and innovation, and they can be practiced even when no formal method appears to be relevant [[17](#) , [21](#) , [26](#) , [27](#)].

Second, of equal value to the insistence on a systemic mindset is Baron's categorization of five broad purposes for the methods he discusses, and this structure helps to differentiate between classes of methods. It is also simple enough to be immediately understood. Of course, methods can be adapted for purposes other than those they are usually used for [[28](#) , [29](#)], but as a starting point for learning, the emphasis on purposes is consistent with mixing methods [[8](#)] and can be readily appreciated by novice practitioners.

I recommend this book to you in the belief that it offers a new kind of resource for systems thinking, with many more methods than usual, which will be of real benefit to the growing number of systems practitioners who seek to mix methods creatively in response to ever more challenging social contexts.

– **Gerald Midgley**

Centre for Systems Studies, University of Hull, Hull, UK

Birmingham Leadership Institute, University of Birmingham, Birmingham, UK

School of Cybernetics, College of Systems and Society, Australian National University, Australia

Department of Informatics, Linnaeus University, Växjö, Sweden

Preface

This book began with a simple intention: to make systems thinking more accessible and usable in everyday work. What you now hold in your hands is the result of years of exploration, collecting methods, testing ideas, refining practices, and learning with others.

It started with a growing set of practical tools and exercises used in facilitation, workshops, and strategy work. Over time, a structure emerged, ways to organize the tools and frame the work, that made it easier to teach, share, and apply in many different settings. The idea behind this book is that it can be a resource not just for learning about systems thinking but also for applying it directly in complex, messy situations.

This book would not exist without the support of many people.

Thank you to those closest to me: Anna, Kirsten, Rita, and Wolfgang. Thank you for your presence, encouragement, and care.

Thank you to everyone who contributed feedback, reviewed drafts, challenged ideas, or helped sharpen the clarity of the text. Your input pushed this work forward in essential ways.

A special thanks to the reviewers: Tony Fish, Michael Frahm, Isabell Osann, and James Stauch. Thank you to Gerald Midgley for contributing the foreword and to all who offered endorsements and encouragement along the way. Your questions, critique, and perspectives helped bring this to another level.

Writing this book has been both a personal and professional process. Systems thinking is not just a set of tools, it is a way of seeing, of listening, of working with uncertainty. This book reflects what I have learned so far. It is not a final answer but a contribution to an ongoing field of practice.

The process was supported by modern AI tools, used for research, synthesis, and drafting. But the heart of the work lies in dialogue, reflection, and shared learning with people.

Thank you for being part of this. May this book support your own thinking, questioning, and action in the systems you care about.

About the Author



Christian Baron, PhD, is a freelance consultant, trainer, and systemic coach. As founder of *zusammen-weiterdenken*, he supports clients in creating sustainable value and navigating organizational transformation. With experience in research leadership and mid-sized industry, he applies systems thinking and systemic methods to make complexity more workable. His practice focuses on clarity, collaboration, and long-term impact.

About This Book

Methods for Systems Thinking is a workbook of practical approaches to systems thinking. It brings together a wide range of frameworks, methods, tools, visuals, and activities that help users explore, understand, and intervene in real-world systems. These approaches focus on visualizing relationships, understanding change over time, fostering creative responses, and supporting collaboration across diverse perspectives.

Why This Book?

This workbook is designed for immediate use. The focus is on approaches that can be applied rather than on theoretical discussion. It offers a broad collection of hands-on techniques to explore, understand, and intervene in real-world systems – whether mapping systems, analysing dynamics, or developing solutions.

Whom for?

Methods for Systems Thinking is for educators, managers, facilitators, leaders, consultants, and others working with real-world systems. It applies across fields, such as education, healthcare, business, government, and environmental work, and extends to any area where people deal with complexity, collaboration, or change. It is also useful in academic contexts, offering students and teachers clear examples and a broad set of approaches for teaching, research, and applied learning. Whether you work within a discipline or across boundaries, these methods support systems thinking in practice.

Why Methods?

Systems thinking is not a fixed set of rules or a single approach. What counts as systemic often depends on context, purpose, and perspective. This book offers structured approaches to help explore, test, and engage with systems.

Readers are encouraged to build their own understanding and choose tools that fit their needs. These resources are not shortcuts but prompts for reflection and action. You remain the master of your own thinking. The approaches in this book support your work but do not replace your judgment.

A Note on Terms

In this book, several terms to describe different types of resources are used:

- *Frameworks* help how we see, structure, or group situations.
- *Methodologies* are theory-based approaches for selecting and combining methods.
- *Methods* are structured processes for exploring, analysing, or planning.
- *Tools* are techniques that support a method or framework.

- *Visualizations* show patterns or connections, often as diagrams.
- *Activities* put these into practice, often in groups or workshops.

QuickStart Guide

Two Ways to Start

This book introduces key ideas in systems and systems thinking, followed by 65+ practical approaches organized using the 5M Structure. You can either start with the fundamentals or go straight to the methods.

- *Want context first? Part 1* covers what systems are, what systems thinking is, and how to become a systems thinker.
- *Ready to get hands-on? Parts 2 and 3* include practical tools, grouped in the 5M Structure.

The 5M Structure – Overview

Focus Area	What it helps with
Motivate	Clarify purpose and need for action
Meet	Engage stakeholders and perspectives
Map	Understand and visualize the system
Make	Take action and create solutions
Manage	Evaluate and adapt over time

Find Your Starting Point

Your Situation	Start with
You need to clarify purpose and direction	Motivate
You need to involve key people or perspectives	Meet
The system feels unclear or overwhelming	Map
You need to design and build possible solutions	Make

You need to evaluate, learn, or adapt over time

Manage

How the Methods Work

Each method in *Part 3* includes the following:

- Purpose, applications, and typical use cases
 - Step-by-step instructions
 - Tips for facilitators, debriefing, and variations
-

Introduction

DOI: [10.4324/9781003658610-1](https://doi.org/10.4324/9781003658610-1)

Many of today's world challenges have to do with systems – where multiple parts connect, interact, and change together. Climate change, economic shifts, or health crises don't happen in isolation. They are part of something bigger. They are part of interconnected systems. When a part changes, other parts respond. Because of these interrelations, simple fixes often fail – or make things worse.

Systems thinking can support work with these kinds of challenges. Instead of looking at isolated pieces, it encourages us to step back and understand how parts fit together. This helps us understand better how problems arise and where lasting solutions might come from.

This book is intended to support readers to apply systems thinking in practice. It offers simple, practical methods, simulations, exercises, and frameworks to explore, understand, and intervene in real-world systems. Systems thinking helps reveal patterns, feedback loops, and unintended effects. Rather than chasing symptoms, it encourages us to address deeper causes and design solutions that remain effective as situations evolve.

From education to urban planning, business, healthcare, or environmental management – many fields face systems where multiple factors interact. Though contexts differ, systems thinking offers shared principles to work with complexity and change.

At its core, systems thinking shifts how we see problems. When we change our perspective, new possibilities emerge – often in unexpected places. This change in perspective helps us work with difficult problems, adapt as conditions change, and build solutions that last.

The following chapters introduce the basics of systems and systems thinking, followed by a wide range of practical methods. Whether you need to map connections, address difficult problems, or plan for the future, these tools aim to make systems thinking practical and actionable.

This is a book for practice. I hope you find these methods helpful as you work with your systems challenges.

Now, let's begin.

Part 1

Systems and Systems Thinking

DOI: [10.4324/9781003658610-2](https://doi.org/10.4324/9781003658610-2)

Many tricky problems involve systems where parts connect, interact, and shift together.

In this part, I introduce how systems thinking helps frame such problems more effectively. Systems in nature, technology, and society display layers of relationships that produce outcomes we cannot predict by analysing parts in isolation.

Together, we explore how systems thinking shifts our framing of problems to see beyond isolated issues toward larger patterns and interactions that shape the world. This chapter sets the foundation for understanding how systems thinking supports better analysis, design, and decision-making when working with systems.

Understand Systems

DOI: [10.4324/9781003658610-3](https://doi.org/10.4324/9781003658610-3)

What do a tree, a weather system, and a company have in common? They're all systems but not of the same kind.

A useful first step in understanding systems is to group them into two broad types:

- *Natural systems* , like ecosystems, weather patterns, or the solar system, form and function without human design.
- *Human-made systems* , like companies, hospitals, or machines, are intentionally designed to serve specific goals.

How we describe a system depends on which type we're looking at. Human-made systems usually have clear roles, boundaries, and objectives. Natural systems show structure and interaction without designed intention.

One often-cited general definition aiming at broad applicability across many domains comes from von Bertalanffy [[30](#)]:

“A system can be defined as a complex of interacting elements.”

This is a minimal definition. It focuses on elements and the interactions between them, regardless of origin or design. In human-made and social systems, however, these elements are typically organized to serve a purpose or achieve specific goals [[31](#) , [32](#)].

Depending on the context, systems are often described by the domain they operate in: for example, biological systems (like organisms), technical systems (like machines), or social systems (like institutions). These categories help us focus on the kinds of interactions and components that matter most in each case.

Across most domains, systems typically share a few core traits that help define them, especially in human-made systems:

- *Purpose (when present)*: The system's reason for existing.
- *Components*: The individual parts or elements that form the system.
- *Interdependence*: Relationships and interactions between the components.
- *Boundaries*: Limits that define what is inside and outside of the system.
- *Environment*: External factors influencing and being influenced by the system.

One trait that often causes confusion and is often misunderstood is *purpose* . It's not the same as a goal. A goal is a specific, short-term outcome a system might try to achieve, like reducing wait times

or increasing output. Purpose is broader, it refers to the system's ongoing role or function over time. In human-made systems, purpose is often defined by design. In natural systems, purpose doesn't apply in the intentional sense because these systems aren't created with goals; they simply function.

Let's look at how this plays out in practice. Take a hospital, for example.

A hospital might set a goal of reducing patient wait times, but its actual *purpose* is reflected in what it consistently does. If its behaviour prioritizes revenue over patient care, then – regardless of stated goals – its effective purpose may be financial gain rather than community health [[33](#)].

The other traits of the system are often easier to observe:

- *Components* include doctors, nurses, equipment, and facilities.
- *Interdependence* describes how these parts interact, for example, nurses monitor patients and provide information that doctors use to make decisions.
- *Boundaries* define what belongs to the system (staff, patients, buildings) and what doesn't (insurance providers, external suppliers).
- *Environment* includes healthcare policies, public funding, and disease trends, all factors that shape how the hospital operates [[32](#)].

This example shows how each trait plays out in a real system and how *purpose* isn't always stated but is revealed by how the system operates in practice. It also highlights that understanding a system isn't just about listing parts. What matters is how those parts interact, how the system responds to its environment, and how its behaviour aligns (or doesn't) with its stated goals.

This view is central to general systems theory: a system is defined not just by its components but by how those components interact as well. Ross Ashby, Donella Meadows, and Peter Checkland each emphasized that it's the relationships and patterns of interaction that make a system. Without them, there may be no system at all, just a collection of elements [[32](#) , [33](#) and [34](#)].

Take the human heart: It doesn't work in isolation. It depends on signals from the brain, oxygen from the lungs, and coordination with other organs. Its function only makes sense within the full body. Or consider an orchestra: individual instruments make sounds, but only their interplay produces music.

Another illustrative example is the Matryoshka doll:



- *Purpose:* It serves as a decorative item representing unity.
- *Components:* A set of nested dolls of decreasing size.
- *Interdependence:* Each doll relies on the others to form a complete set.
- *Boundaries:* The outermost doll defines the system's boundary.
- *Environment:* Includes how the dolls are displayed and their cultural significance.

This example highlights how interconnected parts within a system contribute to a greater purpose, underscoring the value of understanding systems as a whole [32].

But Not Everyone Sees the Same System

What we call a system depends not just on what's physically there but on how we choose to look at it. As Ross Ashby [34] noted, any physical object – like a pendulum, a village, or a hospital – has countless variables. Which ones we focus on depends on our purpose.

This aligns with ideas from radical constructivism, as proposed by Ernst von Glasersfeld and Heinz von Foerster, which emphasize that knowledge, and system boundaries, are constructed by the observer, not simply found in the world [35 , 36]. We don't study "everything." Instead, we define a system by focusing on the elements and relationships that matter for the issue at hand.

Take a car, for example. Is it one system or many? That depends. If you're thinking about transportation, the engine, wheels, and steering might be central. If you're interested in climate control, the air conditioning system becomes relevant.

What counts as the system changes depending on what you're trying to understand or influence.

Let's take another example – a car repair shop:

- *For a customer* , the system seems simple: you bring your car, they fix it, and you pick it up. The customer focuses on the service outcome.
- *For a mechanic* , the system includes diagnostics, repair procedures, parts ordering, safety standards, and technical skills. What matters is finding and solving the technical problem.
- *For the shop manager* , the system is broader: staff schedules, finances, inventory, customer satisfaction, supplier contracts, and legal compliance all become relevant.
- *For someone developing management software* for repair shops, the system breaks down into subsystems: appointment scheduling, billing, parts inventory, customer databases, and reporting tools.

In each case, the same physical place is viewed as a different system depending on the observer's role, purpose, and knowledge. The system boundary shifts based on what questions are being asked.

But even once we've drawn a boundary, not all systems behave the same. They differ in how they respond to their environment, deal with change, or evolve over time.

To make sense of this variety, we tend to put things into mental boxes. It's how we explain our view of the world – by grouping things that seem similar. For systems, this means using categories or classifications. We group systems to spot patterns, highlight important differences, and choose better ways of working with them [37]. Without some kind of structure, we'd have to start from scratch every time we faced a new system. That's why it makes sense to begin with the basics – the common ways systems are understood and classified.

Even though every system depends on how we define it, certain recurring patterns help us work with systems more effectively. Classifications and categories give us a starting point for selecting appropriate methods and tools.

System Classification

There is a broad variety of systems. Some we call simple and predictable, like a light switch. Others are seen as dynamic and ever-changing, like the weather. Classifying systems helps us make sense of their diversity by organizing them into categories based on key characteristics [38].

There are many ways to classify systems, depending on the field or purpose. In classical systems theory, systems are seen as bounded, analysable, and made up of interacting parts with clear boundaries and purpose. In complexity science and ecology, Jean Boulton [39] describes systems as ongoing processes rather than fixed structures. She emphasizes flow, emergence, and the role of context. In economics, J. Doyne Farmer [40] shows that economies behave as complex systems that are nonlinear, uncertain, and shaped by the interaction of adaptive agents rather than by fixed rules.

To ground these ideas, we begin with one of the most accessible approaches: structural classification.

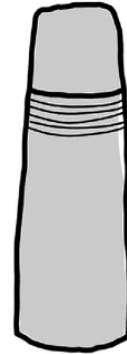
A Textbook Example

Textbooks often illustrate structural classification with a simple example: how systems interact with their environment and whether they are open, closed, or isolated. This framework, originally developed in thermodynamics, is often the starting point in system studies because it deals with observable boundaries and flows, making it useful for identifying what goes in, what comes out, and what stays contained.

This structural view divides systems into three types:

- *Open Systems* exchange matter, energy, or information with their environment. These interactions make them adaptable and responsive. In social or ecological contexts, their boundaries are often conceptual rather than physical. Examples include the human body and ecosystems [[30](#)], businesses and social systems [[32](#)], or simple physical examples like refrigerators, frying pans, or a cup of coffee, often used in systems teaching.
- *Closed Systems* exchange energy but not matter with their surroundings. Examples include a sealed water bottle, where heat passes through but water remains inside, or a pressure cooker, which transfers heat while retaining contents or a coffee cup with a lid [[32](#)].
- *Isolated Systems* neither exchange matter nor energy with their surroundings. While theoretical in nature, examples include a well-insulated thermos, effective only for a short time before heat escapes, or experimental setups in physics designed to minimize all external interactions, or the universe as a whole [[41](#)].

THERMODYNAMIC SYSTEMS



OPEN

CLOSED

ISOLATED

HEAT ✓

HEAT ✓

HEAT X

MASS ✓

MASS X

MASS X

The structural view is only one way of classifying systems. To capture a broader range of patterns, researchers also distinguish systems by their behaviour, complexity, adaptability, and hierarchy. Together, these five categories help identify key features, guide strategy, and show how systems interact with their environment [[32](#)].

Five Key Classifications

What counts as a system, and how it should be framed, depends on the field. Still, the following classifications offer a useful starting point in many practical contexts:

1. *Structural*: How systems interact with their environment (e.g., open, closed, or isolated) [[34](#)].
2. *Behavioural*: How systems change over time (e.g., static, dynamic, linear, or nonlinear) [[42](#)].
3. *Complexity-Based*: How interconnected and predictable they are (e.g., simple, complicated, complex, or chaotic) [[37](#) , [43](#)].
4. *Adaptability*: How systems respond to disruptions (e.g., resilient or adaptive) [[44](#)].
5. *Hierarchy*: How systems are organized (e.g., hierarchical or flat) [[30](#) , [38](#)].

These categories help us make sense of systems in theory. In practice, however, most systems don't fit neatly into a single category.

Real-World Systems

In theory , systems can be neatly classified – as open or closed, simple or structured, hierarchical or flat. These categories offer useful ways to study and describe them.

In practice , however, the systems encountered in everyday life rarely fit neatly into a single category. Those “*real-world systems*” don’t stay inside neat boxes. Their behaviour shifts depending on the situation, and many systems show features from more than one category at once [[44](#) , [45](#)].

Most systems we deal with are nonlinear and difficult to predict. They involve many parts that interact in often unexpected ways, with feedback loops and ongoing change.

Real systems rarely fit simple textbook definitions. Their behaviour depends not just on the parts they contain but on how those parts interact and adapt as well [[32](#) , [33](#)].

Even supposedly “closed” systems, such as a thermos or a pressure cooker, still interact with their surroundings, showing that system boundaries are not fixed but depend on our point of view.

As Donella Meadows [[33](#)] puts it:

“There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion.”

This perspective leads to three important insights:

- Systems are rarely fully isolated.
- Boundaries are defined by the observer and depend on context.
- Elements within and across systems are interconnected.

In light of this, it’s more useful to see systems not as fixed structures but as evolving patterns, shaped by feedback and outside influence. Systems that behave this way often show features like openness, emergence, self-organization, and change. These are typical of what complexity science calls *complex systems* : systems made up of many parts that interact in ways we can’t predict by looking at the parts alone. Examples include ecosystems, economies, cities, and social networks.

To capture how some of these systems change and learn over time, researchers use the concept of complex adaptive systems (CAS). This framing highlights systems that adjust continuously, with behaviour that emerges from many small interactions and shifts as conditions change [[46](#) , [47](#) and [48](#)].

Real-world systems don’t always fit neatly into this category, but the idea points to traits that are often useful when describing them. The following table shows examples and the kinds of patterns that are often observed in practice:

<i>System</i>	<i>Key Classifications</i>	<i>Description</i>
Human Body	Open, dynamic, complex, adaptive, hierarchical	Subsystems like circulatory and nervous systems work together, adapting to maintain homeostasis.
Cities	Open, dynamic, complex, adaptive, hierarchical	Interconnected infrastructure (e.g., transport, utilities) adapts to growth, crises, and disruptions.
Healthcare Systems	Open, dynamic, complex, adaptive, hierarchical	Hospitals and policymakers coordinate to address care and crises like pandemics.
Ecosystems (Forests)	Open, dynamic, nonlinear, complex, adaptive	Forests show resilience through feedback loops (e.g., regrowth after wildfires) and interdependencies.
Global Supply Chains	Open, complicated or complex, adaptive, hierarchical	Systems of suppliers and manufacturers adapt to global disruptions like COVID-19.
Social Media	Open, chaotic, adaptive, often flat	Viral content spreads unpredictably, with emergent patterns driven by user interactions.

Even though these examples show useful patterns, most systems rarely remain fully stable. Their behaviour can change over time, and many display different characteristics depending on scale, timeframe, or perspective. The same system may appear simple, complicated, or complex depending on which part is observed or which question is being asked.

That's why classifications are only a starting point. To work with real-world systems – especially under conditions of uncertainty, novelty, or unpredictability – we need practical approaches that support us understand how systems behave in specific situations.

The next section introduces ways to make systems more visible, more tangible, and more workable.

Making Systems Tangible

Knowing that real-world systems may be complex, adaptive, and unpredictable is important, but it's not enough. To work with them in practice, methods (a set of steps you follow to do something) can turn abstract understanding into concrete action. These methods support efforts to make systems more tangible, not just by naming structures or patterns but also by making them easier to see, map, and work with. They help reveal where connections form, how feedback loops work, and where small changes might matter, even in messy or uncertain systems.

For example, in dynamic systems, behaviour unfolds over time and is often shaped by delays and feedback loops. Tools such as [Causal Loop Diagrams](#) help map these cause-and-effect patterns. Methods like [Leverage Point Mapping](#) show where small changes might lead to big effects. Frameworks such as [Systems Archetypes](#), the [Iceberg Model](#), and [Cynefin](#) are intended to assist in making sense of system behaviour and help select suitable actions [[33](#) , [49](#)].

Recognizing that a system is possibly complex also means accepting its unpredictability. Methods like [Scenario Planning](#) [[50](#)], [Morphological Analysis](#) [[51](#)], and visualizations, such as the [Futures Wheel](#) [[47](#)], help explore possible developments and ripple effects. These methods don't offer control, but they help us prepare for change and uncertainty.

Some methods also make abstract system categories easier to grasp. For instance, terms like “open systems” or “resilient systems” can feel vague until paired with methods such as stakeholder mapping, causal loop diagrams, or rich pictures. These methods help bridge the gap between general ideas and practical engagement, making it easier to apply systems thinking in the real world [[32](#) , [33](#) , [52](#)].

Turning Toward Action

While many systems share similar core traits (see: “ [Understand Systems](#) ”), not all need the same attention or effort to manage. Supposedly simple systems, like light switches or mechanical levers, seem predictable and easy to handle. But most real-world challenges, such as climate change, financial instability, or organizational change, take place within systems that are interconnected, adaptive, and often unpredictable [[37](#)].

Recognizing their supposedly complex nature isn't enough. Without the right approaches, even getting started can feel overwhelming. That's why practical methods are essential: they help bridge understanding and action, linking what we know about a system with what we can actually do [[52](#)].

Systems thinking, when paired with the right approaches, helps us to do the following:

- *Reveal hidden patterns and relationships* : Spot trends and connections that aren't obvious [[33](#)].
- *Find leverage points for real change*: Identify where small shifts can make a big difference [[33](#)].
- *Deal with uncertainty and adapt as things change*: Stay flexible and adjust to new conditions [[44](#)].

After looking at how classifications, methods, and tools help us engage with systems, we now turn to the mindset that ties it all together. Tools and methods matter, but how we frame, interpret, and act on what we see matters just as much. Systems thinking gives us that lens: it helps reveal structure and patterns and helps us reflect on our role within the system.

Understand Systems Thinking

DOI: [10.4324/9781003658610-4](https://doi.org/10.4324/9781003658610-4)

There are many ways of thinking. At its core, thinking is the mental process of making sense of information, forming judgments, and guiding actions. Some kinds of thinking focus on quick fixes. Others step back and look at patterns. Some try to break things into parts. Others look at how things connect. Not all types of thinking work well in every situation. When we're dealing with something that changes over time, has many moving parts, or doesn't respond to simple fixes, a more connected kind of thinking is needed.

That's where systems thinking comes in.

Systems thinking is often described in broad or holistic terms, but those phrases can be vague and do not explain how systems actually behave. One simple way of putting it is that systems thinking is “thinking about systems.” More accurately, systems thinking focuses on how systems generate behaviour through the interactions of their components [[33](#) , [52](#) , [53](#)] or, in the case of social systems, through ongoing communication processes that reproduce the system itself [[54](#)].

Brief History

Most published histories of systems thinking focus on academic and institutional developments in Europe and North America. As a result, they often foreground modern, formalized approaches while overlooking cultural and indigenous traditions that have long emphasized connection, balance, and interdependence, even if not described using systems language. While these broader traditions exist, the historical development of systems thinking in academic literature is usually traced as follows:

Over time, different people and schools of thought have shaped how systems thinking is used and understood. It is often described that this development has happened in waves, with each wave adding new ideas and tools for addressing connected problems [[8](#) , [22](#) , [55](#)]. The wave metaphor offers a useful overview but simplifies a more complex development. In practice, many of these approaches have evolved in parallel, overlap, and continue to influence each other. There are also different ways of defining the waves, depending on which traditions and frameworks are emphasized.

The first wave (hard systems thinking) focused on structured, goal-oriented problem-solving, modelling, and control, often using formal models to analyse interrelationships between system components. One of the earliest contributions came from Russian thinker Alexander Bogdanov, who developed *Tektology* (1910–1913) – a general science of organization [[56](#)]. He argued that social and organizational systems should reflect natural systems, or they would fail. Although his work was later suppressed in the Soviet Union, it laid important conceptual groundwork for later systems theories.

This early interest in wholes and interconnection re-emerged in the West. In the 1940s and 1950s, the development of cybernetics by Norbert Wiener [[57](#)] and W. Ross Ashby [[34](#)] introduced key ideas like feedback, control, and communication – particularly in the context of machines and biological systems. Around the same time, Kenneth Boulding’s paper “General Systems Theory – The Skeleton of Science” [[58](#)] applied systems thinking to economics and social science. Later, Ludwig von Bertalanffy’s *General System Theory* (1968) [[30](#)] offered a broad conceptual framing of how systems work. It proposed that systems show properties that cannot be understood by analysing their components separately. This laid the groundwork for interdisciplinary systems thinking, emphasizing the importance of understanding wholes, patterns, and structures.

During this period, systems thinking was strongly linked to intervention and practical problem-solving, often through structured modelling approaches such as system dynamics [[59](#) , [60](#)] and the viable system model [[61](#) , [62](#)]. The goal was to optimize performance or improve planning through rational, often expert-driven methods.

The second wave (soft systems thinking) introduced the importance of perspectives. As the limits of purely technical and control-based approaches became clear, attention shifted in the 1970s and 1980s to the role of human viewpoints, interpretation, and learning. Many real-world problems were recognized as ill-structured or “messy,” involving multiple stakeholders with different goals and worldviews.

Soft Systems Methodology [[32](#)] provided a structured way to explore these different perspectives and support learning in situations where problems cannot be clearly defined in advance. Similarly, Strategic Assumption Surfacing and Testing [[63](#)] offered ways to uncover and examine the assumptions behind competing positions. The focus moved from prediction and optimization toward negotiation, participation, and collaborative sense-making, emphasizing that understanding complex situations often requires dialogue, not just technical expertise.

The third wave (critical systems thinking) introduced critical reflection on power, values, and ethics in system interventions. It emphasized that systems are not neutral or purely technical but involve decisions about boundaries, inclusion, and exclusion [[8](#) , [22](#)]. Interpretive and constructivist approaches [[64](#) , [65](#)] stressed that systems are shaped by the observer’s purpose, interests, and cultural context. Rather than assuming that system boundaries are fixed, critical systems thinking views boundaries as choices that reflect particular perspectives and serve particular interests.

Critical Systems Heuristics [[22](#)] provided a structured way to examine whose interests are being represented, which voices are included or excluded, and how power relations shape system designs. This wave shifted attention from technical solutions to issues of fairness, legitimacy, and emancipation, encouraging practitioners to reflect on the broader social and ethical consequences of system interventions.

The fourth wave (complexity and adaptive systems) addresses systems that are dynamic, nonlinear, and unpredictable. Complexity science [[46](#) , [48](#) , [66](#)] explores how large numbers of interacting elements produce emergent behaviour that cannot be explained by analysing parts in isolation.

Concepts such as self-organization, adaptation, and emergence are central to this view. Complex adaptive systems (CAS) are characterized by ongoing change, distributed control, and sensitivity to initial conditions. While this perspective is widely adopted, some thinkers instead emphasize universal structures of systems thinking, highlighting frameworks such as DSRP [[27](#)]. Alongside this work, new ideas about living and social systems also took shape, such as the concept of autopoiesis. Autopoiesis [[67](#)] describes systems as self-producing entities that maintain themselves through internal processes rather than external control. Niklas Luhmann [[54](#)] applied autopoiesis to social systems, arguing that they reproduce themselves through communication, constructing their own meaning rather than simply reacting to their environment.

Today's systems thinking has become a mix of approaches, shaped by fields as different as neuroscience, complexity science, social theory, and consciousness studies. These fields use systems terms but often in different ways.

Concepts like meaning, perception, ethics, and emergence have moved to the foreground, replacing earlier emphasis on control and prediction. The field is shifting away from managing systems from the outside and toward acting wisely within them. The real challenge now is practical and ethical: how to respond with awareness, care, and adaptability in complex, uncertain situations, where people have different values [[39](#) , [49](#) , [68](#)].

Two Strands

Systems thinking has developed across a wide range of disciplines and traditions. Within this diversity, two main strands can be distinguished:

- *Theoretical systems thinking* , which focuses on understanding what systems are and how they work. This includes describing system elements, relationships, boundaries, and purposes – the basic building blocks of systems theory. It draws on formal models, abstract concepts, and general principles that help frame complex situations. This strand is sometimes described as *conceptual*, *ontological* , or *thinking about systems* and includes work by foundational thinkers such as Ashby, von Bertalanffy, Checkland, Churchman, and Luhmann [[30](#) , [34](#) , [38](#) , [54](#) , [64](#) , [69](#)].
- *Applied systems thinking* , which focuses on how systems concepts can be used in practice – to support learning, diagnosis, planning, or intervention in complex, real-world contexts. It includes methods such as causal loop diagrams, soft systems methodology, and critical systems heuristics. This strand is often referred to as *practical*, *methodological* , or *thinking with systems* , drawing on the work of Checkland, Ison, Meadows, Midgley, and Hoverstadt [[8](#) , [33](#) , [62](#) , [64](#) , [70](#)].

This book follows the applied strand of systems thinking. It builds on the work of practitioners such as Forrester, Meadows, Midgley, Senge, and Sterman [[8](#) , [33](#) , [52](#) , [59](#) , [71](#)], who, among other things, developed approaches to support decision-making, facilitation, and systems-based inquiry.

At the same time, insights from the theoretical strand help us understand the assumptions behind these tools. Thinkers like Maturana and Varela (autopoiesis), Prigogine (self-organization), and Haken (synergetics) have shaped how we conceptualize systems in fields such as biology, sociology, and complexity science. While their contributions are foundational, they are not always directly aimed at application or intervention [[42](#) , [67](#) , [72](#)].

By making this distinction clear, the book supports readers move between theory and practice – using systems ideas not only to act in the world but also to reflect on how systems are seen, framed, and understood. It encourages practitioners to remain aware of how their own framing shapes what they notice, prioritize, and do in complex situations.

9 Core Concepts of Systems Thinking

Having clarified the historical and theoretical foundations, we now turn to the practical building blocks of systems thinking – concepts that help us understand, engage with, and influence systems in applied settings.

Systems thinking offers a way to look beyond events and linear cause-and-effect. Instead, it focuses on the patterns, structures, and mental models that shape system behaviour over time [[71](#)].

There are many ways to approach systems thinking, and different disciplines may emphasize different approaches or ideas. The concepts discussed here are among the most widely used across fields and offer a common foundation for applied work. They're not the only valid approach, but they provide a strong starting point for practice.

Concepts such as interconnectedness, feedback loops, stocks and flows, delays, nonlinearity, emergence, boundaries, perspectives, and leverage points give us practical tools for mapping systems, identifying points of intervention, and reflecting on how our framing shapes what we notice and act on. These ideas help shift the focus from isolated problems to the relationships and interdependencies that shape real-world outcomes [[33](#)].

With a foundational understanding of systems as mental constructs, we can now explore these core concepts in more detail. Feedback loops show how systems self-regulate or reinforce change. Stocks and flows represent how things build up or move over time. Delays and nonlinearity highlight how timing and scale matter. Emergence describes patterns that arise from interaction. Leverage points help identify where small changes might make the biggest difference. And boundaries and perspectives remind us that how we see the system shapes how we engage with it.

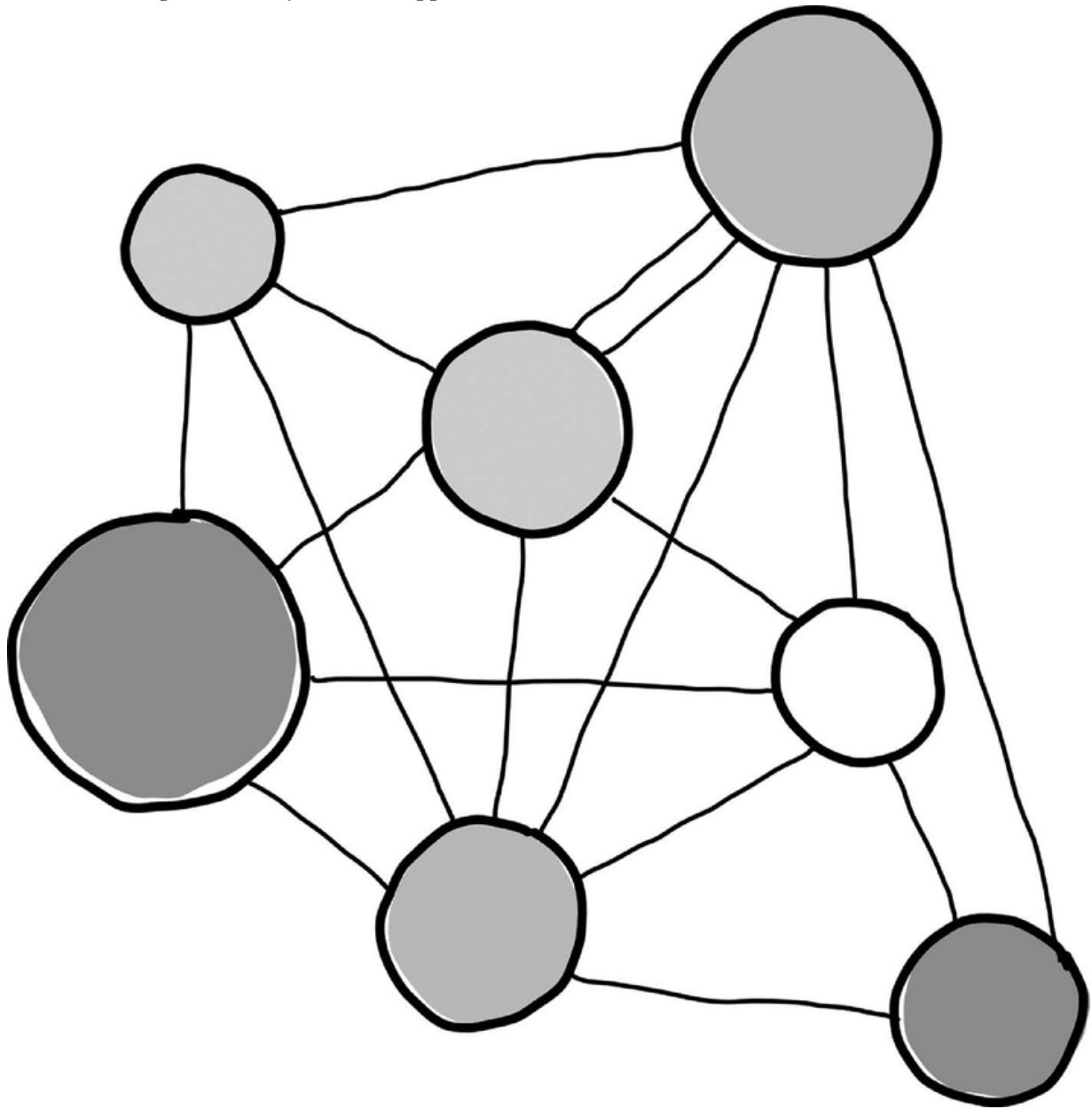
Now, we look at the core concepts in detail:

Interconnectedness

Interconnectedness describes how all parts of a system are linked, often in ways that are not immediately visible. No part functions in isolation. The behaviour of any individual element depends on its relationships with other elements [[33](#)]. This network of connections gives rise to the system's overall behaviour.

In practical terms, this means that a change in one area can lead to effects elsewhere – sometimes expected, sometimes not. For instance, in urban planning, investing in bike lanes might reduce car traffic, which then lowers air pollution, improves public health, and even affects housing demand along those routes. These chain reactions often cross traditional boundaries between sectors or domains.

Failing to consider interconnectedness can lead to short-term fixes that create long-term problems elsewhere. Systems thinking helps us zoom out, identify those connections, and understand how actions in one part of the system can ripple across others.



The following examples show how changes in one part of a system can trigger effects elsewhere.

Examples

- *Building more* bike lanes may reduce car use, which lowers pollution, improves public health, and increases housing demand near bike-friendly areas.
- *In agriculture* , using chemical fertilizers might boost crop yields short-term but over time can degrade soil, reduce biodiversity, and contaminate water sources.
- *Cutting school budgets* could save money now but might later lead to higher dropout rates, reduced job readiness, and long-term economic costs.

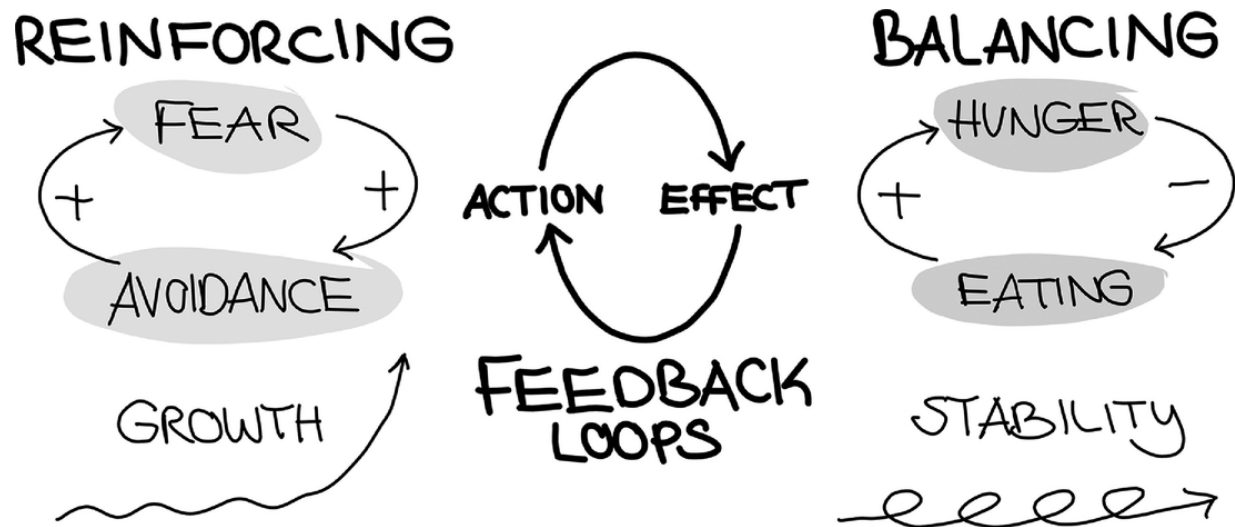
Feedback Loops

Feedback loops describe how parts of a system influence each other through circular cause-and-effect relationships. These loops can either reinforce change or balance it out over time. Understanding them helps explain why systems grow, adapt, stabilize, or spiral out of control [[33](#) , [71](#)].

There are two main types:

- *Reinforcing loops* (also called positive feedback) amplify change. Each action pushes the system further in the same direction. These loops are behind patterns like exponential growth or collapse.
- *Balancing loops* (negative feedback) work in the opposite way: they push back against change to help maintain stability or reach a goal. They're responsible for regulation and self-correction in systems.

Not all feedback is obvious or controllable. Some loops are easy to model (like thermostats), as in control systems, while others (like team motivation) involve delays, uncertainty, or effects we only see over time. In social and complex systems, feedback may not follow strict or fully predictable patterns. This can lead to delays, hidden effects, or unintended consequences, especially when multiple loops interact.



The following examples illustrate how reinforcing and balancing loops affect system behaviour over time.

Examples

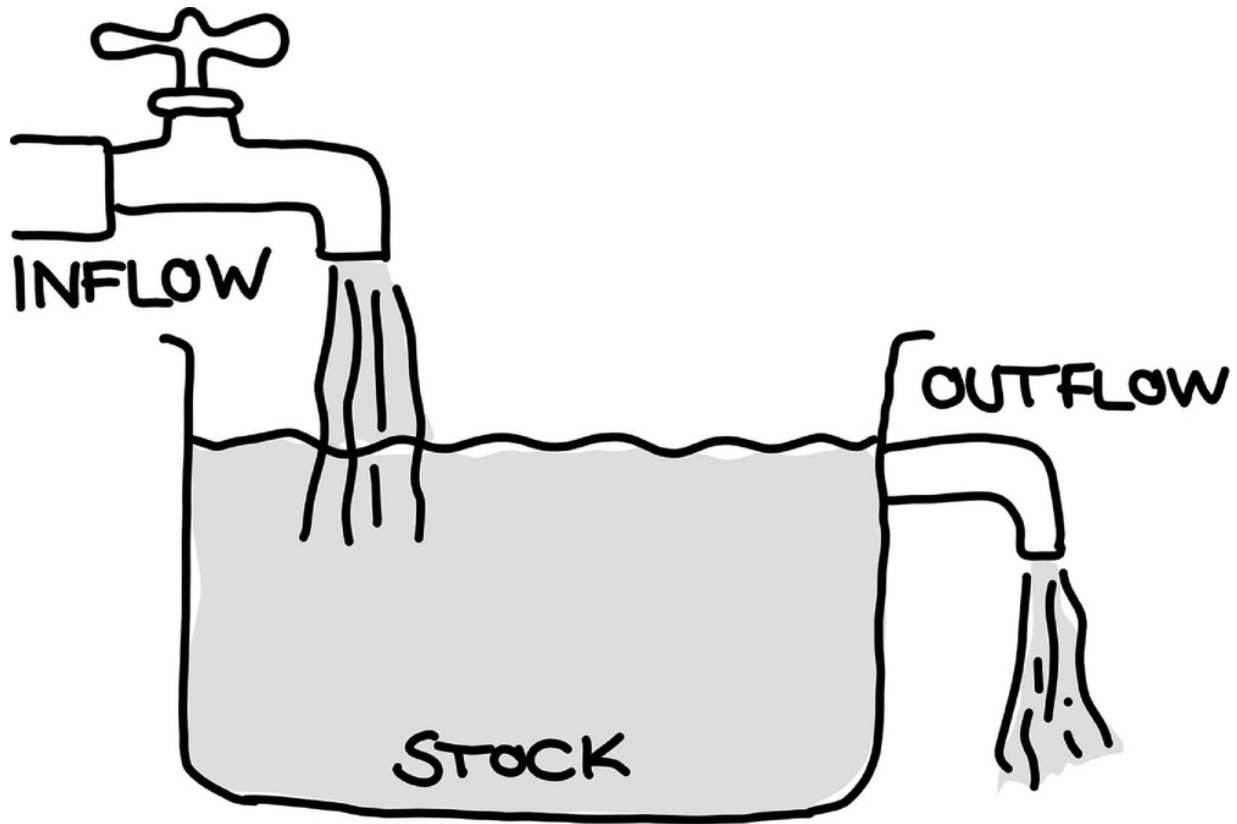
- *Population growth* is driven by a reinforcing loop: more people lead to more births, which increases the population, which then leads to even more births.
 - *A thermostat* is part of a balancing loop: when the room temperature drops below the set point, the heating turns on; once the target temperature is reached, it turns off again. This keeps the system stable.
 - *Team motivation* can be shaped by a reinforcing loop: reaching goals boosts morale, which increases motivation, making further success more likely.
-

Stocks and Flows

Stocks and flows help us understand how parts of a system grow or shrink over time – and how those parts interact [[71](#)].

- A *stock* is something that accumulates or depletes. It represents a quantity at a specific moment and tends to change gradually.
- A *flow* is what changes the stock – either adding to it (*inflow*) or reducing it (*outflow*) [[33](#)]. These two elements shape system behaviour over time.

By observing how stocks and flows behave, we can identify what drives change in a system and where interventions might be most effective. These relationships are often visualized in stock-and-flow diagrams, where stocks are shown as boxes and flows as arrows to reveal the system's structure.



The following examples show how resources build up, drain, or shift within a system.

Examples

- *Water in a reservoir* is a stock: rain and river inflow increase it; evaporation or usage decreases it.
- *Money in a bank account* is a stock: deposits add to it; withdrawals reduce it.
- *The number of people* in a city is a stock: births and migration increase it; deaths and emigration reduce it.
- *Traffic congestion* is a stock of cars on the road: cars entering add to congestion; cars exiting reduce it.

Delays

Delays refer to the time gaps between an action and its visible effect in a system. These delays are common in both physical and social systems, and they often lead to confusion, misinterpretation, or overreactions [[71](#)].

When delays are not recognized, people may assume their actions have no effect or the “wrong” effect. This can lead to policies being reversed too soon or to actions that overshoot the goal. In

systems with strong feedback loops, delays can even cause instability or oscillations, where responses come too late and overcorrect.

Understanding delays helps us make more thoughtful decisions. It encourages patience when needed and helps avoid reacting to short-term symptoms rather than long-term trends. Recognizing delays also supports to explain why systems don't always respond immediately or predictably to interventions.



The following examples highlight how delayed responses can affect how we interpret and respond to change.

Examples

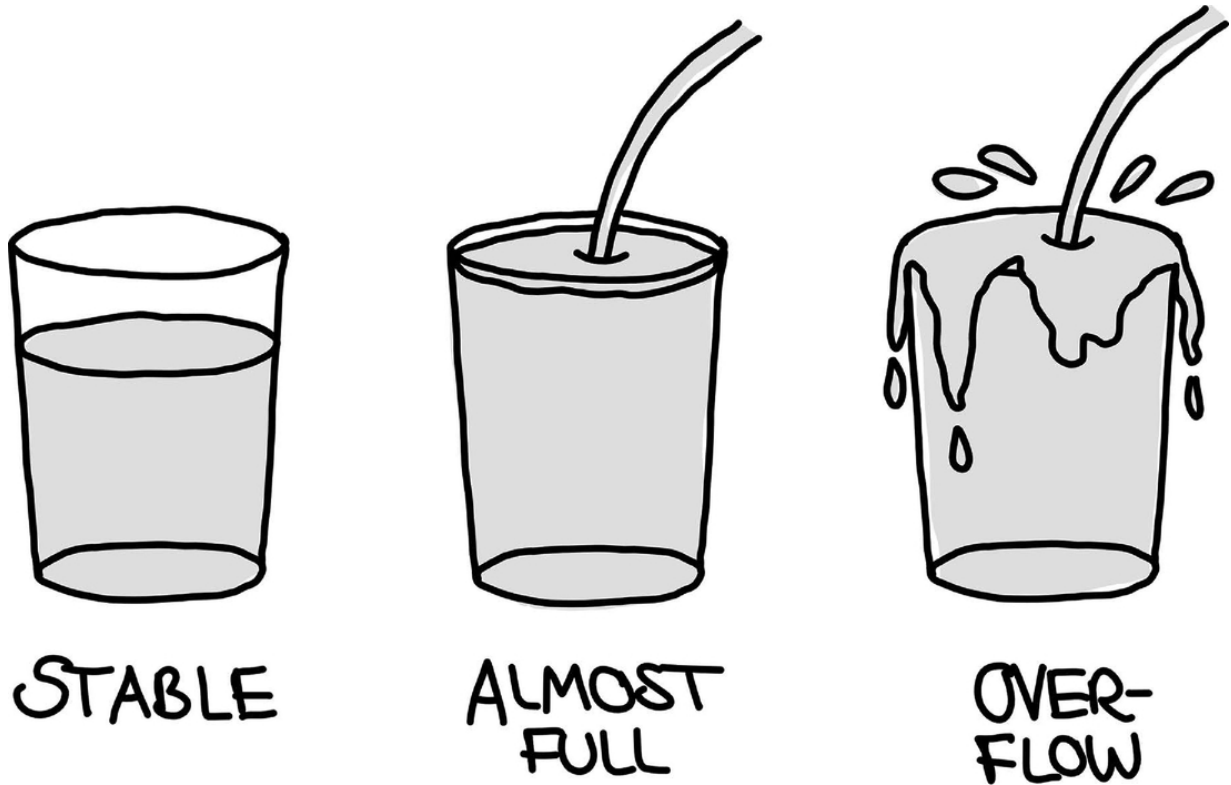
- *A government* increases healthcare funding, but improvements in health outcomes may take years to appear. Reversing the policy too soon could undo long-term gains.
- *Greenhouse gas emissions* released today may not cause visible climate effects for decades, making it difficult to generate urgency in the present.
- *A company* responds to falling sales with aggressive marketing, but due to delayed customer response, it overcompensates and floods the market.
- *In supply chains*, production adjustments take time to impact inventory, often leading to cycles of over- and understocking.

Nonlinearity

Nonlinearity means that cause and effect in systems are not always proportional. A small change might have no visible effect, or it might push the system into a new state with very different behaviour. The outcome depends on timing, context, and how close the system is to a threshold or tipping point [[33](#)].

This makes systems more difficult to predict and manage. Nonlinearity challenges the assumption that a certain level of input will always produce a matching level of output. It shows that context, thresholds, and feedback matter just as much as the action itself. In practice, this means that even well-intentioned interventions can have minimal effect or trigger major, unintended shifts.

Understanding nonlinearity helps decision-makers avoid oversimplified thinking and consider how systems might respond in unexpected ways as conditions change.



The following examples show how outcomes don't always scale with inputs; small actions may have big or no effects.

Examples

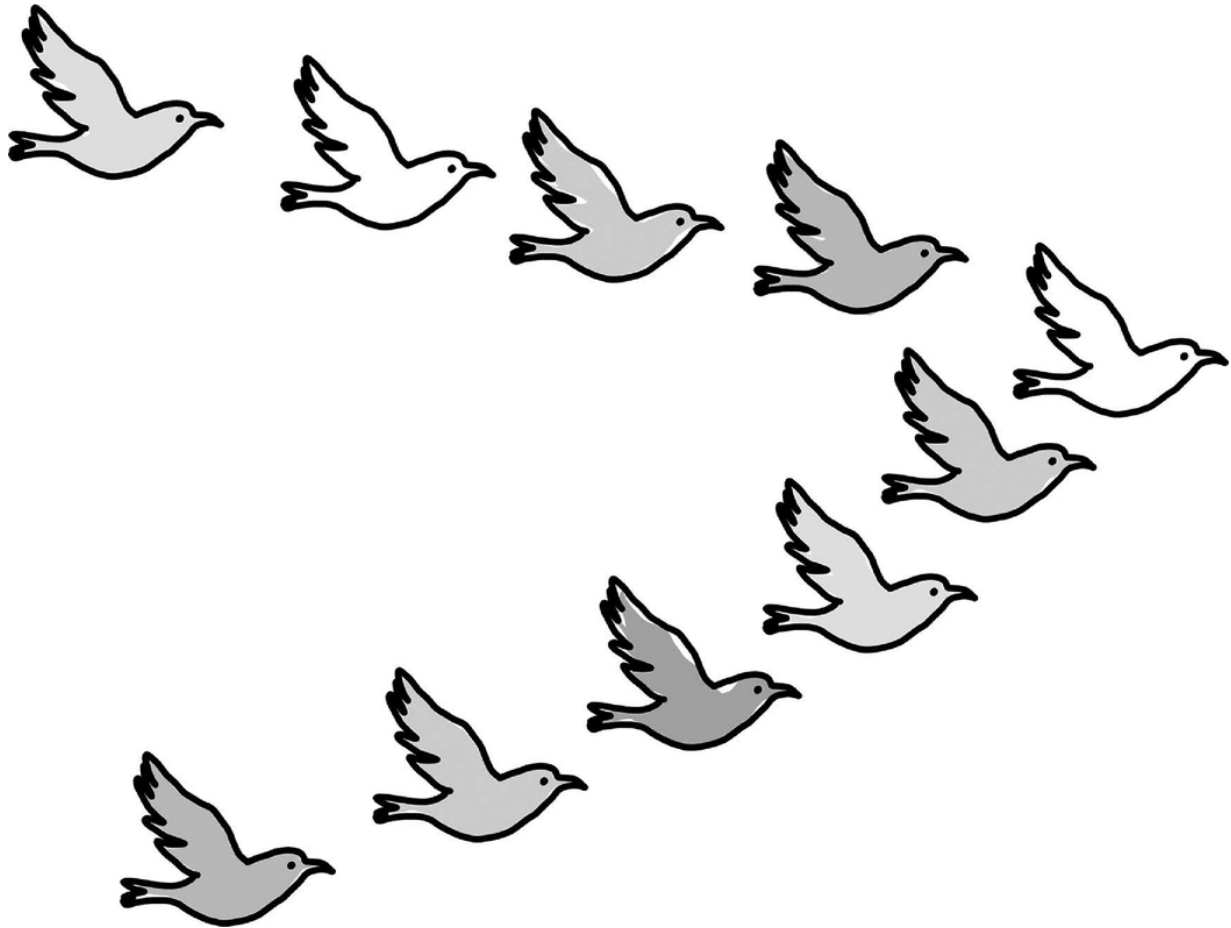
- A small *increase in pollution* may have no visible effect – until it crosses a threshold that causes rapid species collapse in an ecosystem.
 - *Reducing wait times* in a customer service setting might have little impact – unless the system is already under strain, in which case even a small improvement could shift public perception dramatically.
 - A minor *policy adjustment* might go unnoticed in a stable economy, but in a fragile one, it could trigger significant market volatility.
 - *In education*, small class size reductions may have limited effects – until they reach a point where teacher-student interaction quality shifts significantly.
-

Emergence

Emergence describes how patterns, behaviours, or properties arise from the interaction of simpler elements – without any single part containing or controlling the whole outcome [32]. This means that a system can display qualities that none of its parts have in isolation.

Emergence is often hard to spot because it can look like there's a central cause, even when there isn't. The system's behaviour "emerges" from how parts relate to each other. Studying components individually can miss what only becomes visible when everything interacts as a whole.

This concept is widely used in fields like biology, sociology, and artificial intelligence. In systems thinking, emergence explains why interventions at the component level don't always work and why system-wide behaviours can seem unpredictable. It reminds us to focus on structure, interaction, and context, not just individual parts.



The following examples illustrate how simple interactions can lead to surprising system-level patterns.

Examples

- *Consciousness* is not found in a single neuron but emerges from the interactions of billions of them.
 - *Market trends* are not caused by one decision-maker but by the combined behaviour of many individuals responding to shared signals.
 - *Traffic patterns* don't come from one driver but emerge from the timing, spacing, and flow of many vehicles interacting at once.
 - *A bird flock* moves as a coordinated group, but no single bird is in charge. The collective behaviour comes from local rules followed by each bird.
-

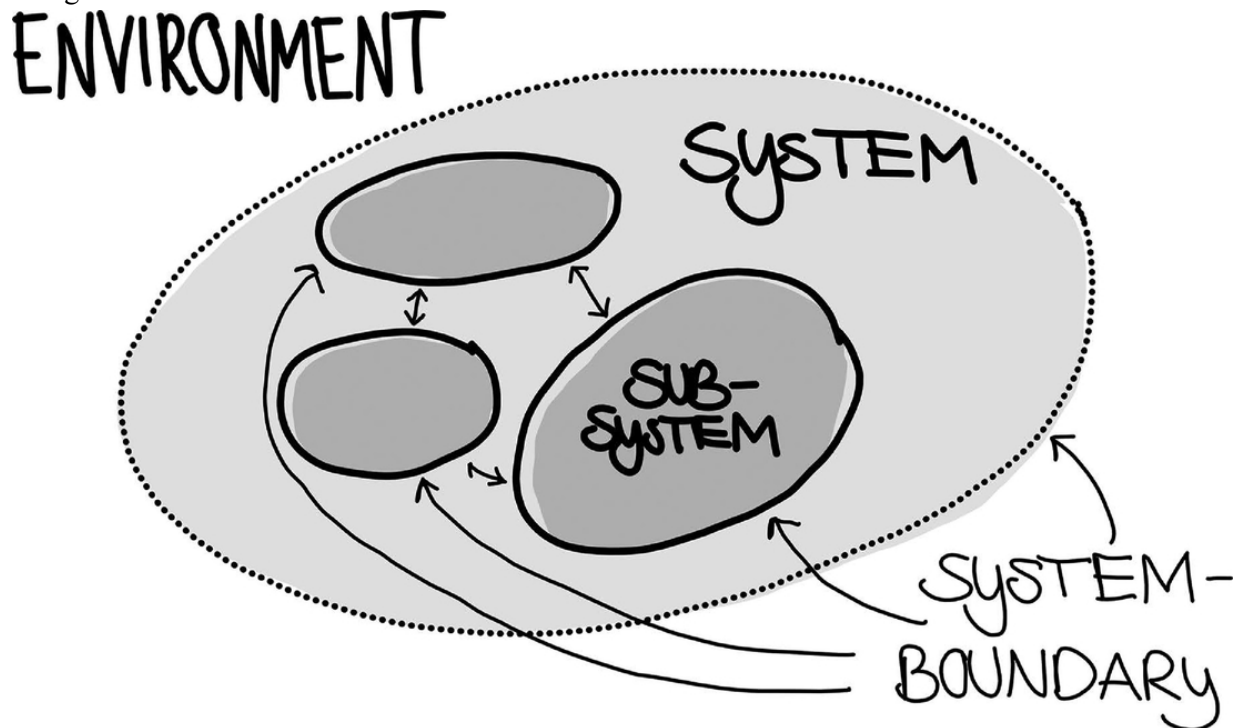
Boundaries

Boundaries define what is included and excluded when we analyse a system. They are not fixed but shaped by the perspective of the person or group doing the analysis [8]. Different stakeholders may see the same system in very different ways, depending on their values, interests, roles, and experiences.

At the same time, boundaries are also shaped by practical limits, by what we can observe, measure, or model. In complex systems, we often simplify by drawing boundaries that make the system easier to study or manage. But these choices also come with trade-offs.

Because of this, boundaries are not just technical, they are also political. Whoever defines the system's boundaries also defines what counts as relevant, what gets attention, and what is left out. These choices influence how problems are framed and which solutions are seen as legitimate.

In systems thinking, questioning and adjusting boundaries is a key part of making sure different viewpoints are considered. It helps reveal blind spots and opens up space for more inclusive, thoughtful interventions.



The following examples show how defining what's inside or outside a system affects how we understand and work with it.

Examples

- *A city's transport system* may be seen by a commuter as roads and transit routes, by an ecologist as a source of emissions, and by a policymaker as an infrastructure investment.

- *A school system* might be viewed by teachers as a learning environment, by parents as a support structure, and by budget officials as a cost centre.
- *In healthcare*, a hospital administrator might focus on operations, while a patient cares more about trust, access, and well-being – each framing defines different boundaries.

Perspectives

Perspectives describe the different ways people understand and define a system. What one person sees as a problem, another might see as a solution, or does not see as a problem at all. These differences depend on people's roles, values, experiences, and positions within or around the system [[8](#)].

In systems thinking, perspectives are not just opinions, they also shape how systems are mapped, which elements are considered important, and what outcomes are pursued. Overlooking them risks creating narrow, incomplete, or biased understandings of the system.

These views are not fixed, people may revise their understanding through dialogue, learning, or exposure to new evidence.

Recognizing these different views doesn't make things easier, but it does make our understanding of systems more honest, inclusive, and useful.



The following examples highlight how different viewpoints can shape how a system is described or understood.

Examples

-
- A patient sees the healthcare system as a lifeline. A nurse sees it as a place of work. A government administrator might see it mainly in terms of cost and efficiency.
 - A river might be viewed as a sacred site by Indigenous communities, a resource by farmers, or a hazard by flood managers.
 - A school system can be seen as a place for learning by students, a job environment by teachers, and a policy tool by education departments.
-

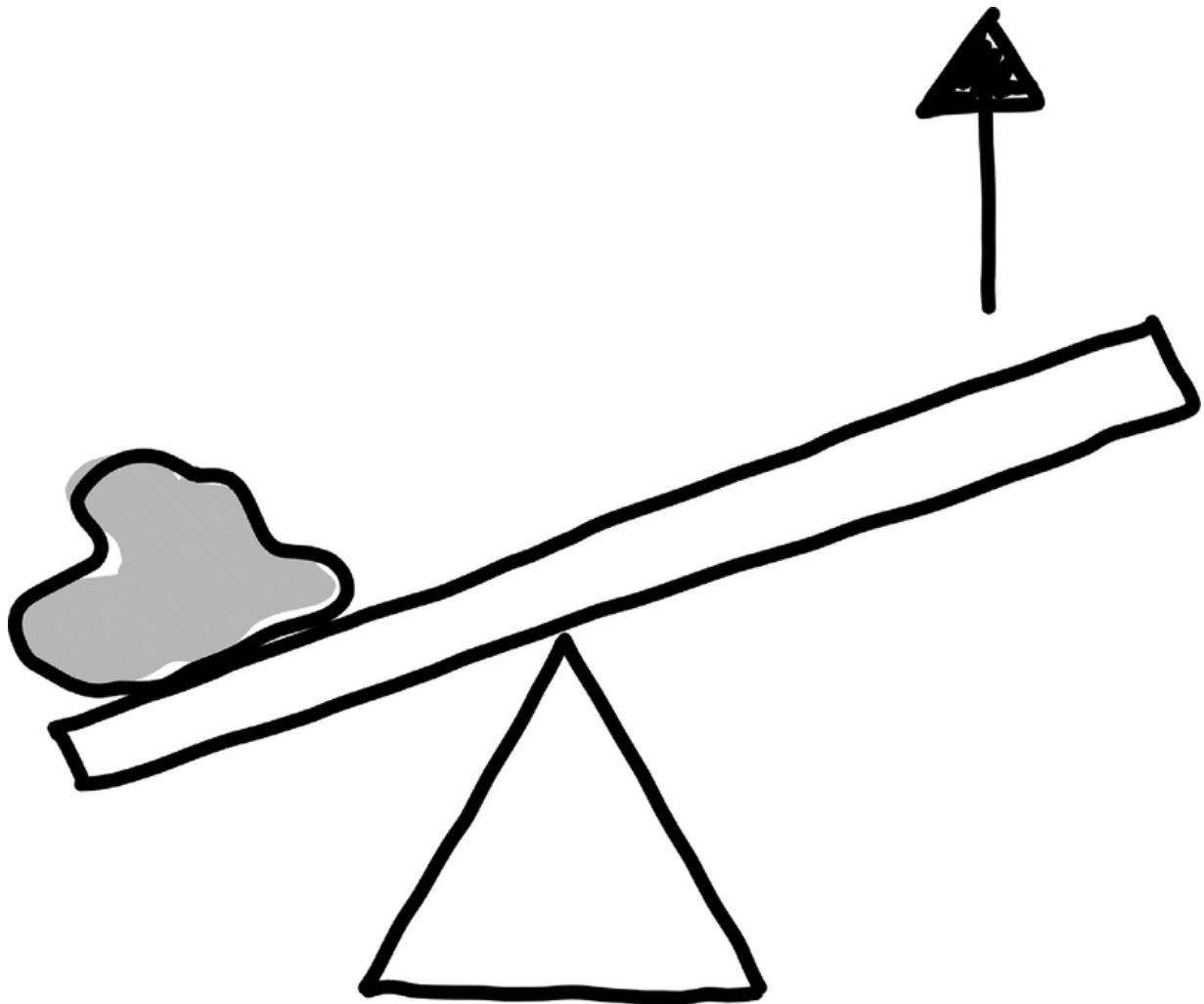
Leverage Points

Leverage points are places in a system where a small shift can lead to big, lasting change [[73](#)]. These points matter because they show us where to act if we want the most impact with the least effort, like a well-placed push on a seesaw on a children's playground.

Donella Meadows, a key voice in systems thinking, described different kinds of leverage points – some easier to change, others more powerful. For example, changing numbers (like tax rates) is a shallow leverage point. Changing how people think or what goals the system serves is much deeper – and often harder – but it can transform the whole system.

While the term “points” is widely used, it can be misleading. These aren't fixed spots in a machine. Often, they are patterns of interaction, relationships, or flows within the system – ongoing structures that shape behaviour over time.

Understanding these deeper patterns helps us move beyond surface fixes and focus on changes that truly last. It also helps avoid wasting time on adjustments that won't matter in the long run.



The following examples show how targeted changes in the right place can shift the behaviour of an entire system.

Examples

- Improving how *information flows in an organization* (e.g., clearer internal communication) can boost trust, reduce delays, and raise morale.
- *In a transport system*, changing road rules might help, but changing how people *think* about car use (e.g., encouraging bikes or public transit) can shift the entire system.
- *In education*, changing test formats might tweak outcomes. But shifting the purpose of schooling – from performance to learning – can reshape the system completely.

The principles earlier reflect core concepts commonly discussed in systems thinking literature. Different authors and schools of thought may emphasize additional principles or frame them

differently, depending on their perspective, discipline, or purpose. Still, these concepts offer widely used tools to see patterns, uncover causes, and better understand how systems behave not just in theory but also in real-world systems. Together, these concepts shift our attention away from quick fixes and isolated symptoms toward deeper structures, relationships, and dynamics.

Systems thinking is especially valuable when working with uncertainty, change, and interdependence – as found in public health, education, urban planning, environmental policy, and organizational life. It equips us to see more clearly, act more thoughtfully, and stay aware of how our own framing shapes what we notice and how we intervene.

In the end, systems thinking doesn't promise control or simple answers. Instead, it offers better questions, deeper insight, and more realistic ways to engage with the world we live in.

Think in Systems

DOI: [10.4324/9781003658610-5](https://doi.org/10.4324/9781003658610-5)

Thinking in systems starts with attention – what you notice, what you ignore, what you assume, and how you decide what something is “really” about.

In systems work, the way we frame things often *is* the work. A person who sees only parts will act on the parts. Someone who sees relationships and feedback will act very differently. This chapter is about that difference.

We’re not looking for the “right” mindset as a fixed thing. It is a way of noticing – a set of thinking habits, such as the following:

- Paying attention to what’s included and what’s excluded
- Asking what parts make up a system – and how those parts relate
- Watching for patterns, not just events
- Remembering that every view is just that – a view, from somewhere

These are subtle shifts in how people make meaning. Some of these habits have been formalized into structured models. For example, Cabrera and Cabrera [[53](#)] describe four basic habits: making distinctions, recognizing part-whole systems, identifying relationships, and taking perspectives. They call it the [DSRP Framework](#), which is also presented later in this book (cf. [Part 3](#)). This framework is a structured method for thinking that helps build the habit of pausing, slowing your immediate reaction, and looking one level deeper.

When someone says, “This process is broken,” pause:

What’s the process? Where does it begin? What’s assumed to be inside it? Who’s left out?

When someone says, “We need to fix this,” ask:

Is it a one-time event or part of a longer pattern? What’s reinforcing it? Who benefits from how it works now?

Systems thinkers do not have magic answers. They simply ask better questions – earlier. The rest of this chapter explores these habits: how they work, why they matter, and how they shape what happens next.

7 Core Habits for Systems Thinkers

Systems thinking is not limited to diagrams or terminology. It represents a shift in how we perceive and interpret the world around us. The habits discussed here are not sequential steps but cognitive

practices – ways of directing attention to aspects that often remain hidden: feedback loops, time delays, interconnections, mental models, and one's own role in shaping the systems being observed.

They are shared mental practices drawn from over six decades of systems research and application across disciplines. They synthesize recurring insights found in core systems traditions, including the following:

- System dynamics, pioneered by Jay Forrester [[59](#)] and developed by John Sterman [[71](#)];
- Organizational learning, through Peter Senge's five disciplines [[52](#)];
- Cybernetics, introduced by Norbert Wiener [[57](#)] and extended by von Foerster [[36](#)];
- Soft systems methodology, from Peter Checkland [[32](#)]
- Critical systems thinking, advanced by Churchman [[69](#)], Ulrich [[22](#)], and Midgley [[8](#)]; and
- And leverage-focused interventions, through Donella Meadows [[33](#) , [73](#)].

Different thinkers emphasize different habits – some include more, others fewer. The seven included here reflect patterns that appear across major sources. They serve as practical anchors for engaging with complex systems – supporting awareness of feedback, delays, interconnections, boundary choices, mental models, and one's role as both observer and actor.

Together, these habits form a usable foundation for systems thinking in action – not to replace existing methods but to sharpen the mindset behind them.

We now turn to the individual habits, starting with the following:

1. Look for Patterns, Not Just Events

When something happens – a missed deadline, a sudden breakdown, an unexpected success – our natural tendency is to focus on that isolated incident. Systems thinkers, however, train themselves to see beneath these surface events to the patterns generating them.

As Jay Forrester [[59](#)] demonstrated in his foundational work on system dynamics, what appears as a crisis or sudden change is often just one visible point on a longer trajectory. The isolated event isn't the story; the underlying structure producing it is what matters. These structures often involve reinforcing feedback loops, delayed effects, or accumulated pressure that eventually crosses a threshold.

In practice, this means asking:

- “Is this part of a recurring pattern we've seen before?”
- “What trends are forming over time that might explain this event?”
- “If we graphed this situation over months or years, what curve would we see?”

John Sterman [[71](#)] emphasized that graphing behaviour over time is essential for exposing system dynamics that remain invisible when we fixate on individual incidents. And as Peter Senge observed, “Seeing patterns of behaviour rather than events is the beginning of systems thinking” [[52](#)].

This shift – from reacting to individual events to recognizing underlying patterns – moves us from reactive firefighting to genuine systems insight. It’s the foundation for all other systems thinking habits.

2. Always Ask: What's the System?

Before attempting to solve a problem, systems thinkers first clarify: What system are we actually dealing with? Where does it begin and end? Who and what should be included in our analysis?

These boundary questions aren’t merely technical decisions; they’re profoundly consequential choices that determine what gets attention and what remains invisible. C. West Churchman [[69](#)] was among the first to highlight the ethical dimension of system boundary judgments, noting that how we define a system inherently privileges some perspectives while marginalizing others.

Werner Ulrich formalized this insight through his Critical Systems Heuristics [[22](#)], providing structured methods for questioning boundary assumptions. As he noted, “Every boundary judgment has ethical consequences.” Deciding what’s “in” vs. “out” of our system analysis directly shapes what solutions become possible.

When engaging with any system, ask:

- “What elements and relationships am I including in this system?”
- “What important factors might I be overlooking or excluding?”
- “Who benefits from defining the system boundaries this way?”
- “Whose perspectives or needs are being marginalized by this framing?”

Building on Ulrich’s work, Gerald Midgley [[8](#)] incorporated boundary critique as a reflexive practice – a way to systematically question how we’re defining problems and who gets to participate in finding solutions. This critical awareness of boundary judgments helps prevent the common mistake of solving the wrong problem precisely.

3. Zoom In, Zoom Out

Systems reveal different patterns depending on our level of focus. What appears as individual miscommunication at a close-up level might reveal itself as systemic understaffing or structural pressure when viewed from a broader perspective.

Systems thinkers cultivate the ability to shift their vantage point deliberately – moving between detailed examination and bird’s-eye view to gain richer understanding. This capacity to change scale perspective connects to Holling’s panarchy theory [[74](#)], which demonstrates how systems operate simultaneously at different spatial and temporal scales, with different dynamics emerging at each level.

This habit involves conscious perspective shifts:

- Zoom in: What specific interactions and behaviours are occurring in detail?

- Zoom out: What broader patterns become visible from a distance?
- Change time scales: How does this look over days vs. decades?

Peter Senge [[52](#)] emphasized this movement between the parts and the whole as essential for understanding underlying system behaviour. Similarly, Frank Geels [[75](#)] showed how innovation and transition processes can only be understood by examining interactions across micro (individual), meso (organizational), and macro (societal) layers.

When a situation seems confusing or intractable, try changing your zoom level; the problem might look entirely different from another scale.

4. Follow the Relationships

Traditional analysis breaks systems into their component parts. Systems thinking reverses this approach, recognizing that a system's behaviour emerges primarily from the relationships between elements, not from the elements themselves.

This perspective traces back to Norbert Wiener's [[57](#)] pioneering work in cybernetics, which placed feedback and communication at the centre of understanding complex systems. W. Ross Ashby [[34](#)] extended this by exploring how relationships create self-regulation and stability in natural systems. Gregory Bateson [[76](#)] further advanced this thinking, arguing that the basic unit of survival is not the individual but the relationship. His work laid the foundation for relational thinking in systems science.

For social systems, Niklas Luhmann [[54](#)] argued that communication itself forms the system. Social systems emerge through ongoing exchanges of information and meaning, rather than from individual people or fixed structures.

And Donella Meadows [[33](#)] noted, "The structure of a system is the pattern of interconnections between its components." Changing a single relationship – creating a new information channel, modifying a feedback loop, introducing a different decision rule – can transform system behaviour without changing any of the components themselves.

When analysing a system, focus your attention on:

- What's influencing what? Where do causal connections flow?
- Where is information flowing well or getting blocked?
- Are there reinforcing loops (where change accelerates) or balancing loops (where change is resisted)?
- What relationships seem missing that might make the system work better?

Fritjof Capra and Pier Luigi Luisi [[77](#)] reinforced this relational perspective from biological and cognitive science, showing how living systems exist fundamentally as relationship networks.

When you're trying to understand or change a system, don't look harder at isolated parts; look between them, at the connections.

5. Respect Delays

One of the most common mistakes in dealing with systems is expecting immediate results from our interventions. In reality, most systems have built-in delays – gaps in time between actions and their full effects, between decisions and their consequences, between problems and their visible symptoms.

Jay Forrester [[59](#)] demonstrated mathematically how even small delays in feedback loops can destabilize entire systems, leading to oscillations or unexpected outcomes. John Sterman's [[71](#)] experimental work showed that people consistently underestimate or misread delays, contributing to poor decision-making, especially in policy and organizational settings.

These time delays are particularly prominent in social, ecological, and economic systems:

- A company implements a new strategy, but results may take quarters or years to materialize
- A community adopts sustainability practices, yet environmental improvements lag behind
- A government changes policy, while effects ripple through society gradually

When working with systems, build delay-awareness by asking:

- “Where are there significant time gaps between cause and effect?”
- “How long might it reasonably take to see results from this intervention?”
- “What might happen if we act repeatedly before seeing the full effects of earlier actions?”

Meadows [[33](#)] noted, delays are one of the core system structures – and one of the most frequent sources of surprise – because they disconnect cause from effect over time.

Respecting these delays is essential for patience, appropriate timing, and avoiding the dangerous overcorrection that happens when we can't wait for feedback.

6. Notice Mental Models

Systems don't exist only in the physical world; they're also shaped by the cognitive frameworks we use to understand them. Mental models are the deep, often unconscious assumptions, beliefs, and frames through which we interpret reality. They determine what problems we recognize, what solutions we consider viable, and what metrics we value.

Peter Senge [[52](#)] identified mental models as one of five disciplines essential for building learning organizations, arguing that unexamined assumptions frequently block systemic insight. Similarly, Donella Meadows [[73](#)] placed paradigms – shared belief systems – near the top of her hierarchy of leverage points, showing how changing underlying mindsets can transform entire systems more powerfully than adjusting parameters or rules.

As Chris Argyris and Donald Schön [[78](#)] discovered, people often operate from implicit “theories-in-use” that contradict their stated intentions, creating systems that undermine the very goals they claim to pursue.

To surface these hidden models, systems thinkers regularly ask:

- “What core assumptions are we making that might not be true?”
- “Whose worldview is shaping how this problem is defined?”
- “What alternative perspectives might lead to different solutions?”
- “What are we collectively taking for granted that could be questioned?”

Derek and Laura Cabrera [[53](#)] advanced this work by developing DSRP theory (Distinctions, Systems, Relationships, Perspectives) to make mental models more explicit and workable. Their approach demonstrates that becoming aware of our conceptual frameworks is not merely philosophical; it’s practical and essential for effective systems change.

7. Stay Aware of Your Role

As a systems thinker, you are never a neutral observer standing outside the systems you study or seek to change. You are inherently part of those systems; your questions, your presence, your framing, and your interventions actively shape what emerges.

This insight stands at the heart of second-order cybernetics, developed by Heinz von Foerster [[36](#)], who insisted that “the observer must be included in the description of the system.” Humberto Maturana and Francisco Varela [[67](#)] provided biological foundations for this view, demonstrating how cognition itself is fundamentally participatory and bound within systems.

Peter Checkland [[32](#)] embedded this principle in Soft Systems Methodology, where the practitioner explicitly acknowledges their role within the inquiry process. Similarly, Werner Ulrich [[22](#)] showed how the observer’s values, interests, and position must be made transparent to ensure ethical systems practice.

This reflexive awareness raises important questions:

- “How might my presence be influencing what I’m observing in this system?”
- “What biases and blind spots am I bringing to this situation?”
- “How do my own goals and needs shape what I see as ‘the problem’?”
- “What role am I playing in how this system is evolving?”

This isn’t mere philosophical reflection; it’s practical humility. Recognizing your participation in the systems you wish to understand or change helps avoid the trap of presumed objectivity, opening space for more authentic engagement with complexity.

These seven habits aren’t acquired overnight. They represent an ongoing practice of perception, reflection, and engagement. They help us to spot patterns where others see random events, notice connections where others see separate parts, and include ourselves in the system we’re working with.

By cultivating these habits, we develop what systems pioneer Donella Meadows called “systems wisdom” – not just technical skill with models and methods but a deeper capacity to work with rather

than against the nature of systems [[33](#)].

How Systems Thinkers Make Meaning

Systems thinkers don't start with a fixed plan. They start with a different way of making sense of what's in front of them. The habits from the last section aren't just theory; they shape how people interpret real-world situations.

Where others might see confusion, contradiction, or chaos, systems thinkers ask different kinds of questions. Not because they know more – but because they're trained to look for structure, patterns, and relationships.

We might say, "It's not about having the full picture. It's about seeing enough to act wisely."

This reflects the core principle of bounded rationality [[38](#)] combined with systems pragmatism: you never see the whole system, but you act wisely by watching structure and patterns. Also aligns with Schön's idea of "reflection-in-action" [[79](#)] and Checkland's [Soft Systems Methodology](#) [[32](#)].

Next, we look at how systems thinkers make meaning in practice:

They look for structure before they look for solutions

If a problem keeps coming back, systems thinkers don't reach for a quick fix. They pause and ask:

What's reinforcing this? What's built into the structure that makes this outcome likely?

Structure could mean:

- Rules (formal or informal)
- Information flows
- Incentives
- Habits
- Feedback loops
- Delays

They ask: *What's creating this behaviour – not just today but consistently?*

This is straight from the system dynamics tradition – especially Forrester [[59](#)] and Sterman [[71](#)]. Meadows also emphasized structure as the source of system behaviour: rules, feedback loops, delays, etc. [[33](#)].

They Delay Reaction to Observe the System

Instead of rushing to solve a problem, systems thinkers often hold back – just long enough to see what the system is actually doing. They resist the urge to respond immediately because they know that systems don't always respond in linear ways.

This doesn't mean doing nothing. It means noticing more before acting – especially:

- Time delays

- Patterns that repeat
- Unintended consequences

Similar patterns appear in Sterman's work on "worse-before-better" behaviour and decision delays [[71](#)] and in Meadows' warning that acting too early can backfire [[33](#)].

They Reflect on How They're Framing the Situation

No one is neutral. Systems thinkers are aware that *they're part of the system too*. Their role, perspective, and assumptions all influence what they see – and what they don't.

They ask themselves:

- "What story am I telling about this system?"
- "What's assumed in how I've defined the problem?"
- "Who's not in the room, and how might they see this differently?"

This reflection is not abstract theory. It helps reduce blind spots and keeps actions grounded in the real situation, not personal bias.

The idea draws on Critical Systems Thinking [[8](#) , [22](#) , [69](#)], mental models and reflection [[52](#)], and [Soft Systems Methodology](#) [[32](#)], which sees system framing as shaped by the perspectives of those involved.

They Look for Places with Leverage

Systems thinkers know that not all actions have the same effect. Some changes matter more – not because they're louder or more expensive but because of where they happen in the system. A small shift in the right place can lead to a big change.

They look for those places – where a pattern can shift, not just a symptom patched. These are called *leverage points*.

Donella Meadows [[73](#)] named 12 such points, from the shallowest (like adjusting numbers or buffers) to the deepest (like changing the system's purpose or mindset).

Systems thinkers ask:

- "What's holding this pattern in place?"
- "Where's the point that shifts the system itself – not just the surface?"
- "Am I pushing hard – or pushing smart?"

Meadows' work on leverage points [[73](#)] is being discussed in other places of this book (cf. [Part 1 – Chapters 2 and 4](#)).

The core idea is: don't just do more; look for what matters most.

They Choose Action Based on System Behaviour

There's no one-size-fits-all method. Systems thinkers choose actions based on how the system behaves – not based on habit, pressure, or urgency alone.

- Sometimes that means disrupting a loop.
- Sometimes it means slowing down.
- Sometimes it means creating space for learning or reflection.

It's not about control; it's about alignment.

This connects to adaptive management, complexity-informed design, and feedback-aware interventions. The same idea runs through Meadows on acting based on system structure [[33](#)], Snowden's [Cynefin Framework](#) on choosing actions that fit the domain [[49](#)], and Schön's work on reflective action in evolving situations [[79](#)].

It's not about having more data. It's about paying attention differently. That shift is what makes systems thinking useful – not just as a concept but in practice.

We've looked at how systems thinkers pause, notice patterns, reflect on framing, search for structure, and choose actions that fit system behaviour. Now it's your turn to see how these habits show up in your own thinking.

Are you ready for a small experiment?

Self-Check: Are You a Systems Thinker?

Here's a simple checklist to self-check your current habits.

It's not a test, just a way to notice how you tend to think, observe, and respond. No pressure to tick every box. Just notice what feels familiar – and what might be new. Just use it to reflect. The point is to start noticing your own thinking in real time.

When I look at a situation ...

- I pause before jumping to solutions.
- I look for patterns, not just isolated events.
- I ask what's reinforcing or balancing the current behaviour.
- I pay attention to what's included and what's left out.
- I try to see how parts relate and influence each other.
- I consider who is affected, even if they're not visible.
- I shift between detail (zoom in) and big picture (zoom out).
- I notice my own assumptions and framing.
- I ask how my actions might shape the system.
- I act with awareness, even when things feel uncertain.

Pick one or two that you don't usually do; you are invited to try them out this week. Nothing big. Just something small – a conversation, a meeting, a stuck moment.

In the next chapter, we shift from seeing to navigating. You'll explore tools to help act in systems that are fast-changing, uncertain, or stuck.

Navigate in Systems

DOI: [10.4324/9781003658610-6](https://doi.org/10.4324/9781003658610-6)

Understanding systems is one thing. Navigating them is another.

Real-world systems are often messy. They shift as you act. Effects don't always show up where or when expected. Goals compete, feedback loops surprise, and progress can be slow or uneven.

Many of the ideas introduced earlier – delays, nonlinearity, multiple perspectives, emergence – aren't just academic concepts. They are the reason why working in real-world systems is often difficult.

Real-world systems can't be controlled like machines. They have to be worked with – relationally and adaptively [[80](#)].

This part of the book builds on the previous chapters. It focuses on how to *navigate real-world systems* , especially when they tend to get more complex. That means combining reflection and action, using both systemic awareness and systematic methods to make sense, choose strategies, and intervene wisely.

To do this, it helps to look at two different ways of thinking: *systemic* and *systematic* . Each one plays a different role when working in challenging situations.

Systemic and Systematic Thinking in Systems

When working with real-world systems, it's helpful to distinguish between two ways of thinking that are often confused: *systemic* and *systematic* . While the terms sound similar, they describe different mental orientations, and each plays a distinct role in practice.

- *Systemic thinking* looks at relationships rather than isolated parts. It seeks to understand how parts interact, how feedback and delays shape behaviour, and how change in one place can affect outcomes elsewhere. This perspective is relational and contextual. It emphasizes patterns, connections, and unintended consequences. Grounded in the traditions of systems science and systems thinking (e.g. [8, 32, 33, 52]), systemic thinking asks: *What is influencing what? What is shaping the system's behaviour? What's missing from the frame?*
- *Systematic thinking* is methodical. It is about following clear steps to solve a problem or implement a plan. Often used in engineering, policy design, or project management, systematic approaches rely on checklists, procedures, and repeatable sequences. They are valuable for clarity, efficiency, and accountability – especially when problems are well-defined and environments are relatively stable.

Rather than choosing one over the other, we often need both. *Systemic thinking* helps us understand the situation; *systematic thinking* helps us respond to it. The challenge is switching between the two – zooming out to see the full picture, then zooming in to act in a focused way.

But before we act, we still need to be clear on what we're acting on. That's where framing comes in – shaping how we see the situation, what we focus on, and how we define success.

Framing and Sensemaking in Systems

Before jumping into action, it's worth to pause and ask:

How Are We Framing the Situation?

While diagnosis helps us understand the kind of system we're dealing with, framing shapes how we move forward – what we focus on, who we involve, and how we define success.

A number of approaches have been developed across design, systems thinking, and organizational change that support this early sensemaking phase. They come from different traditions, but many have become particularly influential in practice, not because they offer step-by-step answers but because they help teams work with ambiguity, surface assumptions, and move forward with care. This section briefly introduces several of these approaches. Many are explored in more detail later in the book, with guidance on how they can be used in practice (cf. [Part 3](#)).

Some frameworks focus on identifying the type of context:

- The [Cynefin Framework](#) distinguishes between clear, complicated, complex, and chaotic environments – each requiring a different kind of response [[49](#)].
- The [Certainty-Agreement Matrix](#) maps the level of agreement and certainty in a situation, showing when linear plans break down and adaptive strategies are needed.
- Poli's distinction between complicated and complex systems adds a helpful layer: some situations can be solved through analysis; others must be navigated relationally [[80](#)].

These frameworks don't describe the system itself. They offer a theoretical approach for how to think about a situation. A system may show features from different categories at the same time. The frameworks support choosing which approaches might fit best to start with, depending on uncertainty, dynamics, and the questions being asked.

Other approaches focus more on how to explore and reframe problems:

- [Soft Systems Methodology](#) [[32](#)]: Helps structure conversations across different stakeholder views, without forcing a single problem definition.
- [DSRP](#) [[53](#)]: Offers a way to reflect on how meaning is constructed – by noticing distinctions, systems, relationships, and perspectives.
- [Critical Systems Heuristics](#) [[22](#)]: Surfaces boundary judgments – who is included, whose views count, and what values shape the problem definition.

- [Rich Pictures](#) [64]: A visual tool to map out different perspectives, relationships, and concerns early in the process.

Still others come from participatory and exploratory practice:

- Design Thinking [81]: Supports user-centred exploration through iterative prototyping and testing.
- Double Diamond [82]: Structures problem-solving into phases of divergence and convergence – exploring the problem before defining solutions.
- Design Journey [83]: Guides teams through reflective, participatory exploration to frame complex challenges.
- Theory U [84]: Helps teams sense emerging futures through dialogue, deep reflection, and co-creation.
- [Appreciative Inquiry](#) [85]: Uses strength-based inquiry to surface shared values, hopes, and possibilities for change.

Despite their differences – or shared roots – what unites these methods is a common rhythm. They help people pause, sense, and reflect before acting.

Most follow a similar structure:

- *Open up* – explore the landscape, listen widely, and suspend assumptions
- *Make sense* – identify patterns, reframe the challenge, and clarify the system
- *Align and act* – converge on insights, test directions, and reflect together

Used well, these approaches support more thoughtful and inclusive action. They don't simplify the complex nature of real-world systems, but they help us work with it more wisely.

In the next section, we connect this framing work to strategic thinking and leverage points – the tools that turn insight into action.

Preparing to Act in Systems

Once you've seen the system and framed the situation, the next question is this:

Where Do You Start?

We've learned, in systems, you rarely know the full answer up front. That's not a problem. Systems thinking isn't about finding certainty; it's about acting wisely while staying open to what the system reveals.

This means:

- Acting with the system, not against it
- Expecting unintended consequences

- Testing small changes before scaling
- Involving people who are affected
- Being ready to adapt as you learn

You don't need a master plan. You need a clear direction, a good place to begin, and the flexibility to adjust as the system responds.

Where action is most effectively is focus of our next section.

Diagnosing the Problem

Before action can be taken in systems, it is essential to pause and ask:

What Kind of Problem Are We Working on?

Karl Popper [[86](#)] used a metaphor to explain different types of systems and predictability. He described two types: *clocks* and *clouds* .

- A *clock problem* is structured and predictable; you can break it into parts and solve it.
- A *cloud problem* is messy and unpredictable; it shifts while you're trying to define it.

Why this matters: Different problems need different tools. If you treat a cloud like a clock, you'll over-analyse and get stuck. If you treat a clock like a cloud, you'll waste time exploring what's already clear.

Use the following criteria to help choose the right method for your situation:

- *Problem Type*: Is it from your perspective: simple, complicated, or complex? Is it structured and clear, or messy and uncertain?
- *Purpose*: What do you need to achieve – understanding, action, planning, learning?
- *People*: Who needs to be involved? How much input or participation is needed?
- *Resources*: How much time, skill, and capacity do you have?
- *Evidence*: Do you need stories and insights, numbers and data, or both?

Unfortunately, there is no perfect formula for addressing cloud problems. Different situations call for different approaches. Instead of searching for a single correct answer, systems thinkers stay open, observe carefully, try approaches that fit, and adjust as the situation develops.

Trying to apply a fixed recipe would narrow your thinking rather than broaden it. Use the problem characteristics as a guide: notice the type of problem, apply a fitting approach, see what it reveals – and adjust. That's systems thinking in practice.

Now, once the nature of the problem is clearer, the next question is where change might have the greatest effect within the system. This leads to the idea of leverage points – places where small shifts can produce larger system-wide impact.

Finding Leverage and Acting in Systems

Not all actions in a system are equal. Some changes adjust the surface. Others reshape how the system behaves. A few can shift the system's purpose entirely. So it's important to clarify:

Where to Intervene to Create Meaningful Change?

Donella Meadows [[73](#)] described 12 *leverage points* – places where a small change can produce big results. They range from basic tweaks to deep shifts in purpose and mindset. Knowing where you're intervening helps clarify what kind of change you're aiming for – and what kind of tools you'll need.

For clarity and ease of use, I organized the 12 leverage points into three levels – tweaks, structures, and mindsets – ranging from surface adjustments to deep transformation.

The hospital example introduced earlier ([Part 1 – Understand Systems](#)) is used throughout this section to illustrate each leverage point with practical examples and explanations.

Tweaks

These are the most visible and often easiest types of changes – adjusting parameters, increasing capacity, or speeding up response times. They affect how the system operates on the surface but usually don't shift underlying patterns. Their impact tends to be short-term unless supported by deeper change.

#	Leverage Point	Example
12	Parameters	Adjusting nurse-to-patient ratio
11	Buffers	Adding more intensive care beds
10	Stocks and flows	Redesigning hospital layout to improve flow
9	Delays	Reducing time for lab analysis

Explanations

- Point 12: Adjusting nurse-to-patient ratios can improve care quality and reduce stress, but effects depend on staffing models, funding, and overall system goals.
 - Point 11: Expanding critical care capacity provides resilience during surges, though long-term effectiveness depends on patient flow and demand patterns.
 - Point 10: Rethinking the physical layout to support smoother patient flow can reduce delays and improve coordination across units.
 - Point 9: Speeding up lab turnaround enables faster decisions, especially when supported by aligned processes and staffing.
-

Structures and Rules

These points shape the internal logic of the system – what it responds to, how it adapts, what flows where, and who makes decisions. Intervening here means working with the feedback loops, rules, and flows of information that govern system behaviour. Changes at this level are harder to make but often more durable and far-reaching.

#	<i>Leverage Point</i>	<i>Example</i>
8	Balancing feedback loops	Use infection control to prevent outbreaks
7	Reinforcing feedback loops	Patient reviews attracting more patients
6	Information flows	Sharing real-time bed availability with staff
5	Rules	Changing how patients are admitted

Explanations

- Point 8: Disinfection routines act as balancing feedback – limiting the spread of infection and helping the system maintain safe, stable conditions.
- Point 7: When positive patient experiences are shared publicly, they can draw in more patients, reinforcing system growth and influencing demand patterns.
- Point 6: Giving staff access to live data on bed availability supports faster, better decisions, especially when that information is accurate, timely, and actionable.
- Point 5: Revising how patients are accepted for care (e.g., triage criteria) shifts who receives attention and when, affecting the system's internal priorities and flow.

Mindsets and Purpose

These are the deepest leverage points – the beliefs, values, and goals that define what the system is for. Changes at this level affect how the system sees itself and what it aims to do. While these shifts are the hardest to reach and often slow to unfold, they can lead to the most powerful and lasting transformations.

#	<i>Leverage Point</i>	<i>Example</i>
4	Self-organization	Staff teams designing their own workflows
3	System goals	Focusing on patient well-being, not throughput

#	Leverage Point	Example
2	Mindsets or paradigms	Seeing patients as partners, not cases
1	Transcending paradigms	Combining medical care with community healing

Explanations

- Point 4: When staff teams co-design their workflows, the system becomes more adaptive and grounded in real-world needs, allowing for more responsive and resilient operations.
- Point 3: Shifting the hospital's goal from processing volume to improving patient well-being reorients decisions, success metrics, and care strategies across the system.
- Point 2: Viewing patients as partners in care challenges traditional hierarchies and enables more collaborative, trust-based approaches that influence outcomes and relationships.
- Point 1: Transcending a single medical model makes space for integrating broader definitions of health, such as including social, cultural, or spiritual dimensions alongside clinical care.

Often, change efforts stay near the surface – adjusting parameters, incentives, or capacity. These changes can help in the short term but usually don't shift the system's underlying patterns. More durable change often requires working at deeper levels: revising rules, changing goals, or challenging mindsets.

Similar ideas to Meadows' approach appear in Goldratt's [Theory of Constraints](#) [100] which targets the key bottleneck, Beer's [Viable System Model](#) [61] which identifies weak subsystems, Checkland's [Soft Systems Methodology](#) [32] which builds accommodation between different worldviews, and Churchman's critical systems thinking [69] which brings forward voices that are usually marginalized. But knowing where to intervene is only part of the work. The next challenge is how, which methods to use, who to involve, and what kind of change is possible.

Some Caution Is Needed

Meadows' list is an incredibly helpful set of points for identifying *where to intervene*. At the same time, it doesn't fully address the next challenge:

How to Intervene?

As real-world systems are often messy, adaptive, and unpredictable, a leverage point at one scale may not exist, or may backfire. In some cases, changing mindsets or goals directly may not be possible.

That's why it's often helpful to start with small experiments – testing changes, watching how the system responds, and adjusting based on what emerges. Involving diverse perspectives also helps since no one person sees the full picture.

To support this, the methods in this book are grouped into five categories – the *5M Structure*. It's not a fixed process but as a simple structure to help you choose what might be useful depending on your situation.

The 5Ms are: Motivate, Meet, Map, Make, Manage.

Each group includes approaches you can explore and apply, while staying aware of the system as a whole.

In the next chapter, we explore how to choose methods and approaches that fit your situation and support effective action.

Part 2

Select Methods for Systems Practice

DOI: [10.4324/9781003658610-7](https://doi.org/10.4324/9781003658610-7)

This part presents how the methods in this book are structured to support systems practice to explore situations, engage people, develop interventions, and learn from the outcomes. The methods support different stages of systems work, depending on the situation, the people involved, and the questions at hand.

First, we'll look at why these methods were selected, where they come from, and how they are organized. Then you'll find guidance for selecting which methods to apply depending on your situation.

Why This Set of Methods

Asking why a set of methods was chosen or not can start useful conversations about completeness and incompleteness. From a systems perspective, any view of a situation depends on the lens used to look at it. For some systems thinkers, approaches not included in this book may still appear relevant or feel more appropriate than others. Recognizing that no collection can ever be complete is part of the practice itself, keeping the work open to ongoing revision and growth.

Its purpose is to offer a practical set of approaches for systems thinking and decision-making. Some focus on understanding relationships and power dynamics. Others help visualize complex challenges, develop creative solutions, or anticipate long-term consequences.

Each method can be used alone or combined, depending on the specific challenges with and in the system. The goal is to give practitioners approaches they can apply both strategically and operationally.

Together, these methods provide a structured, interactive, and action-oriented way to work in systems – supporting readers make better decisions, foster new solutions, and create change that lasts.

Where These Methods Come From

The methods in this book aren't drawn from a single school of thought or framework. They come from a mix of sources: some grounded in academic research or widely used professional practice –

like [Causal Loop Diagrams](#) , [Appreciative Inquiry](#) , or the [Balanced Scorecard](#) – and others drawn from facilitation work, systems practice, and creative group processes.

Some communities, like the Systems and Complexity in Organisation (SCiO) [[87](#)], highlight methods commonly used in systemic practice through their competency framework. Similarly, Jackson’s System of Systems Methodologies (SSM) [[22](#)] groups a set of well-established systems approaches based on his view of different problem situations. Both provide guidance for method selection, but neither sets a strict boundary around what counts as a systemic method.

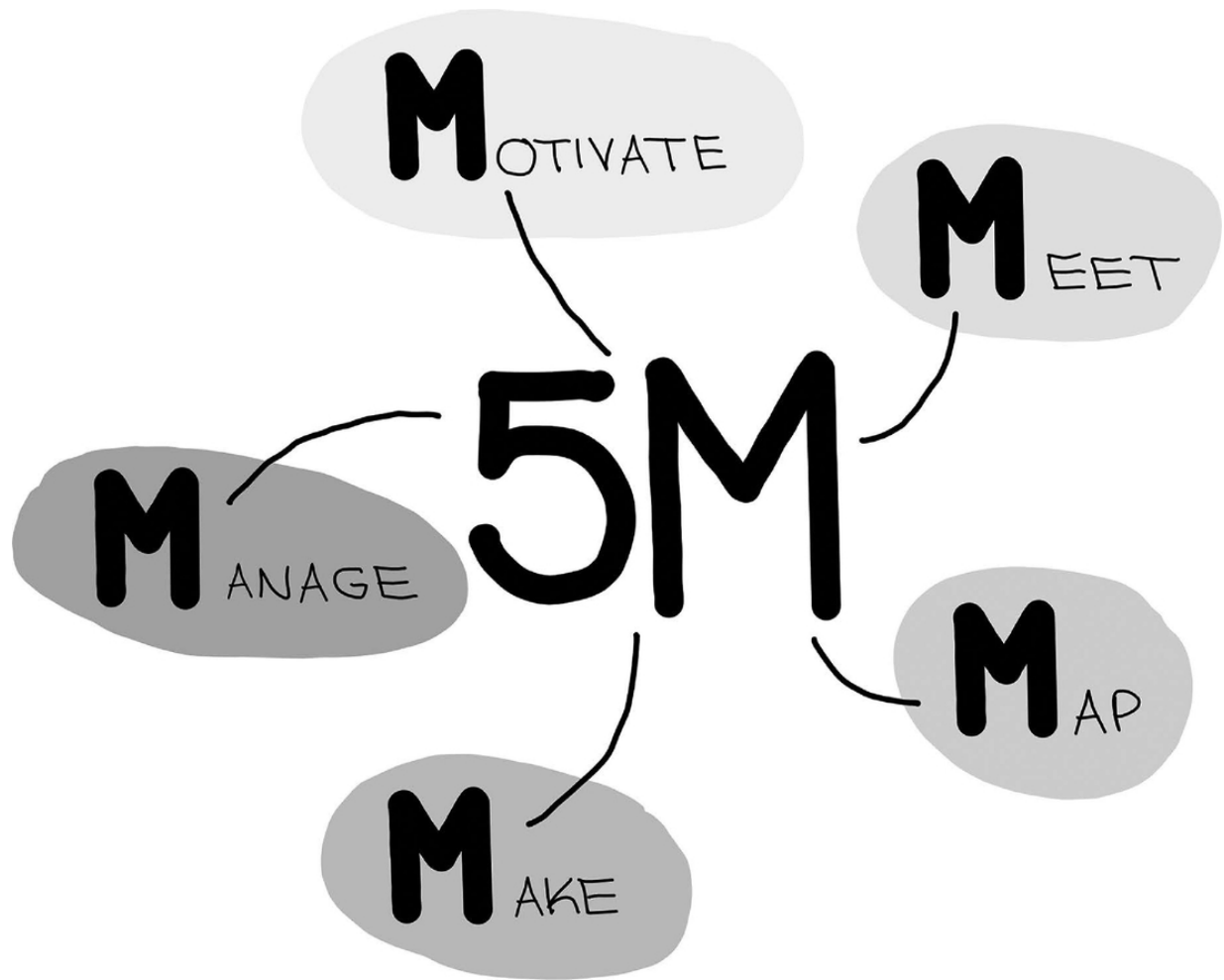
The methods in this book reflect a broad, practice-based view: Not all included methods are recognized in formal frameworks, but all may be used by systems thinkers to explore complexity, reflect, and act in real-world settings. This includes tools from facilitation, simulation, group dynamics, and related fields. Some are analytical or experiential. Others support learning, planning, or collaborative sensemaking.

None of these methods are presented as rigid solutions. They are not all “evidence-based” in a strict academic sense, but they are evidence-informed, which means tested by teams, communities, and organizations navigating challenging situations.

Use what fits. Adapt what helps. These aren’t rigid formulas, they’re approaches to spark thinking, sensing, making, and adjusting in systems that keep changing.

The 5M Structure

In this book, the methods are organized into five categories, the *5M Structure* , where the *Ms* stand for: *Motivate*, *Meet*, *Map*, *Make* , and *Manage*.



This structure offers a simple, practical way to organize, select, and apply methods depending on the situation. Each category supports a different type of work – from deciding whether to intervene, to engaging people, understanding systems, taking action, and adapting over time. It's a flexible way to organize methods and choose useful approaches depending on the situation. Each category includes a range of methods – from simple to advanced – covering different levels of cognitive effort and creativity. In real work, you may enter at any point or move back and forth between categories and approaches.

In organizations and other complex systems, isolated fixes rarely work. We need to recognize patterns, understand relationships, design smart responses, and track effects over time. That's why the methods are categorized this way – not just to analyse systems but also to engage with them and create change.

Let's take a quick walk through the 5Ms and how they support your work:

- Motivate: Why and What For?

Clarifies why intervention is needed and what purpose it serves. Helps teams assess motivation, urgency, and alignment with larger goals.

Example methods: [Deciding to Act](#) , [Guiding Star and Near Star](#) .

- Meet: Engage Stakeholders and Perspectives

Focuses on identifying key stakeholders, facilitating discussions, and surfacing different perspectives. Brings people together to build dialogue, collaboration, and shared understanding.

Example methods: [Stakeholder Mapping](#) , [World Café](#) , [Cluster Mapping](#) .

- Map: Understand the System

Supports teams in visualizing structures, dependencies, recurring patterns, and leverage points. Supports a deeper understanding of system dynamics and where interventions may have the greatest effect.

Example methods: [Causal Loop Diagrams](#) , [Rich Pictures](#) .

- Make: Take Action and Create Solutions

Supports improving processes, testing ideas, and developing solutions. Encourages teams to challenge existing structures, experiment with new approaches, and refine solutions iteratively.

Example methods: [Paper Airplane Factory](#) , [Process Hacking](#) , [Prototyping Sprints](#) .

- Manage: Evaluate and Adapt Over Time

Enables teams to track changes, measure progress, and respond to emerging patterns. Supports organizations monitor outcomes, evaluate effectiveness, and adjust as conditions evolve.

Example methods: [Balanced Scorecard](#) , [Scenario Stress Testing](#) .

Focus Areas of Methods

Each method also links to focus areas, which describe what the method is most effective at achieving. While *5M* organizes methods by type of work, focus areas are intended to support matching methods to goals.

The five focus areas are as follows:

- *Understand*: Visualize, map, and make sense of systems – their parts, connections, and structure – to find causes and relationships.
- *Collaborate*: Involve people, gather different views, create shared understanding, and align stakeholders toward common goals.
- *Strategize*: Plan solutions that address system complexity while considering long-term outcomes.
- *Innovate*: Support creative thinking and find unique solutions when usual approaches aren't enough.
- *Adapt*: Monitor, evaluate, and refine processes as conditions change and new information appears.

In *The 5M Methods Matrix* , focus areas are indicated by check marks.

With these focus areas defined, you can now select methods that fit your situation.

The 5M Methods Matrix

DOI: [10.4324/9781003658610-8](https://doi.org/10.4324/9781003658610-8)

The 5M Methods Matrix supports readers in matching appropriate methods to challenges. It provides a practical way to select methods based on where you are in your systems work, what you want to achieve, and who is involved.

The *5M Methods Matrix* is organized in the following categories: *Motivate*, *Map*, *Meet*, *Make*, and *Manage*.

You can use the following steps to select methods that fit your situation:

1. *Identify relevant “M”*: Consider which of the five areas are most relevant to your current challenge.
2. *Review the purpose*: Look at the specific purpose of each method to see which matches your goals.
3. *Consider the focus area*: Check which aspects (Understand, Collaborate, Strategize, Innovate, Adapt) each method supports.
4. *Select appropriate method*: Choose one or more methods that fit your situation and priorities.

With these steps in mind, we now turn to the matrix itself.

Motivate: Why and What For?

This section focuses on methods that help practitioners assess the need for systemic intervention and define strategic directions for meaningful change.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Deciding to Act	Assess the necessity and urgency of intervention	✓		✓		✓
Readiness Assessment	Evaluate system readiness for intervention	✓	✓	✓		✓
Guiding Star and Near Star	Define vision and milestones for intervention	✓	✓	✓		✓
Cynefin Framework	Categorize and understand system complexity	✓		✓		✓
Certainty-Agreement Matrix	Align decisions with levels of certainty and agreement	✓	✓	✓		✓
Power Mapping	Analyse power dynamics and influence in systems	✓	✓	✓		✓

Meet: Engage Stakeholders and Perspectives

This section emphasizes stakeholder involvement, collaboration, and capturing different perspectives to build shared understanding and alignment.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Silent Signal	Explore how messages change without words	✓	✓			✓
Invisible Connections	Experience interdependence through movement	✓	✓			✓
Collective Pulse	Demonstrate self-organization without leadership	✓	✓			✓
Speed Framing	Expose bias by quickly reframing problems	✓	✓	✓	✓	
Invisible Negotiation	Reveal how hidden goals influence group behaviour and decisions	✓	✓		✓	✓
Ladder of Inference	Reveal how unconscious thinking shapes beliefs and actions	✓	✓	✓	✓	
Fishbowl Discussion	Facilitate inclusive group dialogue		✓			✓
Reverse Fishbowl	Practice adapting discussions under disruption		✓			✓
Stakeholder Mapping	Identify and prioritize key stakeholders	✓	✓	✓		
Cluster Map	Explore and connect ideas around a topic	✓	✓			
CATWOE Analysis	Clarify system purpose from multiple angles	✓	✓	✓		
Boundary Critique (BC)	Define and challenge system boundaries	✓	✓	✓		
Appreciative Inquiry	Identify and build on system strengths	✓	✓	✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
World Café	Enable rotating conversations on shared topics		✓	✓		

Map: Understand and Visualize the System

This section focuses on methods that help practitioners explore, visualize, and map systems to gain deeper insights into their structures and dynamics.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Air Circles	Show how perspective shifts change interpretation	✓	✓			
Adaptive Pen Control	Visualize interdependence, adaption, and dynamics	✓	✓			✓
Group Juggle	Explore how systems grow more complex	✓	✓			✓
Triangles	Show interdependence within systems	✓				✓
Live Systems Mapping	Physically map evolving system relationships	✓	✓	✓		✓
Bathtub Game	Visualize system accumulation and delays	✓				✓
DSRP Framework	Thinking patterns to understand complexity and make better decisions	✓	✓	✓	✓	✓
Behaviour Over Time Graphs	Plot and analyse variable trends over time	✓		✓		
Paper Computer	Identify influence patterns and leverage in complex systems	✓	✓	✓	✓	✓
Refrigeration Game	Experience how delays and local decisions cause instability	✓	✓			✓
Fishbanks Ltd.	Experience how individual actions and delays lead to resource collapse	✓	✓	✓		✓
Sankey Diagrams	Show flows of resources across systems	✓		✓		

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
System in Focus	Define the system, its boundaries, and external interactions	✓	✓	✓		✓
Rich Pictures	Capture complexity using visual storytelling	✓	✓			
Double Q-Diagram	Map hard and soft causes of problems to support balanced thinking	✓	✓	✓		✓
Impact Mapping	Align actions with strategic goals	✓	✓	✓		
Connected Circles	Reveal relationships between system variables	✓		✓		
Causal Loop Diagrams (CLD)	Identify feedback loops in systems	✓				
Systems Archetypes	Recognize patterns in system behaviour	✓		✓		✓
Leverage Point Mapping	Identify high-impact areas for systemic change	✓	✓	✓		✓
Scenario Planning	Plan for future uncertainties	✓	✓	✓		✓
World Game	Explore global challenges and interdependencies through cooperative, systems-based simulation	✓	✓	✓	✓	✓
Soft Systems Methodology (SSM)	Explore messy, contested situations by comparing perspectives and finding meaningful change	✓	✓	✓		✓

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Viable System Model (VSM)	Diagnose system structure and organizational viability	✓	✓	✓		✓

Make: Take Action and Create Solutions

This section covers methods that guide practitioners in moving from planning to execution, fostering innovation, and applying strategies to implement solutions effectively.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Human Knot	Build teamwork and collaboration		✓			✓
Paper Airplane Factory	Simulate and improve processes		✓		✓	✓
Forced Prioritization	Rank and cut options under pressure		✓	✓		✓
Resource Tree	Map needed resources to reach a goal, clarify dependencies, and spot constraints	✓	✓	✓	✓	✓
Kano Model	Prioritize features based on user satisfaction		✓	✓	✓	
Theory of Constraints (TOC)	Identify and manage system bottlenecks	✓	✓	✓		✓
Prototyping Sprints	Rapidly test and improve early-stage ideas		✓		✓	
Process Hacking	Redesign broken processes for better performance	✓		✓	✓	
Backcasting	Plan strategically from future goals	✓		✓		✓
Synectics	Solve problems using analogies		✓		✓	
Morphological Analysis	Generate creative solutions	✓		✓	✓	
Futures Wheel	Map and evaluate long-term impacts	✓		✓	✓	✓

Manage: Evaluate and Adapt Over Time

This section highlights methods for overseeing processes, tracking performance, and adapting strategies to ensure continuous improvement and resilience within systems.

Method	Purpose	Understand	Collaborate	Strategize	Innovate	Adapt
Boom and Bust	Monitor and understand growth cycles	✓		✓		✓
Most Significant Change (MSC)	Capture significant outcomes and changes	✓	✓	✓	✓	✓
Outcomes Mapping	Track behavioural change and impact	✓	✓	✓		✓
Lag vs. Lead Indicator Tracking	Spot early signs vs. results	✓		✓	✓	✓
Balanced Scorecard	Measure and align strategic objectives			✓		✓
Iceberg Model	Reveal underlying system structures	✓				✓
Scenario Stress Testing	Test system response to shocks	✓	✓	✓	✓	✓
Fuzzy Cognitive Mapping (FCM)	Visualize and analyse causal relationships	✓				✓
Critical Systems Heuristics (CSH)	Evaluate system boundaries ethically	✓		✓		✓

Part 3

Apply 65+ Methods for Systems Practice

DOI: [10.4324/9781003658610-9](https://doi.org/10.4324/9781003658610-9)

In this part, 65+ methods are introduced that support systems thinking in practice. Each method is designed to help individuals and teams better understand systems challenges, act more effectively within dynamic environments, and reflect on what works – and why. The methods are grouped into five focus areas (Motivate, Meet, Map, Make, and Manage) and are intended to be practical, adaptable, and easy to apply across a wide range of contexts.

Integration with Systems Thinking Principles

Each method builds on several core concepts of systems thinking introduced earlier in the book – such as interconnection, feedback, delay, and perspective (cf. [Part 1](#)). They are grounded in real-world practice, not just theory. The methods offer ways to translate systems thinking into action: making invisible structures more visible, helping teams surface assumptions, exploring boundaries, and testing decisions before they are made.

These methods offer step-by-step approaches to guide thinking and action, but they are not rigid templates. Each one can and should be adjusted to fit the people, challenges, and context at hand. They are meant to support flexible, adaptive practice, not impose fixed routines. Think of them as scaffolds: they provide structure, but you choose how to build with them.

You can adapt them for quick sessions or extended projects, apply them individually or in combination, and use them across many settings: education, policy, organizations, communities, and more. They support both solo reflection and collaborative work.

By offering methods that can be applied to real design and decision-making challenges, this chapter supports more structured action and continuous learning.

What's in Each Method

Each method is presented in a consistent format:

- Purpose: What the method helps participants achieve.
- How It Works: The underlying process and logic.
- Applications: When and where the method is especially useful.

- Exercise: How to run the method in practice.
 - Participants/time/equipment/space
 - Setup
 - Instructional steps
- Tips for Facilitators: How to run the exercise effectively.
- Tips for Debriefing: How to reflect and guide learning after the exercise.
- Variations: Optional adaptations for different situations.

Together, these methods offer a flexible set of approaches for systems practice. Each method is described with clear steps and structure, based on principles that support effective learning and group work. But the steps are not fixed rules. As a facilitator, you can adjust, skip, or reorder parts depending on the situation. The goal is to support clear thinking, bring in diverse perspectives, and guide good decisions in complex situations.

Motivate

Why and What For?

DOI: [10.4324/9781003658610-10](https://doi.org/10.4324/9781003658610-10)

Intervening in a system is not just about fixing problems; it is about disrupting the structures that create and sustain them. Many interventions fail by addressing symptoms rather than deeper forces. Before acting, it is critical to understand both why intervention is necessary and what for – clarifying motivation and purpose.

“Why” and *“What for”* serve different but complementary purposes:

- *“Why”* questions look backward, helping to uncover the causes, motivations, and justifications for action. They help clarify the reasons to intervene and assess whether the timing and approach are appropriate.
- *“What for”* questions look forward, focusing on the purpose, function, and intended outcomes of your intervention. They ensure that your actions align with the broader goals of the system and address the right issues.

Some systems persist despite being harmful because they serve certain interests, are reinforced by policies, or are protected by cultural norms. Others remain unchanged because the risks of intervention seem greater than the risks of maintaining the status quo. Without understanding both the reasons for intervention and the purpose it serves, your actions may be misdirected or ineffective.

Use “why” and “what for” questions early in the intervention process – during problem diagnosis, strategy development, and stakeholder engagement – to build a shared understanding of both the justification and purpose of your actions. Encourage participants to reflect on these questions individually and collectively to ensure clarity and alignment.

The following questions support participants in justifying and defining a strategic intervention:

***“Why”* questions:**

- Why is intervention necessary?
- Why does the system resist change?
- Why intervene now?
- Why are we the ones to intervene?
- Why this approach?

***“What for”* questions:**

- What is this intervention for?
- What purpose does it serve?
- What function does it fulfil?
- What is the intended outcome?

By thoroughly exploring both “why” and “what for” questions and assessing system readiness before moving into action, participants ensure that interventions are justified, timely, well-targeted, and positioned for meaningful impact.

Deciding to Act

Boundaries | Perspectives | Leverage Points

Purpose

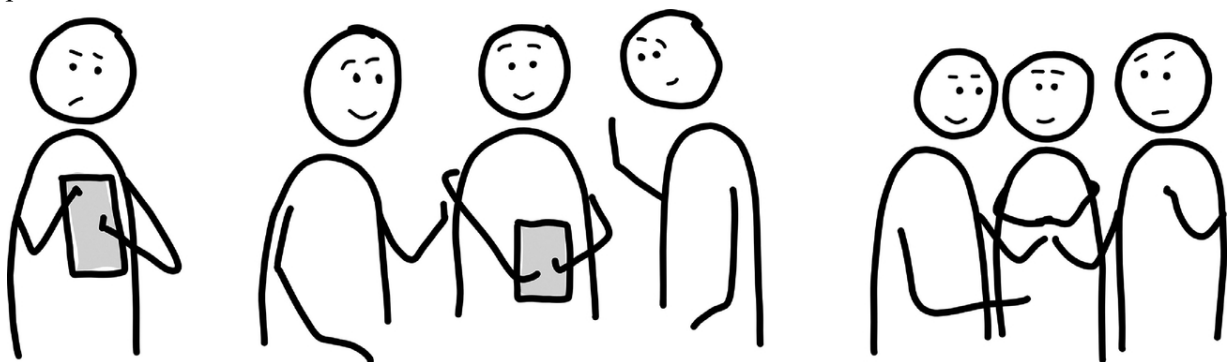
This exercise supports participants in critically assessing whether intervention is necessary and in clearly defining the real problem they seek to address. Instead of rushing into action, it encourages reflection on system resistance, urgency, risks of inaction, and possible impacts of change.

How It Works

Participants work individually or in small groups to examine a system they are involved with or wish to influence. They reflect on whether intervention is needed, who benefits from the current system, and what would happen if no action is taken. They then define the core problem, focusing on what must change and who is most affected.

Applications

This exercise is useful for system change teams, policymakers, leaders, and project groups starting new initiatives. It is especially helpful when there is uncertainty about whether to act or when previous interventions have failed.



Exercise: “Deciding to Act”

Participants 	Time 	Equipment 
2–20	60–90 minutes	Paper, markers, sticky notes
Space  : An open room with space for participants move around comfortably.		

Setup

1. Participants work alone or in small groups.
2. Provide space for brainstorming and discussion.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that this exercise helps test whether intervention is justified and defines the real issue to address.
 - Emphasize that disciplined thinking early on strengthens later interventions.
2. Identify the system (15 minutes)
 - Ask participants to select a system they are involved in or wish to change.
 - This could be an industry practice, organizational structure, or a social norm.
 - If participants are unsure, a *system mapping* can help clarify the system.
3. Reflect on the need for intervention (15 minutes)
 - List possible causes, not just symptoms. Name factors you can influence.
 - Individually, participants answer:
 - i. Why intervene now?
 - ii. What happens if no action is taken?
 - iii. Who benefits from maintaining the current status quo?
4. Frame the core problem (15 minutes)
 - Encourage participants identify:
 - i. What is happening what should not happen?
 - ii. Who is most affected?
 - iii. What would success look like?
5. Small group sharing and refinement (10 minutes)
 - Small groups work together to create a combined “Why and What” statement linking the need for action and the core problem definition.

- **Example:** “*We believe intervention is necessary because [reason why now]. If nothing changes, [risk or harm will increase]. Currently, [describe the problem]. This affects [who is harmed]. Success would mean [what changes].*”

6. Debriefing (15 minutes)

- Ask participants to share their insights with the group.
- Facilitate a discussion on how clarity about motivation and problem framing strengthens system change efforts.

Tips for Facilitators

Encourage participants to critically reflect on both the need for intervention and the clarity of the problem. Remind them that it is better to delay action than to rush into a poorly defined challenge. Push them to ground their reflections in real-world systems rather than theoretical problems. Guide them to stay focused on current conditions and affected groups rather than jumping ahead to possible solutions. Help participants recognize that strategic timing and clear framing are essential foundations for effective interventions.

Tips for Debriefing

Create a space where participants can reflect on how their understanding of intervention and problem clarity evolved through the exercise. Use these questions to guide the discussion:

- What made deciding whether to intervene difficult or easy?
- How did framing the problem affect your thinking about possible actions?
- Were there disagreements about whether intervention was justified?
- What risks can arise from acting without a clear problem focus?
- How did connecting urgency and problem definition strengthen your plan for change?

Summarize key takeaways, focusing on how disciplined decision-making and clear framing create a stronger foundation for future interventions.

Variations

The “Deciding to Act” exercise can be adapted for different contexts, group sizes, or system challenges while maintaining its focus on strategic decision-making and clear framing.

- *Silent reflection:* Participants complete the full template individually before any group discussion to encourage deeper independent thinking.
- *Stakeholder perspective framing:* Groups create separate “Why and What” statements from the viewpoint of different key stakeholders to uncover hidden biases or conflicts.
- *Challenge and defend:* After drafting their statements, groups switch and critique another group’s work, questioning assumptions and sharpening clarity.

- *Timing scenario*: Participants explore how the urgency of intervention might change under different future conditions (e.g., political shifts, social movements).
- *Combined decision wall*: Groups post their final statements on a wall and vote on which ones show the clearest justification and most focused problem framing.

Readiness Assessment

Boundaries | Perspectives

Purpose

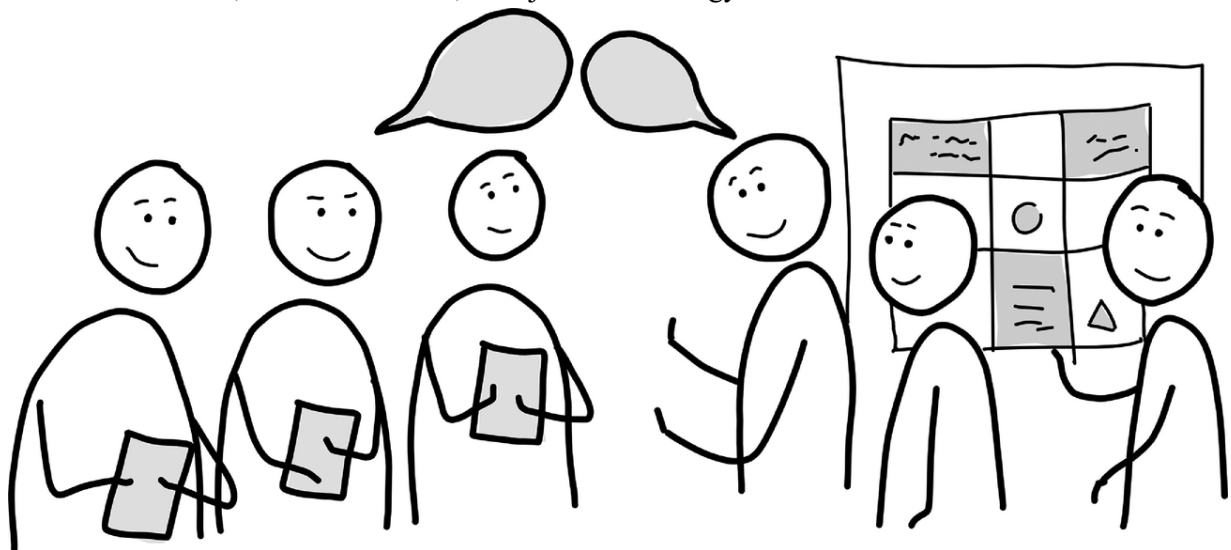
This exercise helps participants assess whether a system is ready for intervention by analysing key factors such as stakeholder support, structural barriers, and timing. Instead of pushing change without understanding potential resistance, this method ensures that interventions are well-timed and positioned for impact.

How It Works

Participants evaluate a system's readiness for change using a structured assessment framework. They analyse factors like urgency, stakeholder alignment, resources, and external conditions. By scoring these elements, they identify whether an intervention is likely to succeed, needs more preparation, or requires a shift in approach.

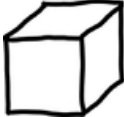
Applications

This exercise is valuable for change-makers, policymakers, and teams working on complex transformations. It helps organizations avoid premature or ineffective interventions by ensuring that systemic conditions are favourable for change. Participants leave with a clearer understanding of whether to act now, build momentum, or adjust their strategy.



Exercise: “Readiness Assessment”

Participants 	Time 	Equipment 
2–20	45–60 minutes	Paper, markers, sticky notes, assessment templates

Space  : An open room with space for discussion and reflection.

Setup

1. Participants work individually or in small teams.
2. Provide assessment templates with key readiness factors.
3. Ensure space for discussion and scoring.

Instructional Steps

1. Introduction (5 minutes)
 - Explain that the goal is to assess whether the system is ready for intervention.
 - Encourage participants to approach the assessment critically rather than assuming action is always the next step.
2. Identify Readiness Factors (10 minutes)
 - Introduce key assessment criteria, such as the following:
 - i. Urgency: Is there a pressing need for change?
 - ii. Stakeholder Alignment: Are key actors supportive or resistant?
 - iii. Resources: Are funding, knowledge, and capacity available?
 - iv. External Conditions: Are policy, social, or market conditions favourable?
 - v. Past Efforts: Have previous interventions succeeded or failed?
3. Score the system (15 minutes)
 - Participants rate each factor on a scale (e.g., 1–5) and discuss their scores.
 - High scores indicate readiness, while low scores suggest obstacles that need addressing before action.
4. Analyse results (5 minutes)
 - Facilitate a discussion on overall readiness.
 - Discuss where the system is ready, where gaps exist, and what steps could strengthen readiness.
5. Debriefing (15 minutes)
 - Reflect on how this readiness assessment shapes the planned intervention.

- Encourage participants to consider timing, risks, and areas for preparation.

Tips for Facilitators

Encourage participants to be honest in their scoring rather than overly optimistic. Help them recognize that waiting and preparing can sometimes be more strategic than acting immediately. Push for evidence-based reasoning, ensuring scores are backed by real conditions rather than assumptions. Guide discussions toward what can be done to improve readiness if conditions aren't yet favourable.

Tips for Debriefing

Create a space for critical reflection and strategic thinking. Use these questions to guide the discussion:

- What readiness factors scored the lowest, and why?
- How does readiness influence the likelihood of success?
- What would need to shift to increase system readiness?
- Are there risks in intervening too soon?
- If the system is not ready, what next steps can help prepare for intervention?

Summarize key takeaways, emphasizing that systemic change requires the right timing and that building readiness can be a valuable intervention itself.

Variations

Readiness Assessment can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Fast-track version:* Participants use a simplified three-category scale, e.g., “ready, needs work, not ready,” for a quicker decision-making process.
- *Stakeholder perspectives:* Instead of assessing readiness from a single viewpoint, participants evaluate it from multiple system actors' perspectives (e.g., policymakers, funders, affected communities) to uncover potential misalignments.
- *Scenario-based readiness:* Participants test system readiness under different future scenarios (e.g., policy changes, economic shifts) to explore how external conditions might impact intervention success.
- *Barrier identification:* Rather than scoring readiness, participants identify the biggest obstacles to change and brainstorm targeted strategies to address them before moving forward.
- *Comparative readiness:* Participants assess multiple systems or potential intervention areas side by side to determine where action is most feasible and impactful.

Guiding Star and Near Star

Leverage Points | Perspectives

Purpose

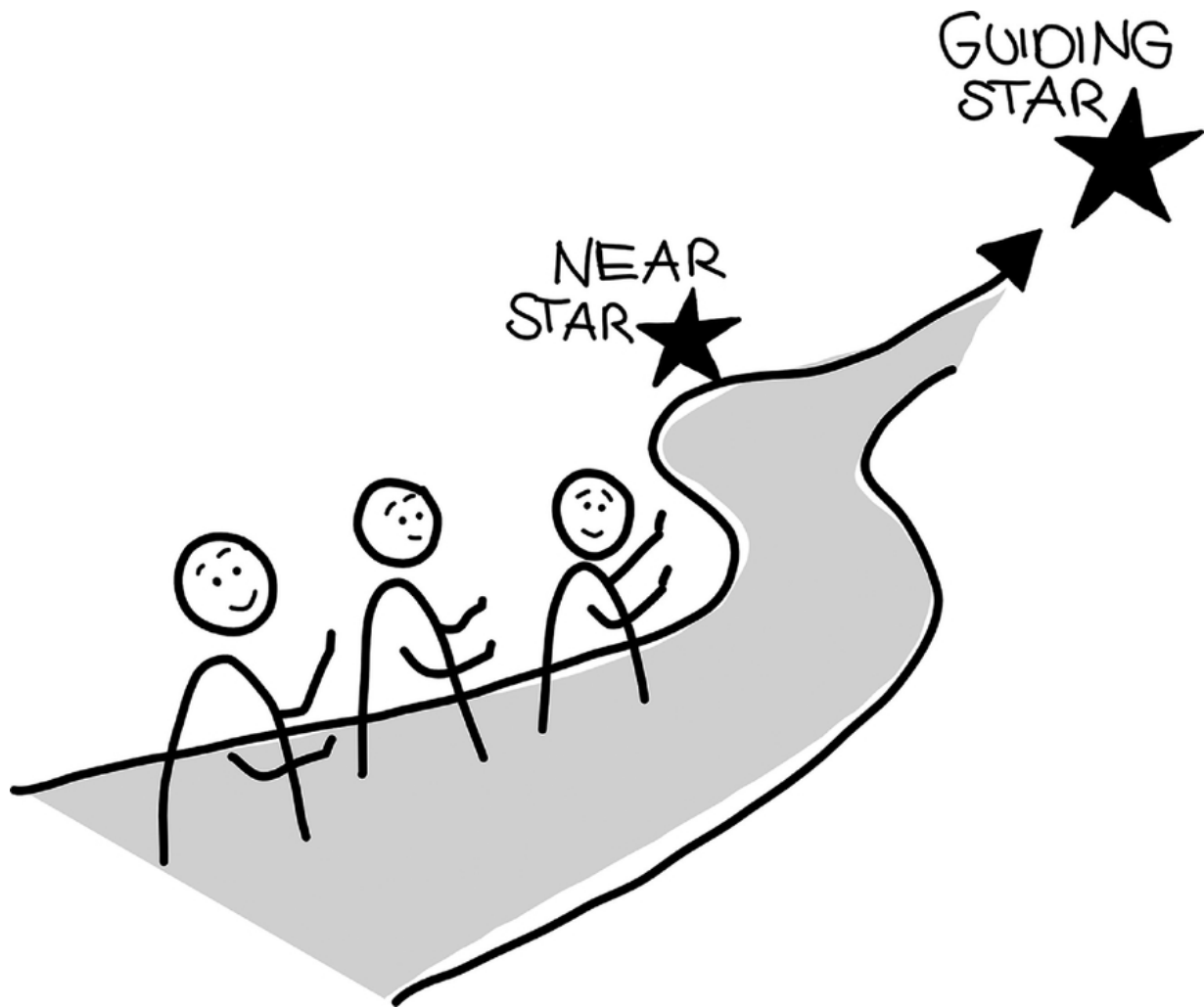
This exercise helps participants define a clear direction for systemic intervention by establishing a Guiding Star (long-term vision) and a Near Star (achievable milestone). By shifting focus from immediate fixes to systemic change, participants develop a structured, strategic approach. Instead of reacting to symptoms, this method encourages them to identify root causes and leverage points, ensuring that interventions are purposeful and impactful.

How It Works

Participants begin by envisioning a Guiding Star, a long-term vision that defines how the system should function if transformation is fully realized. They then establish a Near Star, a concrete and measurable milestone within 5–10 years that signals meaningful progress toward that vision. By clarifying both, participants create a bridge between ambition and action, ensuring that their intervention is both aspirational and achievable.

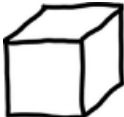
Applications

This exercise is ideal for teams working in policymaking, social impact, business transformation, and organizational change. It helps ensure that interventions are strategic, timely, and focused on deeper system shifts rather than temporary fixes. Participants gain clarity on why action is needed, how to measure progress, and what structural forces must be engaged to sustain long-term change.



Exercise: “Guiding Star and Near Star”

Participants 	Time 	Equipment 
2–20	45–75 minutes	Paper, markers, sticky notes

Space  : An open room with space for participants move around comfortably.

Setup

1. Participants work individually or in small teams.
2. Provide a workspace with flip charts, markers, or sticky notes for brainstorming.

Instructional Steps

1. Introduction (5 minutes)

- Explain that this exercise helps participants define a long-term vision for system change (Guiding Star) and a key milestone toward it (Near Star).
- Shift focus from short-term fixes to long-term system interventions.

2. Define the Guiding Star (15 minutes)

- Participants describe the *ideal future state* of the system:
What does a transformed system look like? What principles guide it, and how would people experience it differently?
- Prompt: “Our Guiding Star is a [name of system] that produces [desired condition].”
- Example: “Our Guiding Star is a global supply chain that eliminates labour exploitation and ensures fair wages.”

3. Define the Near Star (15 minutes)

- Participants identify a measurable milestone within 5–10 years:
What structural, policy, or behavioural shift signals progress? What measurable outcome is achievable?
- Prompt: “Our Near Star is a [specific achievement] that enables [broader system improvement].”
- Example: “Our Near Star is a corporate accountability standard that requires companies to verify fair wages across their supply chains.”

4. Share and refine (15 minutes)

- Teams present their Guiding Star and Near Star to the group.
- Facilitate discussion to refine clarity, alignment, and feasibility.

5. Debriefing (15 minutes)

- Ask participants to reflect on challenges in defining the Guiding Star and Near Star and how it helps guide systemic interventions.
- Facilitate a discussion on key next steps to move toward it.

Tips for Facilitators

Encourage participants to think beyond immediate solutions and focus on long-term system transformation. Guide discussions to ensure that both the Guiding Star and Near Star remain ambitious yet realistic. Push participants to refine their Near Star into a clear, measurable milestone that shows real progress. Keep the conversation grounded in systemic change rather than individual actions, and help participants identify key leverage points within the system.

Tips for Debriefing

Create a reflective space and encourage participants to connect the exercise with real-world system interventions. Use these questions to guide the discussion:

- What challenges did you face in defining your Guiding Star?
- Was it difficult to identify a Near Star that feels both ambitious and achievable?
- How does this approach shift your thinking about systemic interventions?
- What are potential barriers to achieving the Near Star, and how can they be addressed?
- What first steps can be taken to move toward the Near Star?

After gathering responses, summarize key takeaways, focusing on strategic direction, system evolution, and the balance between ambition and feasibility. Encourage participants to consider how these insights apply to their own interventions, organizations, or projects.

Variations

The Guiding Star and Near Star exercise can be adapted to different contexts, group sizes, or system challenges while maintaining its focus on systemic change.

- *Backcasting approach*: Instead of setting the Near Star first, participants work backward from the Guiding Star, identifying key milestones along the way.
- *Stakeholder perspectives*: Participants consider how different system actors (e.g., policymakers, businesses, communities) might define the Near Star differently.
- *Multiple Near Stars*: Instead of defining just one, participants identify several Near Stars to map how different interventions contribute to the same long-term vision

Cynefin Framework

Boundaries | Perspectives

Purpose

The Cynefin Framework is a sense-making tool for classifying situations based on how cause and effect are perceived. It is used when the path forward is unclear and adaptive strategies are needed. The framework helps identify the nature of a situation to guide appropriate action in complex or uncertain systems.

How It Works

Developed by Dave Snowden [[49](#)], the Cynefin Framework classifies situations into five domains depending on how predictable relationships appear at the time of assessment:

- *Clear*: Cause and effect are obvious; apply best practice.

→ *Sense – Categorize – Respond*

- *Complicated*: Cause and effect exist but require expert analysis.

→ *Sense – Analyse – Respond*

- *Complex*: Cause and effect only clear in hindsight; patterns emerge.

→ *Probe – Sense – Respond*

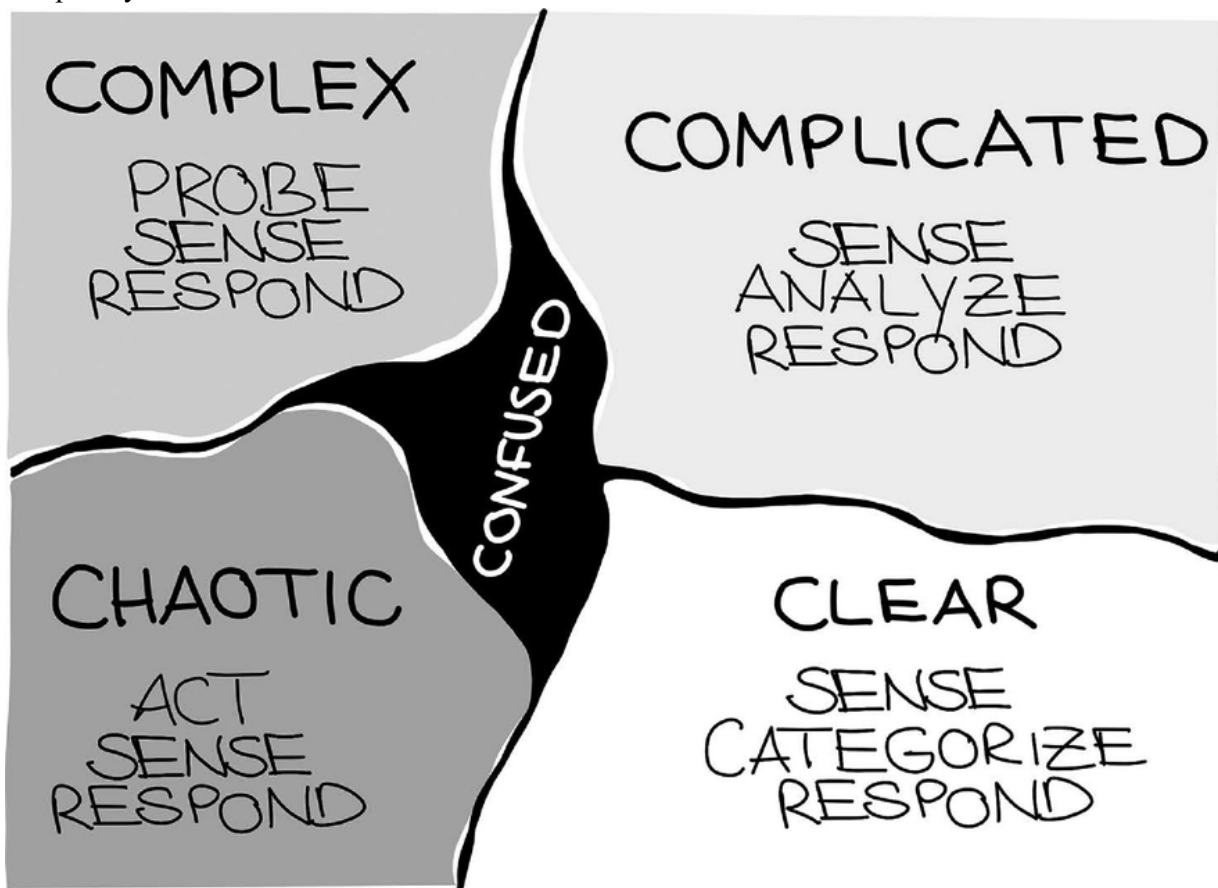
- *Chaotic*: No stability; immediate action is required to establish order.

→ *Act – Sense – Respond*

- *Confused*: Unclear situation; clarify which domain applies.

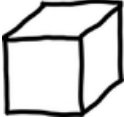
Applications

The Cynefin Framework is used in strategy, crisis response, policy, and organisational development. It supports decision-makers understand the context and choose how to act based on perceived complexity.



Exercise: “Cynefin Framework”

Participants 	Time 	Equipment 
1–10	60–90 minutes	Large sheets of paper or whiteboards, markers

Space  : A room with ample space for group discussion and visual brainstorming.

Setup

1. Set up large sheets of paper or whiteboards for group discussions.
2. Provide markers and reference materials for the Cynefin Framework.
3. Ensure space for breakout groups and group presentations.

Instructional Steps

1. Introduction (5 minutes)
 - Explain the Cynefin Framework and its role in framing situations and guiding decision-making for different types of situations.
 - Provide an overview of the five domains: Clear, Complicated, Complex, Chaotic, and Confusion.
2. Forming groups and initial discussion (10 minutes)
 - Divide participants into small groups, and explain that they will use their experiences to identify examples for each Cynefin domain.
3. Domain exploration (20 minutes)
 - Guide each group to discuss and document examples from their own work or real-life situations that fit into each Cynefin domain.
 - Encourage groups to talk through their reasoning and identify why each example belongs in a specific domain.
4. Group sharing and comparisons (20 minutes)
 - Have each group present their examples and reasoning.
 - Facilitate discussion to compare differing perspectives and framings.
5. Discussion and insights (15 minutes)
 - Encourage participants to discuss any challenges they faced in categorizing situations and what insights they gained from the exercise.
 - Allow groups to adjust their examples or reasoning based on what they learned from others.

6. Debriefing and application (15 minutes)

- Conclude with a reflection on how the Cynefin Framework applies to real-world decision-making and what steps to take next.
- Discuss how participants can use their understanding of the framework and apply the suggested strategies.

Tips for Facilitators

Make sure participants understand each Cynefin domain before starting. Use real-world examples they can relate to. Encourage open, collaborative discussion and remind them there's no single right answer when categorizing complex situations. Step in only when needed; let groups lead their own analysis. Summarize key points now and then to keep focus.

Tips for Debriefing

Ask participants to reflect on their experiences with questions like the following:

- What insights were gained from framing situations into different Cynefin domains?
- How did using the framework change your approach to understanding problems and developing strategies?
- What lessons or takeaways can you apply to improve decision-making in complex or uncertain environments?

Encourage participants to share specific examples of how their thinking shifted and discuss potential applications of the framework in their work. Highlight any common themes or new perspectives that emerged during the exercise to help solidify understanding. This process supports integrating the Cynefin Framework into daily practices and underscores its importance in sense-making and strategic planning.

Variations

- *Simplified domain exploration:* Focus on only a few key domains for a more manageable session, ideal for beginners or short workshops.
- *Digital Cynefin workshop:* Leverage online collaboration tools, such as virtual whiteboards, for remote sessions where participants can engage and contribute their insights.
- *Case study analysis:* Use a shared real-world case study that participants can categorize and discuss, providing practical context for applying the framework.

Note

This framework was developed by Dave Snowden in the early 2000s [[49](#)]. The framework has continued to evolve over time, including refinements such as a liminal zone and the aporetic state,

introducing more nuanced distinctions. This version keeps the focus on practical application and accessibility.

Certainty-Agreement Matrix

Boundaries | Perspectives

Purpose

The Certainty-Agreement Matrix provides a practical tool to reflect on situations based on two dimensions: certainty and agreement. Use it when perspectives differ or the problem feels unclear. It is intended to support choosing suitable ways of working by framing the perceived clarity and alignment.

How It Works

The Certainty-Agreement Matrix uses two dimensions:

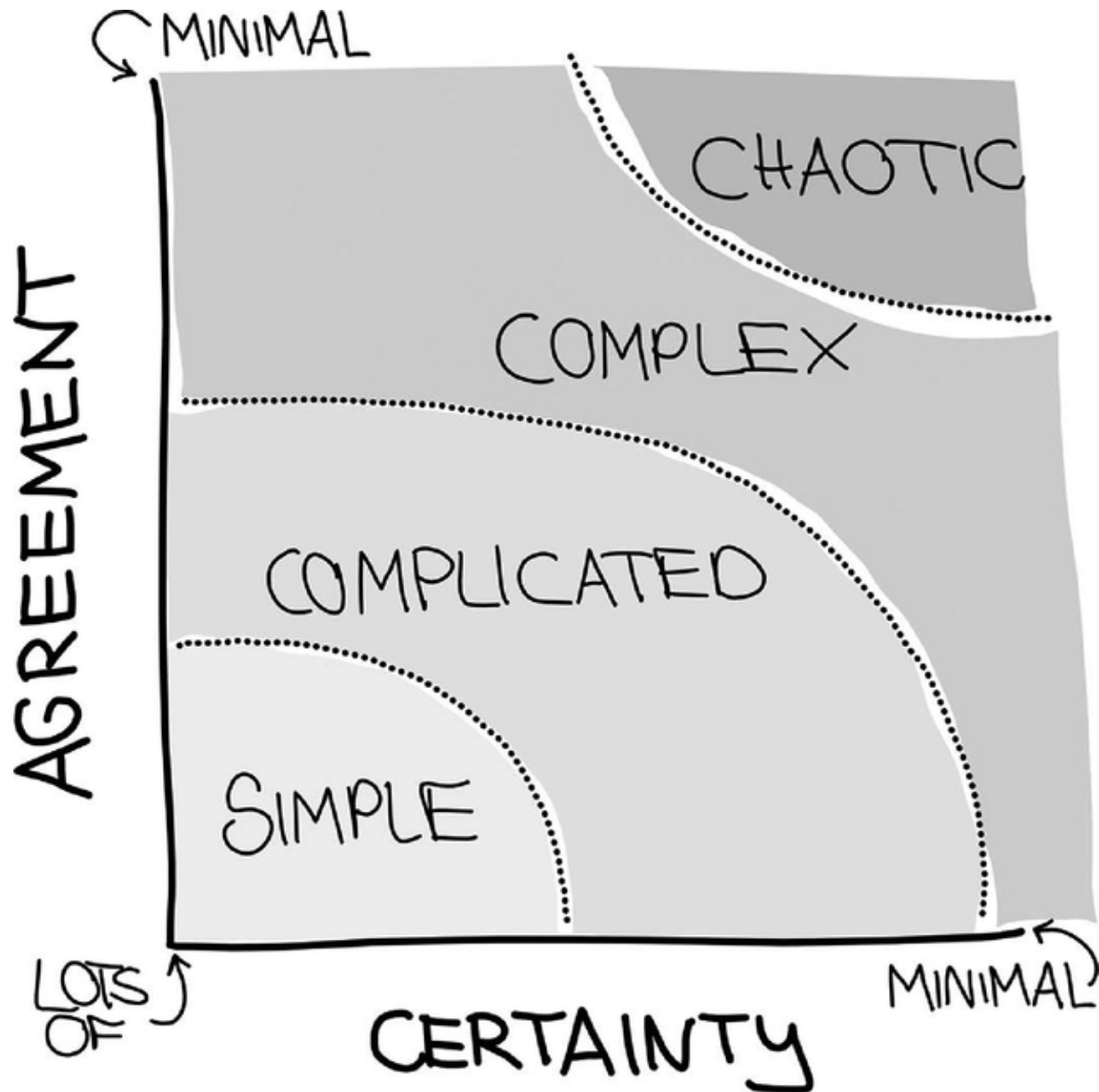
- *Certainty* – how well cause and effect are understood.
- *Agreement* – how much stakeholders align on goals or solutions.

Depending on where the situation falls, it suggests different modes of working:

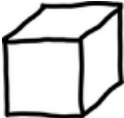
- *Simple*: Cause and effect are clear; follow standard procedures.
- *Complicated*: Cause and effect are knowable but may require expert analysis; apply expert knowledge and planning.
- *Complex*: Cause and effect are unclear and evolve over time; experiment, observe patterns, and adapt.
- *Chaotic*: No clear cause and effect; act fast to stabilize then assess.

Applications

The Matrix is used in leadership, project planning, group facilitation, conflict resolution, and strategic decision-making. It helps teams reflect on how they perceive a situation and choose approaches that match those perceptions.



Exercise: "Certainty-Agreement Matrix"

Participants 	Time 	Equipment 
10-30	60-90 minutes	Large sheets of paper or whiteboards, markers
Space  : A room with enough space for group discussions and visual work.		

Setup

1. Draw the Certainty-Agreement Matrix (two axes: Certainty and Agreement) on whiteboards or paper.
2. Provide markers and reference guides on the Certainty-Agreement Matrix for participants.

Instructional Steps

1. Introduction (10 minutes)

- Explain the Certainty-Agreement Matrix and its purpose.
- Walk through the four areas: Simple (high certainty, high agreement), Complicated (some uncertainty, but agreement), Complex (low agreement, some certainty), Chaotic (low agreement, low certainty).

2. Forming groups and initial discussion (10 minutes)

- Break participants into small groups.
- Brief them on brainstorming real-world situations and placing them onto the matrix.

3. Mapping exercise (20 minutes)

- Groups discuss examples and decide where they fit on the matrix.
- Encourage them to talk through why they chose specific spots.

4. Group sharing and comparisons (20 minutes)

- Each group presents their map.
- Facilitate discussion around different interpretations and placements.

5. Discussion and insights (15 minutes)

- Ask participants about challenges in placement and new insights gained.
- Allow groups to move examples if they change their mind after discussion.

6. Debriefing and application (15 minutes)

- Reflect on the usefulness of the Certainty-Agreement Matrix for decision-making.
- Discuss ways participants can use the matrix in everyday situations at work.

Tips for Facilitators

Ensure participants understand the Certainty and Agreement axes before starting. Use simple, relatable examples to illustrate the different zones. Emphasise that not all situations fit neatly, and differing views are part of the process. Let groups explain their reasoning and guide rather than provide answers. Summarize key points to maintain focus. Encourage open questioning and exploration.

Tips for Debriefing

Ask participants reflective questions such as the following:

- What did you learn from placing situations onto the Certainty-Agreement Matrix?
- How did thinking about Certainty and Agreement affect your understanding of the problems?
- What changes would you make to how you approach decision-making after this exercise?

Encourage participants to share real examples of shifts in thinking. Highlight surprising insights or common patterns. Discuss how complexity and uncertainty affect leadership and planning. Emphasise that the Certainty–Agreement Matrix can be used regularly in strategy or project sessions to build confidence in navigating complex, uncertain situations.

Variations

- *Whole group mapping* : Have everyone work together on one large matrix to encourage shared discussion and diverse examples.
- *Digital session* : Use online whiteboards like Miro or Jamboard for remote workshops; participants can map situations together in real time.
- *Case study* : Use a real-world scenario for participants to practice placing examples on the matrix.
- *Regular use* : Bring the matrix into regular meetings or reviews to help teams recognize and adapt to different problem types.

Note

This activity is based on concepts introduced by Ralph D. Stacey in the 1990s [[88](#)]. The version used here – with labelled areas like “Simple,” “Complicated,” “Complex,” and “Chaotic” – is an adaptation developed later by practitioners in leadership, systems thinking, and agile. Stacey did not present the model in this exact form. It’s not a diagnostic tool but a reflection aid to explore how a group sees a problem.

Power Mapping

Perspectives | Boundaries | Leverage Points

Purpose

This exercise helps participants analyse power structures within a system by mapping key actors, their influence, and their relationships. Instead of assuming change happens through direct action alone, participants uncover who holds power, who resists change, and where influence can be leveraged to drive systemic transformation.

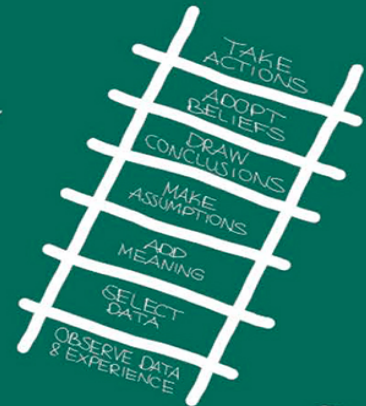
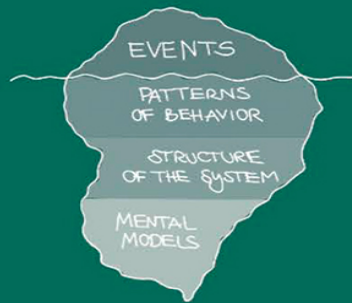
How It Works

Participants create a power map by identifying stakeholders within a system and categorizing them based on their level of influence and stance toward change. They then assess power dynamics to

CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR EXPLORING SYSTEMS, PERSPECTIVES, AND COMPLEXITY



CONNECTIONS

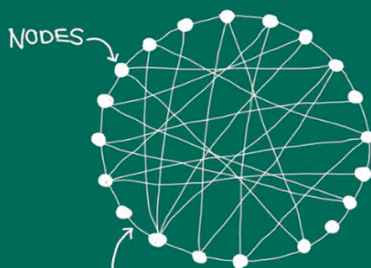
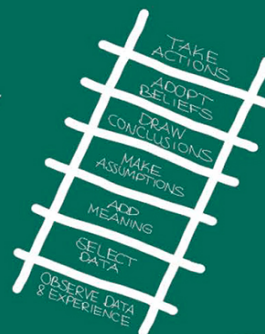
»IS« — ACTUAL SITUATION	»OUGHT« — IDEAL SITUATION



CHRISTIAN BARON

METHODS FOR SYSTEMS THINKING

65+ PRACTICAL APPROACHES FOR
EXPLORING SYSTEMS, PERSPECTIVES,
AND COMPLEXITY



•IS•—ACTUAL SITUATION	•OUGHT•—IDEAL SITUATION



Methods for Systems Thinking

Methods for Systems Thinking is a practical workbook with more than 65 methods you can apply right away. It helps you explore complex systems, involve the right people, and respond effectively to change.

The QuickStart Guide shows you where to begin. You can start with the short theory section, use the 5M Methods Matrix to choose an approach, or jump straight to a method. Methods are organized by the 5M Structure (Motivate, Meet, Map, Make, and Manage) so you can quickly find what fits your purpose, whether clarifying goals, engaging stakeholders, mapping connections, shaping responses, or adapting over time.

Each method spans three pages and gives you a description, purpose, application, illustration, and step-by-step guidance. You also get tips for facilitation, debriefing, and variations. The focus is on action, turning reflection into results.

Christian Baron , PhD, is a consultant, trainer, and systemic coach. He uses systems thinking to make complexity manageable, with a focus on clarity, collaboration, and lasting impact.

Methods for Systems Thinking

65+ Practical Approaches for Exploring Systems,
Perspectives, and Complexity

Christian Baron

