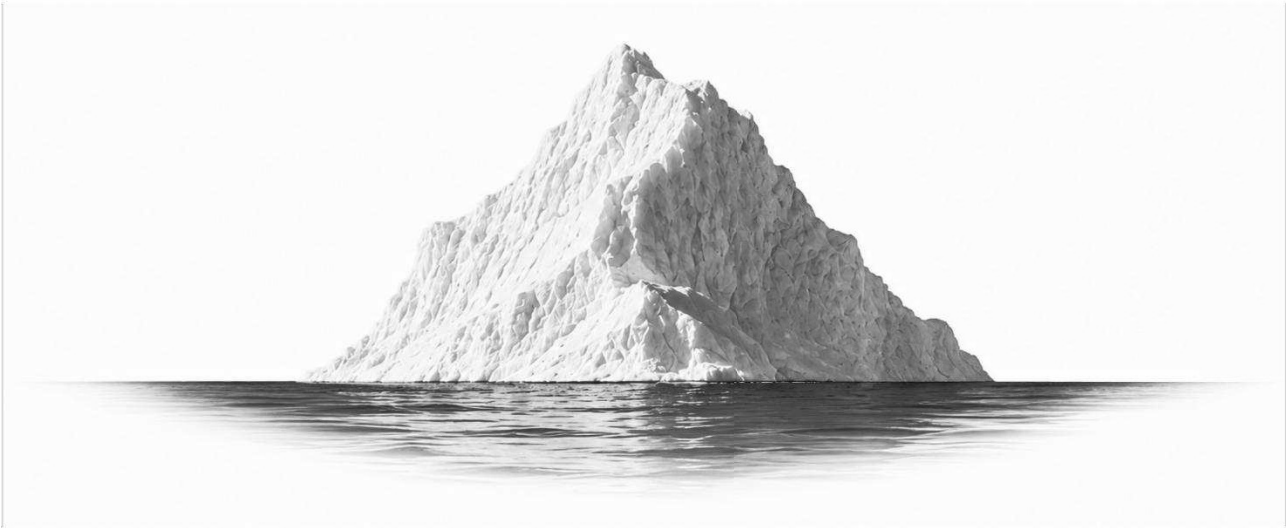
SYSTEMS THINKING

FROM UNDERSTANDING TO PRACTICE



A practical guide for leaders who want to make a difference

Peter Blokland & Koen Callaerts

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AUTHORS' PREFACE - WHY SHOULD YOU READ THIS BOOK?

When you see things going wrong in the world, you can look away and carry on as usual. You can feel overwhelmed by the scale of the problems. Or you can roll up your sleeves and try to make a difference—even without having all the answers.

That is why Koenraad Callaerts and I wrote this book.

We see a lack of systems thinking in society. Too often, we focus on what goes wrong without understanding what keeps making it go wrong. We treat symptoms while leaving the underlying systems unchanged. As a result, our efforts may bring temporary relief while the same problems continue to return.

Systems thinking helps us see more clearly. It deepens our understanding of how things influence one another, how patterns develop over time, and how our own actions contribute to the outcomes we experience. This matters because the quality of our decisions depends on the quality of our understanding.

It also helps us recognise how choices that serve individual interests can collectively undermine what we all depend on. This is the "tragedy of the commons": a situation in which people, pursuing their own interests, deplete a shared resource, leaving everyone worse off.

If we want a sustainable future, systems thinking needs to become common knowledge, shared understanding and everyday practice. It should be accessible to everyone who wants to understand the world and help shape its future.

With this book, we have brought our knowledge and insights together to contribute to that ambition. We want to help you recognise connections, question familiar assumptions and understand why well-intended efforts do not always produce the results we hope for. Above all, we want to help you discover where and how you can make a meaningful difference.

This book is for anyone who sees what is happening in the world and wants to turn concern into thoughtful action. Reading it is an invitation to sharpen your perception, reconsider your choices and become more aware of the systems you help sustain—and can help change.

You do not have to redirect an entire river to influence its course. Sometimes, it starts with a single stone (or a book).

ACKNOWLEDGEMENTS

My first words of thanks go to Steff Vanhaverbeke, who, as a trainer, opened the door to a broader awareness and introduced me to knowledge that has profoundly shaped my personal and professional development.

I also think of Ides De Vos, while realizing that there are undoubtedly many others whom I fail to mention here. Over the years, countless conversations, encounters and learning experiences have left their mark on my thinking.

My sincere thanks also go to Hans, Lieven and Erik for the many insightful, reflective and inspiring discussions we have shared.

I would also like to thank everyone who has participated in the systems thinking courses I have had the privilege to deliver. Your questions, feedback and curiosity continually challenged me to look again, think more deeply and refine my understanding.

Finally, my thanks go to Peter. He recognized the potential of the original course syllabus to become a book and invited me to develop it further together. His experience, research and conceptual frameworks added depth to the content and significantly broadened its application to leadership and organizations.

Koen Callaerts

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No book is written in isolation. Behind every chapter, every idea and every insight are people who, often without realizing it, have contributed to its creation.

My special thanks first go to Steff Vanhaverbeke. By introducing me to Peter Senge's The Fifth Discipline and encouraging me to develop and teach courses on systems thinking, Steff set in motion a journey that profoundly shaped my professional life.

I would also like to express my sincere gratitude to Ides De Vos. Our workshops, training programmes and, above all, our many conversations about organizations, leadership and change have had a lasting influence on my thinking. Ideas rarely grow in isolation; they emerge through dialogue.

My thanks also go to Prof. dr. Ir. Genserik Reniers, who encouraged me to further explore my ideas through scientific research. His confidence in me gave me the opportunity to pursue a PhD at Delft University of Technology, where many intuitive insights could be examined more critically and developed into a scientifically grounded framework.

A special word of thanks goes to Koen Callaerts. His idea of transforming the original course syllabus into a book and inviting me to join him as co-author marked the beginning of a fascinating journey. I am grateful for his trust and for the constructive collaboration that ultimately led to this book.

Finally, my deepest gratitude goes to my family. The countless hours of study, reflection and writing would never have been possible without their support, patience and unconditional encouragement.

This book is therefore dedicated to them. Not only because they gave me the space to continue developing my ideas, but above all because they remind me every day of what truly matters.

Peter Blokland

PART I

SEEING DIFFERENTLY

WHY WE MISUNDERSTAND REALITY

What Is Systems Thinking?

Systems thinking is a way of looking at the world that focuses on the whole rather than on isolated parts. It seeks to understand the behaviour of a system by examining the relationships, interactions and interdependencies between its components. Instead of analysing individual elements as if they existed independently, systems thinking explores how they influence one another and collectively shape outcomes.

Traditional analytical approaches typically break problems down into separate parts. A cause is identified, linked to an effect, and a solution is developed to address it. This works well in simple, linear situations. In complex environments, however, where multiple factors interact simultaneously, such approaches often fail to capture the bigger picture.

Systems thinking shifts the focus from isolated events to patterns over time, and from individual causes to the underlying structures, mental models and culture that shape behaviour. It is based on the idea that outcomes rarely occur by chance. Instead, they emerge from the way a system is designed and from the interactions between its components.

This does not mean that details are unimportant. On the contrary, details only gain meaning when viewed within the context of the larger system. A decision made in one part of an organization often influences other parts—sometimes with significant delays and sometimes in unexpected ways. What appears to be a logical local decision may produce undesirable consequences for the organization as a whole.

Systems thinking encourages us to ask questions such as:

- Which factors influence one another?
- Which recurring patterns can we observe?
- Which structures make certain behaviours more likely?
- Which assumptions shape the way we interpret what is happening?

The objective is not to reduce complexity to simplicity, but to understand it more deeply. By making relationships and interdependencies visible, systems thinking

enables us to make better decisions and create more effective and sustainable change.

What Is a System?

A system is a collection of interconnected elements that together produce a particular pattern of behaviour. What matters is not only the individual elements themselves, but above all the relationships between them and the way they influence one another. It is these interactions that determine how a system evolves and responds to change.

Donella Meadows defines a system as: *"A system is an interconnected set of elements that is coherently organized in a way that achieves something."*

Every system can therefore be understood through three essential characteristics:

- **Elements or components**
- **The relationships between those elements**
- **A purpose or function**

That purpose may be explicit, such as generating profit, ensuring safety or serving customers. It may also be implicit: preserving power, avoiding conflict or maintaining established habits.

Systems behave according to what they actually pursue in practice, not necessarily according to what they formally claim to pursue.

A system is more than the sum of its parts. When one element changes, other elements are often affected—sometimes immediately, sometimes only after considerable delay. For that reason, the behaviour of the whole can rarely be understood by examining individual components in isolation. It must always be interpreted in relation to the system's purpose and the interactions between its elements.

Systems can be found everywhere.

Natural Systems

An ecosystem, such as a forest or a lake, exists to maintain a dynamic balance between species and environmental conditions. A change in one part of the system inevitably influences the whole.

Human Systems

A family, a team or an organization is a system of people connected through roles, expectations and relationships. The actual behaviour of such a system often reflects its implicit purpose rather than its formally stated objectives.

Technical Systems

A production line or an IT system is designed to fulfil a specific function. Yet its behaviour may differ from its intended design when components are poorly aligned or fail to interact as expected.

Socio-Technical Systems

Most organizations combine people, processes and technology. While their formal purpose may be efficiency, quality or service, their actual behaviour is determined by the interaction between human behaviour, organizational structures and technical systems.

Anyone seeking to understand or change a system must therefore look beyond visible events. It requires understanding how the system is structured, how its elements interact and what purpose it truly serves in practice.

This insight forms one of the fundamental starting points of systems thinking.

Characteristics of Systems

When discussing systems, there is a natural tendency to describe them in terms of their individual components. While this seems logical, it is not enough to explain how a system behaves. What makes a system a system is not merely its elements, but the way those elements are connected and interact to produce behaviour.

One of the first insights of systems thinking is that every system consists of smaller systems while simultaneously forming part of a larger one. A team is part of an organization, an organization belongs to an industry, and that industry exists within a broader social and economic context. Where we draw the boundaries of a system is therefore not an objective fact but a matter of perspective.

Those boundaries are far from arbitrary, however. They are largely determined by the purpose of the system under consideration.

Consider a car. If its purpose is viewed as a collection of mechanical components, the system consists primarily of its technical parts. If, however, its purpose is transportation, the driver immediately becomes an essential part of the system. Without a driver, there is no movement from one place to another.

Purpose therefore acts as an organizing principle. It determines which elements are relevant and which relationships matter. Elements that fall outside that purpose fade into the background, even though they may continue to influence the system. Purpose not only defines the boundaries of a system; it also determines how its performance is evaluated and which interactions become meaningful. System boundaries are therefore not fixed; they are purpose-dependent.

This also means that changing the purpose changes the system itself. The physical reality may remain the same, but different elements and relationships suddenly become relevant. Anyone who fails to make the purpose of a system explicit risks analysing a system that does not correspond to the reality they are trying to understand.

Within a system, elements continuously influence one another. These interactions are rarely linear or immediate. Changes in one part of a system may only become visible elsewhere after a considerable delay. Such delays make it difficult to connect causes with their effects. What we observe today may be the consequence of decisions made months or even years earlier.

System behaviour emerges from these interactions. Feedback loops play a central role in this process. Some reinforce change, leading to growth, amplification or escalation. Others counteract change, helping the system maintain stability or return to equilibrium. The dynamic behaviour of any system results from the continuous interaction between reinforcing and balancing feedback loops.

A final, yet fundamental, insight is that we are never completely outside the systems we observe. Whether we are managers, consultants, researchers or employees, we inevitably become part of the system through our observations, questions and interventions. In that sense, observation itself changes the system.

This is what makes systems thinking both powerful and demanding. It requires us not only to understand the system, but also to recognize our own role within it. Understanding and acting become inseparable: the moment we begin to see a system differently, we inevitably begin to influence it differently.

The Laws of Systems Thinking

In organizations, people generally make every effort to solve problems and improve performance. Yet their actions often fail to produce the results they expected. Solutions that initially appear successful gradually lose their effectiveness. Problems return—sometimes in a different form, sometimes elsewhere in the system. What was intended as an improvement may even increase complexity over time.

These outcomes are not coincidental. They reflect recurring patterns in the way systems behave. System dynamics has identified many of these recurring patterns as the laws of systems thinking. They are not rules or prescriptions, but observations of behaviour that repeatedly emerge across a wide variety of systems.

The following sections illustrate some of these laws through familiar examples. They do not tell us what to do. They help us understand why seemingly logical interventions often produce unexpected consequences, and why lasting improvement begins with understanding the system rather than reacting to its symptoms.

Today's Problems Come from Yesterday's Solutions

Much of the progress enjoyed by modern societies is the result of solutions to real problems from the past. The availability of abundant energy enabled industrialization and significantly improved living standards. Advances in medicine increased life expectancy and transformed many once-fatal diseases into treatable conditions.

At the same time, the unintended consequences of these very successes have become increasingly visible. The large-scale use of fossil fuels has contributed to climate change and environmental degradation. Longer life expectancy has created new challenges related to ageing populations, healthcare and social security. Solutions designed to promote growth, comfort and safety have, over time, introduced new pressures into the system.

What was once regarded as progress has not only solved existing problems but has also created the conditions for new ones to emerge.

The question, therefore, is not whether those original solutions were wrong. Rather, it is why they generate consequences that only become visible years—or even decades—later, long after the original decisions were made.

Systems thinking reminds us that every intervention changes the system itself. The challenge is not merely to solve today's problems, but to understand how today's solutions may shape tomorrow's reality.

How can we make decisions today while taking into account the problems our solutions may create tomorrow?

The Harder You Push, the Harder the System Pushes Back

In international relations, countries often seek to influence one another through economic sanctions, military pressure or diplomatic measures. The intention is to change another country's behaviour while strengthening one's own strategic position.

In practice, however, such interventions frequently trigger counterreactions. Economic sanctions may encourage countries to develop new alliances or alternative trading systems. Military pressure can strengthen resistance rather than weaken it. Attempts to increase control may therefore produce the opposite effect, escalating tensions instead of resolving them.

The same dynamics can be observed in organizations, families, healthcare, education and many other socio-technical systems.

Complex systems rarely respond passively. Every intervention becomes part of the system and influences the behaviour of other actors, who in turn adapt their own behaviour. The greater the external pressure, the greater the likelihood that the system will reorganize itself to absorb, circumvent or resist that pressure.

The tendency to apply more of the same when initial efforts fail often reinforces this dynamic. What begins as a targeted intervention can gradually evolve into an escalating cycle of action and reaction.

When does intervention create meaningful change, and when does it merely strengthen the resistance it was intended to overcome?

It Gets Worse Before It Gets Better — and Vice Versa

Organizations under pressure to improve performance often implement measures that produce immediate results. Costs are reduced, investments are postponed, and processes are managed more tightly. At first, these interventions appear successful: financial results improve, margins increase and the immediate pressure begins to ease.

Over time, however, other effects become visible. Deferred investments start to take their toll, knowledge and motivation decline, and the organization's flexibility gradually erodes. What initially seemed like an improvement later proves to have contributed to its deterioration.

The opposite is equally true. Investments in training, maintenance or innovation require time and resources, often reducing short-term performance. Only later do their benefits become visible in the form of improved performance, higher quality and greater resilience.

Short-term results therefore do not necessarily reflect the direction in which a system is developing. Time plays a crucial role: the effects of interventions are often delayed and may initially move in the opposite direction to what is ultimately achieved.

To what extent are your decisions guided by what is visible today, while the most significant consequences will only emerge tomorrow?

The Easy Way Out Usually Leads Back In

When a problem arises, people often look for a quick solution that produces immediate results. Such solutions usually address what is visible rather than what is causing the problem.

In organizations, for example, tight deadlines often lead to the decision to work longer hours. In the short term, this appears to be effective: backlogs are reduced and targets are met.

Over time, however, a different picture emerges. Fatigue increases, mistakes become more frequent, and productivity declines. As a result, new backlogs develop, which are once again addressed by working even longer hours.

What was intended as a temporary solution gradually becomes a recurring pattern. The intervention addresses the symptom while leaving the underlying causes—such as excessive workload, poor planning or structural resource shortages—untouched.

The system therefore returns to the same situation time and again, despite all the effort invested in solving the problem.

To what extent are you truly solving problems, and to what extent are you unintentionally recreating them through the way you intervene?

The Cure Can Be Worse Than the Disease

When a problem arises, people naturally look for a solution that quickly reduces its negative consequences. Such interventions are usually driven by good intentions: to protect, improve or reduce risk.

In practice, however, interventions often produce effects that were not anticipated. The introduction of new medicines has shown that treatments intended to help may also produce side effects that only become apparent over time and, in some cases, have a greater impact than the original condition. Likewise, policy decisions in areas such as energy or education, designed to reduce risks or improve accessibility, may unintentionally create new dependencies, shortages or declines in quality.

A solution introduced from one perspective may therefore generate consequences elsewhere in the system that reinforce the original problem or create entirely new ones. These effects often become visible only after the system has adapted to the intervention.

The cure changes the system—and with it, the conditions under which the original problem evolves.

To what extent do you consider the effects of your interventions on the system as a whole, rather than only on the problem you are trying to solve?

Faster Is Slower

There is an old saying: more haste, less speed.

Most people have experienced how a decision made in haste or a task completed under intense time pressure ultimately creates more problems than it solves.

Mistakes made under pressure require correction. Decisions taken too quickly often need to be revisited. What was intended to save time ends up creating additional work, delays and sometimes even new problems.

The tendency to speed up when pressure increases is understandable. Yet it is precisely this acceleration that can reduce the quality of both the work and the decisions being made. As a result, short-term time savings often turn into long-term time losses.

What appears to be the fastest route often proves to be a detour.

When does speeding up truly move you forward, and when does it simply create the need to go back and repair the consequences later?

Cause and Effect Are Not Closely Related in Time and Space

In many situations, we expect the consequences of our actions to become visible quickly and clearly. When they do not, it is easy to assume that no relationship exists between what we do today and what happens later.

Health provides a clear example. Behaviours such as smoking or excessive alcohol consumption rarely produce immediate, visible effects. On the contrary, the harmful consequences often remain hidden for many years. Only much later do they become apparent, at a point where the connection with the original behaviour is no longer obvious.

Because cause and effect are separated in time, it becomes difficult to recognize their relationship. What appears harmless today may have significant consequences in the future.

The same principle applies when cause and effect are separated in space. A decision that seems perfectly logical in one part of a system may produce unexpected consequences elsewhere—consequences that are not immediately linked to the original decision.

What we observe is not always what caused it, and what we do today often produces effects that become visible only later or somewhere else.

To what extent do you recognize the connections between the actions you take today and the consequences that may only become visible later—or elsewhere in the system?

Small Changes Can Produce Big Results
But the Areas of Highest Leverage Are Often the Least Obvious

When trying to solve a problem, people often focus on visible interventions: introducing more rules, increasing control or allocating additional resources. Such approaches target behaviour directly.

Yet the greatest leverage often lies not at the level of behaviour, but at the level of how people perceive and understand reality. Small shifts in these underlying mental models can profoundly influence what people consider normal, acceptable or desirable—and, consequently, how they behave.

The Belgian BOB campaign against drink-driving provides a good example. Rather than attempting to control behaviour directly, it gradually changed people's perception of what was socially acceptable. What had once been considered normal became increasingly viewed as irresponsible. Behaviour changed, not because people were forced to act differently, but because they interpreted the situation differently.

The most powerful leverage points in a system are therefore often the least visible. They are found not in rules or structures, but in the assumptions, beliefs and mental models that shape them.

Where are the leverage points in your system that can change not only what people do, but also how they understand the reality in which they act?

You Can Have Your Cake and Eat It Too—But Not All at Once

In many situations, choices appear to be mutually exclusive. We are often led to believe that we must choose between opposing alternatives: short-term versus long-term, efficiency versus quality, or stability versus flexibility.

As a result, decisions are frequently presented as unavoidable trade-offs. What is gained on one side seems to require a sacrifice on the other.

In reality, however, these apparent contradictions often arise from viewing the system too narrowly. Once the dimension of time is taken into account, a different perspective emerges. What cannot be achieved simultaneously may well be achieved sequentially.

Investing in quality or training may slow things down in the short term, but it often creates greater speed, efficiency and resilience over the longer term. What initially appears to be a choice between two extremes is often a matter of timing and sequence.

The tension between competing objectives does not disappear, but it becomes manageable once the system is understood over time.

Which choices seem incompatible today, while in reality they are primarily a matter of timing and perspective?

Dividing an Elephant in Half Does Not Produce Two Small Elephants

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When faced with a complex problem, the natural tendency is to break it down into smaller, more manageable parts. Each part is then analysed and addressed separately, with the expectation that the whole will become easier to understand and control.

This approach, however, overlooks a fundamental characteristic of systems: each component fulfils a specific function within the whole. That function does not arise from the component alone, but from the way it interacts with the other parts of the system.

When a system is divided, not only are the connections between its parts disrupted, but functions that exist only because of those connections may disappear. As a result, the whole loses properties that cannot be found in any of its individual components.

Organizations provide many examples of this phenomenon. Risk management, for instance, can be reduced to a collection of tools, checklists or analyses while becoming disconnected from leadership, decision-making and organizational context. What remains may resemble the original system, but it no longer performs the same function.

A system does not work because its parts exist. It works because those parts interact to fulfil a common purpose.

Which essential functions disappear when you divide a system—and what does that mean for the whole you are trying to understand or improve?

There Is No Blame

When something goes wrong, the natural reaction is often to look for someone to blame. Who made the mistake? Who overlooked something? Who should have acted differently?

Although this search for blame seems logical, it rarely leads to a deeper understanding of what actually happened. It focuses attention on individuals, while the behaviour we observe is often the result of the way the system itself operates.

People act within a context of expectations, rules, incentives and constraints. Their behaviour cannot be understood in isolation from that context. By focusing on blame, the underlying system remains invisible—and so does the opportunity to improve it.

This does not mean that people are free from responsibility. Responsibility, however, is not the same as blame. Understanding how a situation developed requires looking beyond individual actions to the network of interacting factors that made those actions possible—or even likely.

As long as we continue to search for someone to blame, the system that produced the problem remains unchanged.

To what extent do you focus on who acted, and to what extent do you seek to understand why, within this system, that outcome became almost inevitable?

Conclusion

The laws of systems thinking do not describe exceptions; they describe recurring patterns in the way systems behave. They reveal that what appears logical at first glance often produces consequences that are far less obvious. Solutions create new problems, interventions trigger counterreactions, and what we observe is rarely the complete picture of what is actually happening.

Once we begin to recognize these patterns, we start to see reality differently. Problems are no longer viewed as isolated events, but as the result of interconnected processes unfolding over time. The question shifts from "What went wrong?" to "How did this situation come about?"

This insight changes not only the way we analyse problems, but also the way we respond to them. It encourages us to move beyond quick conclusions, to look for relationships that are not immediately visible, and to recognize that every intervention changes the system itself.

The laws of systems thinking do not provide ready-made solutions. Instead, they explain why simple solutions are rarely sufficient. In doing so, they represent not an end point, but a beginning—an invitation to look more deeply at what is really happening.

What Does a Systems Thinker Do?

A systems thinker approaches situations differently from someone who thinks primarily in a linear or analytical way. Rather than focusing on isolated events or immediate causes, a systems thinker seeks to understand how outcomes emerge, what relationships give rise to them, and why the system behaves the way it does.

This perspective is reflected in several key characteristics.

Seeing the Bigger Picture

A systems thinker looks beyond individual components to understand the system as a whole. This requires identifying the relevant elements and determining the boundaries of the system. Those boundaries are not fixed; they depend on the purpose of the analysis. The systems thinker then explores how the various elements interact to produce the behaviour and outcomes of the system.

Recognizing Patterns

Rather than concentrating on isolated incidents, a systems thinker looks for recurring patterns over time. What keeps happening? What remains remarkably consistent? Recognizing patterns helps distinguish structural behaviour from coincidence. Many of these patterns only become visible over longer periods because cause and effect are often separated in time.

Looking Beyond Blame

When problems arise, the focus is not on who is at fault, but on how the system is designed. Which structures, incentives, processes or assumptions make this behaviour likely? By concentrating on blame, we often overlook the system that produced the behaviour in the first place.

Questioning Assumptions

A systems thinker recognizes that perception is never entirely objective. Beliefs, experiences and expectations shape how we interpret reality. By questioning these assumptions and engaging in dialogue with others, systems thinkers broaden their perspective and gain a richer understanding of complex situations.

Thinking Long Term

Decisions are evaluated not only by their immediate consequences but also by their long-term effects. A solution that appears effective today may create new challenges tomorrow.

Seeing Oneself as Part of the System

A systems thinker understands that we are never outside the systems we observe. We influence the system while simultaneously being influenced by it. This means we are often part of both the problem and the solution. Recognizing this increases our sense of responsibility and encourages humility.

Systems thinking does not require exceptional intelligence. It requires a shift in attention—from events to relationships, from blame to structure, and from short-term results to patterns that unfold over time. It also requires the willingness to challenge intuitive explanations and accept that systems often behave differently from what we expect.

In the chapters that follow, we will build on this perspective and explore how systems behave, why they behave as they do, and how a deeper understanding of those dynamics can help us make better decisions and create more sustainable outcomes.

FROM EVENTS TO MENTAL MODELS

The Systems Thinking Iceberg

The word *system* originates from the Greek *systēma*, meaning *a whole composed of interconnected parts*. A system is not merely a collection of individual elements, but an organized whole in which those elements interact to produce behaviour and achieve a particular purpose.

When we observe a system, we usually notice only what is visible: results, incidents, conflicts, performance indicators or failures. Yet, like an iceberg, the largest and most influential part lies beneath the surface.

The **Systems Thinking Iceberg** helps us distinguish these different layers.

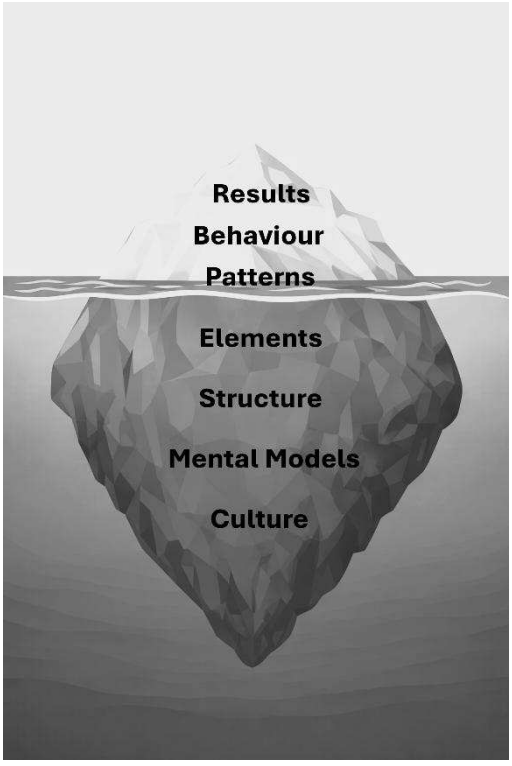


Figure 1. Systems Thinking Iceberg – Peter Blokland