CYBER COGNITION™

Introduction To Systems Thinking for Cyber Security

Transform How You Think About Cyber Security To Achieve Better Outcomes

Michael Collins

Better Thinking. Better Actions. Better Outcomes.

The Author

Hi! I’m Michael Collins,

I'm a cyber security professional with over 20 years experience and a deep passion for thinking differently. My journey to systems thinking began with a question: How can we think better about cyber security?

Systems thinking is a powerful tool. Mastering the art of systems thinking will transform how you view and and tackle complex problems.

During my career, I noticed many professionals, me included, who were caught in a certification race. It was expensive and often ineffective. I realised true progress wasn’t about accumulating technical knowledge but learning how to better organise information.

This led me to explore systems thinking. It's a straightforward, scientifically grounded approach that radically changed my perspective. It's not about memorising facts but understanding relationships and patterns.

Systems thinking offers a fresh lens for cyber security practitioners. It helps you see the bigger picture and make better decisions. As you grow in the skill of seeing more and thinking better, you will not only see improvements in your work, but in your personal life as well.

My research has culminated in a partnership with Cabrera Lab, global leaders in systems thinking. Together, we're bringing these tools to the cyber security field.

This eBook introduces systems thinking for cyber security in a way that’s practical and accessible. You'll learn thinking tools that will revolutionise your approach to cyber security.

I believe these methods will significantly improve how you think, act and make decisions. They've transformed my practice, and I'm confident they will do the same for you.

Enjoy!!

CHAPTER 1

Introduction

Better Thinking. Better Actions. Better Outcomes.

Why HOW You Think Matters

Since the humble launch of the internet in the late 20th century, the digital landscape has seen explosive growth. The sheer volume of content available today is mind-boggling and continues to increase at an unprecedented rate.

As society becomes more interconnected and reliant on digital technologies, the vast amount of data generated and collected in this hyperconnected world creates a perfect storm of opportunities for cyber-criminals. Despite the increasing investments in cyber security tools and technologies, it seems like we are always one step behind the attackers. The question then arises - are we fighting the right battle?

The current state of cyber security is akin to a game of whack-a-mole. We are constantly reacting to threats as they pop up, spending more and more on tools and technologies to combat them.

Yet, despite our best efforts, we don't seem to be winning. This reactive approach, while necessary in the short term is unsustainable over the long term. We need to change what we are doing, but first we need to change HOW we think.

Enter systems thinking, a powerful approach that can revolutionise our understanding of cyber security.

Systems thinking in cyber security offers a fresh perspective on how you think about protecting digital assets. Your organisation, with its people and processes, forms a complex adaptive system. The external threat environment is constantly changing and adapting based on what it learns. Understanding this complexity is key to effective cyber security outcomes.

Traditional approaches often fall short. They rely on linear, mechanistic thinking, viewing cyber security as a series of isolated problems to solve. This view fails to capture the dynamic, interconnected nature of modern organisations and their digital ecosystems.

As cyber threats grow more complex, static defenses become obsolete. Systems thinking equips you with tools to understand and navigate this changing landscape. By changing the way we think, we can change the way we act, and that is a game-changer in the battle against cyber criminals.

In order to act in the most effective way, we must align our thinking with reality. Systems thinking helps us see both the forest and the trees.

Welcome to the new paradigm of Cyber Cognition.

CHAPTER 2

Rethinking Cyber Security: A Paradigm Shift

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The Power of Systems Thinking

Welcome to the first step in your journey towards becoming a more effective cyber security practitioner: understanding the power of systems thinking. First, we'll look at systems thinking, its core principles, we'll introduce the role of mental models, and how this approach can enhance your decision-making in cyber security. Then, we will explore the Systems Thinking Loop, which helps us learn to love reality. Finally, we'll look at the Systems Thinking Iceberg, which demonstrates how our mental models can contribute to both chaos and clarity in our everyday lives.

Systems thinking is an approach to better understanding complex systems. Systems thinking involves the development of mental models that accurately reflect real-world systems. Your thinking and your actions are an output of this system, and high-quality outputs are important.

Therefore, it's crucial to make sure you have a proven process for achieving those results.

By applying these concepts, you can improve your understanding of complex systems, ask better questions, and spot patterns and connections more easily.

Our mental models not only influence our perception of the world, but they also determine how we act, which affects our relationships with others. For example, if you believe that every possible threat is a risk to the business, and that nobody else "gets it", and you have to lock everything down so tightly to protect the business that it impacts how people work, then is it any wonder that you have a reputation as the department of NO?

Compare this to a mental model where you are helping the business make risk informed decisions, where there is no such thing as 100% protection, and it's about balancing value generation with value protection. How would adopting this mental model affect how others see you?

By embracing systems thinking you are not only considering and mitigating risks, but you are also including other crucial aspects of the system that are influenced by your actions, resulting in better overall results.

> *The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.*
> **Albert Einstein.**

CHAPTER 3

Three Key Concepts To Unlock Deeper Understanding

Better Thinking. Better Actions. Better Outcomes.

The Role Of Mental Models

Many people are unaware of how mental models influence their thinking. Our mental models act as a filter between what we believe and reality.

Mental models are the lenses through which we perceive the world. They are our internal representations of how things work, which influence our ideas, decisions, and actions. They also form the basis for our beliefs, behaviours, and our biases.

Improving your mental models starts with an important first step: recognising them through self-reflection or self-awareness. This process of self-examination is critical for identifying the underlying frameworks that influence your thinking and decision making. What assumptions are you making? What biases might be influencing your decisions? By identifying these, you can start to challenge and improve your mental models.

Uncovering hidden assumptions and biases is crucial for refining your mental models and enhancing decision-making processes.

Assumptions are unexamined beliefs we hold as true without concrete evidence. Their importance lies in the fact that unidentified assumptions can lead to flawed reasoning and suboptimal decisions.

Biases, on the other hand, are systematic errors in thinking that can distort judgment and decision-making. Their significance stems from the fact that they can lead to irrational choices and missed opportunities.

> *The attackers' advantage lies in what you think you have (belief) and what you manage (reality). Instead, you must manage from reality, as that is the prepared Defenders Mindset. – John Lambert Corporate Vice President, Microsoft Threat Intelligence*

By testing your assumptions and biases, you can expose blind spots in your thinking, broaden your perspective on complex issues, and develop more robust and adaptable mental models. This awareness enables you to implement checks and balances in your decision-making, seek diverse perspectives to counteract personal biases, and make decisions that are more closely aligned to reality.

Cyber criminals have mental models as well, and when their mental models are a better match to reality than ours it means they have a competitive advantage. In many cases threat actors have access to the same information as the defenders. The difference is in how they organise that information to make meaning about the system they are looking to attack.

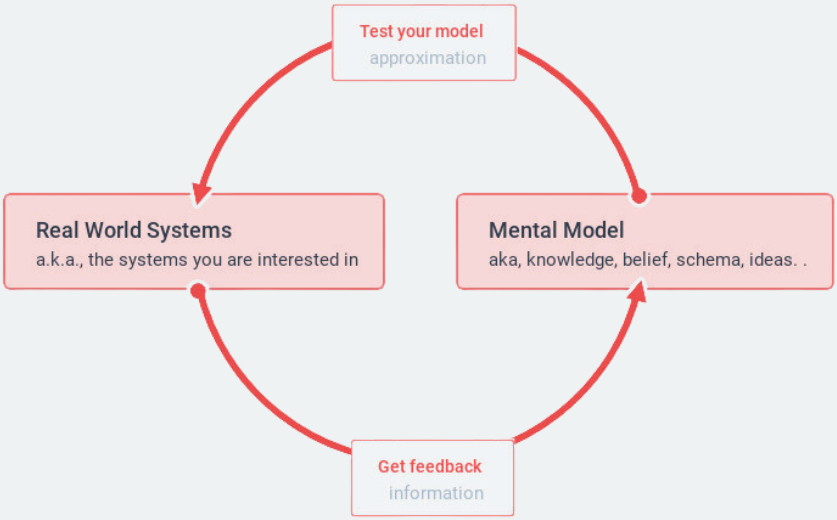
Why Mental Models Matter

The significance of mental models cannot be underestimated. Below are some examples of where understanding your mental models, and those of others can benefit you.

Domain	Benefit
Decision-making	Mental models influence how we analyse situations and make choices. They provide a structure for processing information, evaluating options, and predicting outcomes. By refining our mental models, we can enhance our ability to make more informed and effective decisions.
Problem-solving	When faced with challenges, individuals draw upon their mental models to identify potential solutions. These cognitive frameworks help us recognise patterns, make connections between seemingly unrelated concepts, and approach problems from different angles.
Learning and Adaptation	Mental models are not static; they can evolve as we gain new experiences and knowledge. This adaptability allows us to continuously update our understanding of the world and adjust our behaviors accordingly. The process of refining mental models is essential for personal growth and lifelong learning.
Communication and Collaboration	Shared mental models within teams or organisations facilitate better communication and coordination. When individuals have aligned mental models, they can more easily understand each other's perspectives and work together effectively towards common goals.
Innovation and Creativity	By consciously examining and challenging our existing mental models, we can foster innovative thinking. This process of questioning assumptions and exploring alternative viewpoints often leads to creative breakthroughs and novel solutions.
Risk Management	In complex systems, such as regulated markets or outsourced environments, mental models help us understand interconnections and potential consequences of actions. This understanding is crucial for identifying and mitigating risks effectively.
Emotional Intelligence	Mental models also play a role in how we interpret social cues and manage our emotions. By developing more sophisticated models of human behavior and emotional responses, we can enhance our empathy and interpersonal skills.

Systems Thinking Loop

Systems thinking is not just a theoretical concept; it is a practical approach that can be applied using specific tools and techniques. One of the key tools is the ST Loop (Systems Thinking Loop), which involves building mental models, testing them based on feedback from the real world, and updating them accordingly. This iterative process ensures that your thinking remains adaptable and flexible whilst navigating the reality of a dynamic and complex world. If your thinking remains static in the face of changing information then you risk being out of sync with reality, with potentially disastrous consequences.



The ST Loop is a straightforward yet impactful concept, which stresses the significance of testing ideas in the real world and utilising feedback to refine and enhance thinking, processes, or solutions.

Systems thinking emphasises an important point: adaptive alignment between our thinking and the real environment is crucial. Aligning our thinking with the real world leads to incremental success, while trying to force the real world to conform to our preconceived notions (known as confirmation bias) often results in disastrous outcomes.

Systems thinking serves as a bridge between these two domains; what you think is real, and what is real.

Despite living in an information-rich environment, many people tend to accept information at face value. People rarely challenge their own mental models, let alone those of others, which means they miss out on opportunities to enhance their understanding.

Having access to information is one thing. But changing our thinking based on what we learn from reality is fundamental to learning.

System Thinking Iceberg

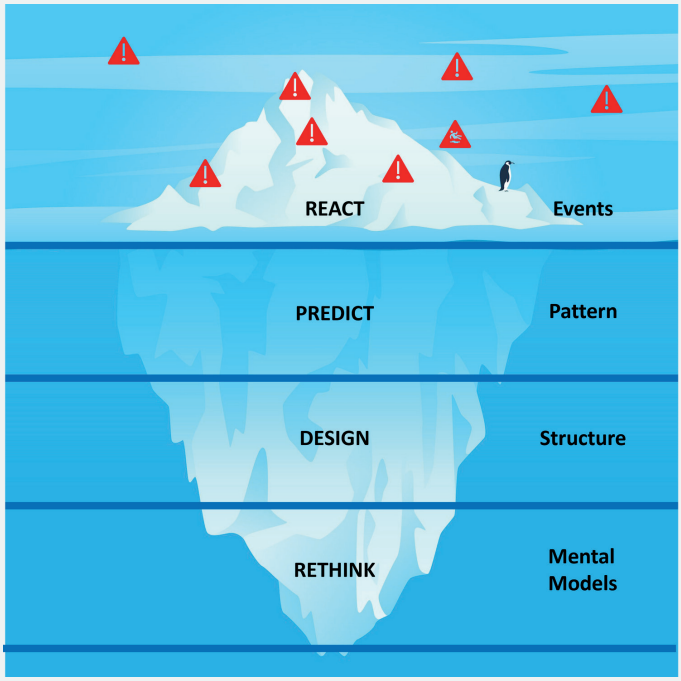
“The Map Is Not The Territory”

This famous phrase, coined by Alfred Korzybski, reminds us that our mental representations (the map) are not reality itself (the territory). They are simplifications, and like any model, they have limitations. But mental models are only one aspect that we need to consider on the journey to better thinking. To understand the role they play we need to zoom in a little further.

Unveiling the Hidden Drivers of Events

Imagine an iceberg floating in the ocean. What we see above the surface is just a small part of its entirety. This metaphor perfectly illustrates how events in our lives are merely the tip of a much larger, unseen structure. At the very bottom of this iceberg lie mental models - our deeply ingrained assumptions and beliefs about how the world works.

These models shape our perception and decision-making processes, often without us realising. They're the foundation upon which we build our understanding of reality. Rising from these mental models is the structure - the systems and processes we create based on our underlying beliefs. This structure, in turn, generates patterns of behaviour and recurring situations in our lives and organisations. Finally, at the surface, we have events - the visible occurrences that we typically react to in our day-to-day lives. These events are the manifestation of the entire system below, rooted in our mental models.



Most people react to surface-level events without exploring underlying causes—like mopping a floor without fixing the leaky pipe causing the problem.

Consider a security analyst dealing with recurring phishing victims. They might focus on quick fixes like training or email filters. However, the key is examining organisational beliefs about cyber threats and trust. Addressing misaligned thinking, such as an over-reliance on technology or the assumption that only large corporations are targeted, can promote long-term change in cyber security strategy and improve digital resilience.

Understanding the iceberg model shifts our focus from reacting to events to reshaping the mental models driving them. This approach creates more effective, long-term solutions to complex problems.

CHAPTER 4

Practical Systems Thinking: Thinking Tools for Cyber Security

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Organising Information

Thinking = Information and Organisation (T=IO). When we engage in thought, we're doing more than just processing information; we're arranging it into meaningful patterns.

Take these two sentences for example:

A woman, without her man, is nothing.
A woman, without her, man is nothing.

At first glance, they appear to be the same, but a punctuation change alters their meaning. This exemplifies part-whole organisation, a fundamental principle of information structure.

The first sentence suggests that a woman is "nothing" without her man. Instead, the second sentence suggests that the man is "nothing" without the woman. The words do not change between sentences, but their arrangement alters the message.

> *Information is something that can be used to remove uncertainty* - **Claude Shannon**

This contrasts Information (words) with Organisation (word arrangement).

In todays information rich world we frequently overlook how information is organised, yet it profoundly influences our thoughts and therefore our actions. Smart is no longer possessing information, it is the ability to organise information to adapt to any situation.

How We Think

Four Simple Patterns

Over 30 years ago Dr. Derek Cabrera discovered that there are four patterns by which we organise information into meaning, a theory known as DSRP. These suprisingly simple patterns are the universal code for HOW to think rather than what to think.

Each of the four patterns is made up of two elements.

Distinctions: We distinguish between **one thing** and **an other** by defining what it is, and isn't.

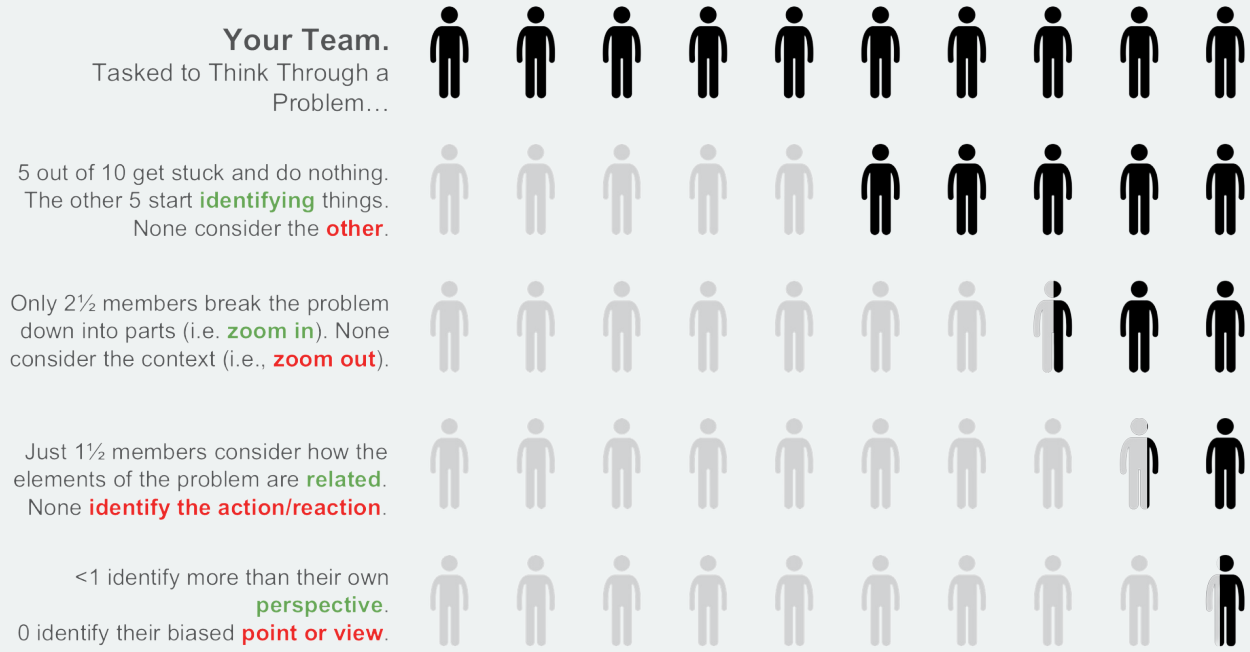
Systems: We group things into **parts** and **wholes.**

Relationships: We notice the **actions** and **reactions** between and among things.

Perspectives: From the **point** of one thing we **view** another thing.

What the Research Says

After 30 years of pioneering systems thinking science and research we now know that there are certain things we tend to do, and not do, when thinking.



Mental Moves

There are four basic mental moves that address the common thinking errors highlighted above. These moves help you to challenge the assumptions and biases that will influence your decisions in cyber security.

Like exercises for the body, mental moves train your brain. Studies have shown that just applying 4 core moves—similar to situps and pushups— will build the foundation for better thinking.

Master and practice these moves, and the science is clear—you'll see BIG results. They will improve your ability to think systemically and see more clearly, helping you to accomplish more and achieve greater results.

Patterns with Benefits

Learning to apply these simple but powerful moves has proven to deliver outsized RoT (Return on Thinking). Cabrera Lab's research shows that applying these moves consistently reduces time, effort, and costly errors in decision-making.

Pattern	Move
Distinction	What is ***x*** and what is ***x*** not?
System	What are the parts of ***x*** and what is ***x*** a part of?
Relationship	What is the relationship between ***x*** and ***y***?
Perspective	From which points of view do we need to look at ***x***?

By learning the foundational cognitive moves and applying them in your every day thinking you can;

- Out-think 90% of the population.
- See up to 5x increases in problem-solving skills and social-emotional intelligence.
- Enhance your ability to ask better questions and get better answers.

Beyond the four beginner moves you can learn many advanced moves by which you can;

- Out-think 98% of the population.
- Gain advanced critical and systems thinking ability and social-emotional intelligence.
- Develop abilities others will notice in your thinking and leadership.

The difference is in doing. Building a daily practice of applying DSRP will dramatically improve your ability to deal with complex challenges, help better organise information to make sense of any situation, and give you a better respect for the diverse social context in which those decisions are made.

A frequent criticism from business leaders is that cyber security practitioners speak a foreign language, and conversely, in cyber security, it is often claimed that leaders "just don't get it".

DSRP helps resolve this tension by providing a universal pattern to organise information that increases the quality of the information exchanged and decreases the time required to achieve a common understanding of the situation.

SUMMARY

From Thinking to Doing: Your Next Steps

Better Thinking. Better Actions. Better Outcomes.

Next Steps

This eBook has offered an introduction to systems thinking for cyber security.

Our thinking, which defines every action we take in cyber security, is reflected in our mental models. Equipping ourselves with the necessary tools to manage the overwhelming influx of information in today's world is essential and long overdue.

DSRP, in particular, provides a scientifically proven method for improving how practitioners organise information.

It allows practitioners to navigate complex challenges, make better informed decisions, and adapt to the emerging threat landscape, ultimately strengthening their organisation’s security posture.

The takeaways are clear:

- Systems thinking is a powerful tool for enhancing your cyber security practices in an increasingly complex world.
- Improving your thinking is the best investment you can make in yourself, with wide-reaching benefits for your professional career.
- The journey to mastering systems thinking is a continuous process of learning, practicing, and improving, but the rewards are well worth the effort.

> “Insights into our own thoughts, or metacognition, is key to high achievement in all domains” – Stephen Fleming

We've only begun to explore the potential of this simple yet effective approach to changing how we think about cyber security. I encourage you to continue exploring this path, and I invite you to join me to learn more about how systems thinking and DSRP can help you and your teams solve today's complex problems with advanced thinking skills.

BONUS CONTENT

Additional Resources

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FREE

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