STOP GUESSING

THE 9 BEHAVIORS OF GREAT PROBLEM SOLVERS

NAT GREENE

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—Jim Fallon, Technology Executive and Entrepreneur

"Clear and concise. Nat Greene has provided expert insights from his consulting practice into how to solve daily problems—his how-to bible is a must-read for busy executives who need to stop guessing!"

—Susan Livingston, Partner, Banking

"Rarely do books fundamentally change the way one looks at life's headaches, but this straightforward guide empowers us with simple steps to avoid the pitfalls most encounter when struggling with a persistent challenge. Problems ranging from the enormous to the mildly annoying can be solved when employing Mr. Greene's techniques. There is nothing inherently complicated about his approach; it simply requires discipline and the willingness to resist shortcuts. I find myself newly encouraged to tackle the problems that have been riddling my life for far too long!"

—Mark Anderegg, CEO, Little Sprouts

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Berrett-Koehler Publishers, Inc.
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PREFACE

Have you ever encountered something in your life that wasn't working as well as you knew it could? Something costly, painful, or frustrating to your family or your business?

Perhaps your dishwasher doesn't dry your dishes well, and you're wasting your time hand drying them. Perhaps your business can't create enough of its product to meet customer demand. Perhaps your organizational processes are dysfunctional and unable to make good decisions. You may be trying to change bad habits in yourself or others, such as trying to eat better. Or maybe you are hoping to resolve a conflict with a colleague or loved one.

How many times have you or your organization tried to solve these hard problems and failed? How often do you build expensive workarounds, or just tolerate them as "part of life?" How many problems in your life have become so commonplace that you don't even notice them anymore?

Imagine a life in which you can see the problems around you and have confidence that you'll solve them. Imagine having great war stories of improving your life, your business, and your community by tackling the hardest problems that hold you back from your potential.

You can become an even better problem-solver. I want to help unleash your problem-solving potential and that of others so together we can form a powerful force for change.

HOW THIS BOOK WILL HELP YOU

There are hundreds of books on problem-solving. Most of these focus on solving simple problems, or provide a step-by-step problem-solving method that the authors hope will help you progress on harder problems, like following a recipe.

When cooking an easy dish or solving an easy problem, a very specific step-by-step guide that you can robotically follow can lead you to victory, like with boiling an egg. But you'll notice that you can't take a totally untrained cook, hand them a recipe for a complicated gourmet dish, and expect it to come out very good. Great chefs demonstrate behaviors that set them apart from other cooks, allowing them to consistently create complex, novel dishes—even dishes others have never thought of before.

Great problem-solvers possess a specific set of behaviors that they apply to solve the hardest problems—the kinds others call "impossible" or have simply accepted as an unchangeable force of nature.

This book will help you understand the behaviors that great problem-solvers use to tackle the hardest problems with skill and panache, regardless of the industry or nature of the problem. These behaviors are universal and will help you to skillfully use whatever problem-solving methods you happen to know.

WHAT PROBLEMS CAN YOU SOLVE WITH THE RIGHT BEHAVIORS?

Regardless of what you do in life and work, I bet you face problems that are important to you and that you fail to fully understand and resolve. You can change this if you recognize the strong problem-solving ability you already possess, enhance this ability,

and then apply it to the tough problems around you. Here are some examples of problems you can work on by using the right behaviors:

- Technical problems at home, such as low water pressure or a door that won't close.
- Technical problems at work, such as critical assets breaking down or underperforming, faulty computer networks, or product quality problems.
- Organizational problems in your business, such as high employee turnover, low customer satisfaction, and logistics headaches.
- Personal health and behavioral problems, such as struggling to adopt new habits that will help you improve your health. Perhaps you want to lose weight or become more physically fit.
- Problems of personal conflict, in which two people that care about each other are upset and don't see eye-to-eye.
- Societal problems, such as global poverty or violence.

I believe the approaches I cover in this book are applicable to any hard problem, and I encourage you to think about hard problems in your life and draw parallels with the stories I share. I look forward to you adding to these stories with your own successes as you begin to solve hard problems.

This book is not a step-by-step guide. Instead, it will help you understand the behaviors you need to nurture if you want to be the greatest problem-solver you can be. Fulfilling your potential as a problem-solver requires practicing these behaviors, stretching

yourself, and ideally, getting strong coaching. I have found no shortcuts or magical methods that can circumvent this. But with practice, you can fulfill that potential, and make both your life and community a better place.

INTRODUCTION

How to Be a Great Problem-Solver

Hard problems are everywhere around us. They lurk in all facets of our lives, unsolved. They make us suffer in ways that we recognize and ways that we have blocked out.

When we fail to solve these hard problems, we often learn to work around them, throw money and resources at them, or simply learn to live with them. These hard problems can persist so long that we or our organizations have long forgotten that they exist, even though they're costing us time and money. But while they are hard, they are not unconquerable. They can be solved.

This book will teach you about great problem-solving behaviors. These are the behaviors you need to solve practical problems—specifically, *hard* problems. If you are willing to apply and practice these behaviors as you approach hard problems, you will become a much better problem-solver, and the lives of everyone around you will flourish for it.

Take stock for a moment of some of the most frustrating situations in your life and work, and keep in mind the problems that you want to solve as you read. Perhaps at work you are having trouble gaining market share, or can't control costs in your department. Perhaps some process in the business or a critical asset is underperforming and you're getting endless phone calls about it. At home, you may be trying to get to the gym and can't do it consistently. Maybe you have conflict with a family member. Perhaps

you simply have a dishwasher that's no longer really cleaning the dishes. Whatever problems you want to solve, think about how to apply each behavior to your efforts.

I'm incredibly passionate about helping to develop and nurture more great problem-solvers in the world. We certainly have no shortage of hard problems to solve in business, in our personal lives, and in society. It is frustrating to see deficient problem-solving all around. It's rampant. But you don't have to accept it.

I have often found it easier to illuminate what it takes to solve hard problems by looking at problems with physical systems that can be more easily understood and observed. This first story is one of my favorites.

A WAR STORY: TOILET ROLLS AND SHRINK WRAP

Early in my career I worked as an industrial consultant and I found myself one morning standing in the middle of a large tissue paper mill. Behind me were several tissue machines: huge, noisy, hot things towering into the distance. They made giant rolls of tissue paper, taller than a person standing and much wider. In front of me were converting lines: They took these giant rolls and turned them into toilet rolls.

The converting process has been around for a long time, and consists of taking the giant rolls from the tissue machines and "rewinding" them onto a thin cardboard tube. These are then chopped up into individual toilet rolls by a large scary saw. If they're fancy rolls, they're individually wrapped in paper and sealed into a bag or case to be shipped out. If they are a low-cost product, many of them are put straight into a plastic bag as you might see in the grocery store. The whole process is fascinating, and it is well worth watching a video of it online.

In front of me that morning was a converting line that made high-end, branded toilet rolls in a nice fancy wrapper. They were being sold in plastic shrink-wrapped packaging for sale in bulk. I was looking at this line because there was a big problem with it: For some reason the plant could not make enough. You would think that toilet paper would be a fairly boring industry: steady demand, not much action. Well it turns out, as is often the case with these things, that when you look a little closer you'll find that a lot is going on.

The big drama was that marketing and sales had done a phenomenal job launching a new packaging format. Instead of selling toilet paper in packs of one, four, or 12, they had made a 20-pack. It was flying off the shelves and consumers loved the product. But the mill could not keep up with consumer demand. There were production problems that were spoiling the party, and the marketing dollars were already spent. That was why I was there. Business people hate missed sales.

The main problem on the line was the shrink-wrapper that took the stack of 20 rolls, put plastic around it, and then shrunk it all in a heat tunnel, creating a nice tight plastic wrap. If you wanted to make more you had to speed up the machine—that much was clear. But it was also clear to everyone that it simply wasn't possible to run this machine any faster. When you sped it up, anything you gained in speed was completely lost, because the machine kept malfunctioning. A pile of loose rolls would fly out of the machine with a bunch jumbled up in the shriveled plastic. Sometimes this would jam the line, and everything would need to be shut down as operators cleaned it up.

This was a well-known problem to the plant and everyone had worked on it. The shrink-wrapper supplier reps had come and gone, leaving a proposal for buying a new, improved machine. The maintenance guys had tried a number of things. The plant engineers

had all tried to fix it, as well as the production team. The prevailing theory was that a mechanical arm that drew the plastic film over the stacked toilet rolls could not move faster. There was a strong consensus that nothing could be done and they would just have to continue to work hard through the weekends until demand dropped off, supplying as many 20-packs as possible.

The option to buy and install a new shrink-wrapping machine was seriously considered as a medium-term solution, but that would take a while to plan and then would involve moving a lot of equipment to get it in. The shrink-wrapper was, after all, trapped in the middle of all these converting lines with conveyors all over the place rushing toilet rolls here and there. No one wanted to lose a couple of weeks' production trying to get that to work. People were out of other useful ideas, and pretty demoralized. This is the sad state that most hard problems end up when people have gone through their list of guesses and failed to solve them.

People are conditioned to guess, and it takes training and skill that comes through guided practice to go beyond guessing. Above all, it requires a certain behavioral attitude that you will learn in this book. People are often reluctant to bring in outsiders, but they also hate weekly conference calls where they are asked why performance is not good enough. So I had an opportunity to take a shot at the problem.

The smart, knowledgeable people who had worked on the issue so far had been trained in a number of problem-solving approaches that relied on experience or guesswork, or sometimes both together. I had been trained not to guess, and when one stops guessing, real problem-solving begins.

I had listened to everyone's theories and guesses as to what was happening, pushed them out of my mind, and set to work studying the problem. On first pass the solution was not obvious. It was clearly a harder problem. I went into more depth, studied the

failures in detail, observed how the process worked, engaged the local team to help me understand key technical points, and wrote out a variable tree (which I'll cover later) for what must be happening. I spent all morning and most of the afternoon working on the problem, and it felt like the solution was just out of reach, but close.

I methodically eliminated every critical variable except one. Understanding a consistent pattern of tearing, along with Newtonian physics, told me there *must* be an unintended force acting on the plastic, caused by something snagging the plastic film before it was correctly "shrunk" in the heater section. However, when we cleared out the machine there was nothing that could be in the way and nothing visible when watching the machine run from the side (you could not easily and safely see down the length of the line or from above or below). It was a real head-scratcher.

When I left for the night I reviewed the situation with the night-shift mechanic and asked for his help in figuring out the final part. I had eliminated everything except for this one mysterious force, and we knew that something during wrapping must be catching the plastic in a very specific area of the machine. But I wasn't yet sure how to observe this mysterious force in action.

I went back to my hotel and pondered the problem at dinner, in bed, at breakfast, and while driving back and towards the facility. When I got in early to catch the night-shift mechanic he came bouncing up to me and handed me a bolt. The problem was solved! We stepped over to a quiet part of the factory floor and he told me the story.

He had been working near the machine the night before when a problem had cropped up. Some errant toilet rolls had jammed part of the machine, so he had fixed it and gotten things running again. He then decided to dry cycle the machine to ensure everything was in alignment before starting production. This involved removing the plastic wrap and stopping the in-feed of toilet rolls.

Then he had a great idea: He decided that this was a good time to "smell the problem." Previously, we had observed the empty machine while it was off, and we had observed it running, but while it was full of plastic and toilet rolls. He decided to safely, but closely, observe the machine while it was dry cycling, paying close attention to the very specific area we had determined must be the source of the mystery force.

He increased the machine's speed, above the "DO NOT RUN FASTER THAN" level that every operator had come to accept. Now that he was running the machine empty, he had a clear view of that section, so he shone a flashlight into the machine as he watched.

These machines are pretty noisy and they vibrate a lot, as they have many big moving parts. And as the vibrating got a little more intense with higher speed, he saw *something* wiggle its way into the chute. Something small, but *definitely there.* He knelt, bewildered, with this trickle of adrenaline starting to course through him—maybe this was it! It was definitely in the right area, and definitely looked like it could snag the plastic film. But what was it?

He decided to speed up the machine even more and look again: There it was, protruding even further. It was shaking, too. As one more experiment, he gradually slowed the machine down and the thing actually receded its way back into the hole. It became clear that the vibrations of the machine at higher speeds were causing the mystery object to vibrate its way through the hole and poke out into the chute and tear the shrink-wrap.

Resisting the urge to run, he shut down the machine, locked it out, opened up the panel in the general area of the mystery object, and peered inside with the flashlight. And there, sitting in a horizontal hole, was a loose bolt, perhaps mistakenly dropped

in by routine maintenance years ago. He almost couldn't believe it was so simple.

He took the bolt out, closed the machine up, dry-cycled it again to check, and saw this time that no mystery object poked out into the chute. They were ready to rock. He brought the production supervisor over and together they tested out running the machine—with product this time—at full speed, and had hours of great production.

In the following months, their output was up over 25% and they were able to meet customer demand. Weekly production phone calls substituted groaning with high-fives. The success was so invigorating for everyone that the bolt became a symbol of powerful problem-solving.

This was a hard problem because it had resisted many attempts to solve it and been declared unsolvable. It also had a complex pattern of failure for such a seemingly simple issue: The plastic film was not in exactly the same place every time, the bolt did not vibrate and move in the same way every time, and these factors changed with the machine's speed. Finally, safely observing this was hard and "general observation" would not get you there. I know as I spent time looking at it myself while working out the critical issue, and others had probably spent dozens of hours doing the same.

Solving this problem required core problem-solving behaviors that I had learned, as well as help from the team. To successfully find the bolt, we had to know exactly what we were looking for. I cannot imagine anyone guessing that there might just be a loose bolt vibrating into the way at certain speeds.

What made the difference here? Instead of guessing, we rigorously measured the problem by employing the right problem-solving behaviors. We spent more time "smelling the problem"—understanding

the symptoms of the problem itself and rigorously defining it—rather than thinking of causes or solutions. Instead of asking for more ideas or guesses from experts, we dug into the fundamental science behind the problem by exploring the mechanical forces that moved—or tore—the shrink-wrap. We kept our focus by relying only on facts to guide our decisions, and by investigating only the parts of the process that were directly relevant to our problem.

In this book you will learn the behaviors that have solved hard problems like this one. Hundreds and thousands of these problems exist in every business, in society, and in your personal life as well, and they destroy value and progress. They are frustrating and demoralizing. Most of them remain unseen or are hidden as a natural defense mechanism.

LET'S SOLVE SOME HARD PROBLEMS

First, let me clarify what kinds of problems you're going to be solving. When I say "practical problems" I mean problems in systems or processes, man-made or natural. I don't mean problems of philosophy, such as "what is love?" I don't simply mean complex decisions, and I don't mean problems of innovation or strategy. I'm referring to problems in which a system or process is operating in a way that we don't want it to, and our lives will be better if the problematic behavior is solved. These problems might include a stubborn waistline, a computer that shuts down intermittently, a public policy that is not achieving its intended goal, or a troublesome relationship.

An easy problem might be one where your car suddenly starts coasting to a stop, and you hear the engine sputtering. Turns out you were too wrapped up in the latest podcast to notice that your

fuel gauge was empty, so you need to get fuel for the car. The vast majority of problems are like this. You use methods you're used to: You use your experience and intuition, and you guess. Because most problems are easy, one of your guesses is often right, and so this approach is practical and efficient. But what happens when you've tried the quick, obvious things that come to mind, and you still haven't solved the problem?

A *hard* problem is one where the solution is deeply hidden or obscure. These problems tend to exist in more complex systems or processes, and have often stubbornly resisted previous attempts to solve them. Our conventional approaches to solving easy problems do not work for solving hard ones.

Some examples of hard problems that I'll discuss in this book include a failing chemical processor that cost hundreds of millions of dollars, a losing baseball team without the budget for star players, and the scourge of poverty in sub-Saharan Africa. These hard problems can be tedious to illustrate in fine detail, so I'll cover them briefly in the book. (For those interested, you can view more detailed case studies of these problems at www.stopguessingbook.com.)

The examples are mostly from my personal experience, along with a few that I have read about, so they'll be weighted heavily to problems I encounter as a consultant in industry, the problems I have run into around my house, and those I deal with as a friend, a husband, and as a father. I believe strongly that these same behaviors can be applied to problems of almost any kind, and I have seen evidence of the behaviors working well in other hard problems that people have solved around the world. But in order to be accurate and clear, I will stick primarily to the examples I know best.

HOW BECOMING A GREAT PROBLEM-SOLVER CAN CHANGE YOUR LIFE

Many people accept the world the way it is, and don't see the incredible potential that is locked behind hard problems. But throughout history, solving the hardest problems facing humanity has been at the root of much of our economic, medical, and social progress. Imagine for a moment a world in which a few million great problem-solvers are on hand to deploy to these problems. A world of great problem-solving will yield incredible economic and social impact for each of us.

You may be able to imagine how solving problems in your operations, human resources department, sales and marketing, and research and development can help your business's bottom line. But when businesses solve hard problems that are holding them back, they often become far more resource efficient: They are able to waste less materials and energy, fuel, and carbon, and that helps everyone. A colleague of mine helped a large industrial plant save millions of dollars in energy costs by helping them convert from burning natural gas to using bark from the trees—in a few weeks and without added capital cost. In the same stroke, she eliminated so much fossil-fuel burning that it offset the lifetime carbon output of my entire team and all their families.

Imagine being able to thoroughly understand and change undesirable behaviors in your life or those of your friends coming to you for help. If you're able to understand what drives your overeating, procrastination, or anger, you can alter key levers in your thinking and environment to achieve victory. Without this understanding, you're depending on hope—and hope is not a strategy.

Developing your problem-solving skills can also lead to tremendous improvements in your relationships. I'm at the age now

where some of my friends are having serious marital problems, or even getting divorced. Some will discuss this with me, and what I consistently learn is that their marriages are falling apart because of problems that cropped up 10 years earlier, and simply weren't confronted. Instead, they festered and built resentment, and by the time the couples started really talking, they had drifted apart. They didn't have the skills to solve these problems before they became too big, so the couples had often lost the will to tackle them and they seemed impossibly difficult. Some people are just not meant to be together and other change over time, but the application of great problem-solving behaviors would certainly help, whatever they decide for their futures.

When you're a great problem-solver, you can help your organization or family make better decisions and reduce conflict. Many heated disagreements seem to stem from people having different opinions over the best course of action, and trying to use social capital to compel others to trust them over someone else. Instead, imagine if you understood completely how each decision would affect the bottom line you all want, and were able to tell the story clearly and decisively. I've found that great problem-solving makes developing alignment as easy as it can be.

These skills can even help you overcome bias in others. The main bias I suffered from in my early twenties was that I was seen as being too young to help a business. People believed I lacked the maturity and experience to add value. Because I had developed great problem-solving skills, I was able to help business leaders clearly see the reasoning behind a great decision, instead of rely on the "authority" of experience that I did not have. Instead of being seen as an immature young person, I was seen as a helpful problem-solver, and respected for it.

WHY PEOPLE CAN'T SOLVE HARD PROBLEMS

Most people guess when they try to solve problems. You may not believe that you do, but any time you come up with a list of possible root causes, or a "hypothesis," or anything that you need to test before you are certain it's the root cause, you are guessing. The good news is that most problems are pretty easy: We solve them all the time, and we may not even be aware that we're solving problems. Humanity got to 7 billion people by solving most of the problems it ran into—some of them hard, many of them easy. Conventional, guess-based approaches will work fine for these easy problems, but they'll run into trouble with hard ones.

Here's where most folks go wrong: Often, people use the same guessing methods they apply to easy problems to try to tackle hard ones, and they get steamrolled. It's like sending your high school basketball team up against the Michael Jordan-era Chicago Bulls—it's just not going to work, and you're going to have to take your game to the next level if you want to solve them. I want to help you understand the behaviors you need to play like an all-star problem-solver.

There are some very simple problem-solving methods, such as Five Whys, that will help you to guess with greater focus.[1] There are also some others that have pages upon pages of steps to follow, and there are many books peddling many of these methods. But solving hard problems is about far more than having a good problem-solving method. Imagine trying to walk into surgery armed only with a handbook, one that is designed to guide you through any kind of surgery with a single step-by-step approach. It's obvious in any other context: You need to know how to use your brain and make decisions in the field in order to be successful at surgery.

Likewise, when solving hard problems you need to learn how to draw on the right behaviors in the right circumstances, and I

have found that most people are never taught about great problem-solving behaviors before they're expected to solve hard problems. It's really no mystery why people struggle so much with it.

With the right skills and behaviors, we can solve hard personal problems such as chronic illnesses, bad habits, and stubborn extra weight. We can solve technical problems at home and at work, from glitches in your car to outages at massive refineries. As a society, we can solve global systemic problems, such as many diseases, economic risks, violence, and environmental contamination. Our lives and the world can become a much better place.

Without a doubt, many of the hardest problems facing the world require more than just a few smart folks to understand the root cause behind what's solving them. Some will require great scientific innovations or discoveries; some will require the mustering of significant resources. I have been solving hard problems for a long time and still shrug my shoulders whenever somebody asks me how to create peace in the Middle East. But every unsolved problem *is* bottlenecked by not understanding the root cause at a fundamental level, and every single one needs some great problem-solvers to crack it.

To become a great problem-solver, you'll need to practice these behaviors on easier problems, using a structured method to guide you and, ideally, a coach to provide feedback and a sounding board. But the most important step to take is to get out there and start solving problems.

What hard problems are you living with? Which ones have you tried and failed to solve? Where have you given up or worked around a problem at great expense? Now is the time to do something about that: We're going to go solve some hard problems.

WHAT TO EXPECT

This book will help you understand the behaviors that great problem-solvers use to solve hard problems with skill and panache, and what holds us back from applying them. In the first nine chapters, we'll discuss each of these behaviors, along with illustrative stories and practical guidance.

Stop guessing. This means stop brainstorming and stop just trying things out. After a few benign guesses at a hard problem, you'll realize it's hard and it's time to try something new. But nature abhors a vacuum, so if you don't have other behaviors at hand, you'll revert to your old ones. That's where the other eight behaviors come in: They will help you to stop guessing at solutions and instead measure the problem.

Smell the problem. Get out from the chair and get in the field, using your natural senses and tools available to you to develop a strong pattern of failure. This doesn't mean burying yourself in streams of data: It means asking relevant questions about the specific problem. This behavior can solve some moderately difficult problems right away, and will be critical to solving hard ones.

Embrace your ignorance. Most people try to solve problems using the knowledge they already have about a process, but it's what you don't know that lies between you and the solution. Often we are afraid to admit our ignorance in front of others in order to preserve our reputation. Great problem-solvers not only admit their ignorance but also embrace it and ask questions others might find "stupid," to shatter old assumptions about the problem.

Know what problem you're solving. Often, people work on the wrong problem entirely by making some implicit assumption about what's causing it. Great problem-solvers invest time upfront to make sure the problem they're working on is well defined, measurable as a

variable, and represents precisely what is wrong with the system or process.

Dig into the fundamentals. This means learning how the process works, both by understanding the process itself and by understanding some of the fundamental science behind it. By focusing on what controls your problem, you'll be able to limit your digging to the parts of the process and the science that are relevant, rather than trying to wrap your arms around the entire thing at once.

Don't rely on experts. Utilizing subject-matter experts is critical to understanding a complex system and its underlying functionality and science. Unfortunately, most people delegate responsibility for solving the problem to these subject-matter experts, rather than driving the problem-solving process themselves. Sometimes internal and external experts aren't well positioned to solve the problem for you, and great problem-solvers always view experts as collaborators rather than saviors.

Believe in a simple solution. When confronting complex problems, it can be comforting to believe that the solution will be complex as well. But by not believing in a simple solution, people often give up long before they've gone through the rigor required to find the simple solution that lies at the root cause, to great cost and detriment. Great problem-solvers will have the belief and tenacity to keep solving until they've found the true root cause, and will be able to most easily and economically implement the simple solution that emerges.

Make fact-based decisions. Avoid making opinion-based decisions: Anything that relies on a vote, on authority, or on some subjective ranking system of what decision to make is one of these opinion-based decisions, and it leads problem-solvers astray. Great problem-solvers insist on using only facts to make decisions in problem-solving, and relentlessly verify what they

are told. They check data streams to ensure that what they're observing represents reality.

Stay on target. When problem-solvers dive deep into a problem, they too frequently seek to expand the number of possible root causes, so they can test them. They attempt to wrap their arms around the entire process and everything that could be causing it. This wastes time and resources, and is unlikely to find the true root cause among hundreds or thousands of potential causes. Great problem-solvers measure the drivers that most immediately control the problem in order to determine whether those subvariables are in control, and in doing so are able to quickly eliminate most possible root causes and avenues of inquiry without having to dive deeper into them. This keeps them efficiently on-track, enabling them to find the root cause.

Choose your method. Great problem-solvers often use structure in order to stay on track and consistently apply these behaviors. In Chapter 10, "Choose Your Method," you will learn how to assess different problem-solving methods by understanding their underlying elements. Strong problem-solving methods will discourage guessing, provide lots of structure to develop a pattern of failure, and guide you to understand how the process works.

CHAPTER 1

Stop Guessing

> *I never guess. It is a shocking habit—destructive to the logical faculty.*[1]
>
> —SHERLOCK HOLMES, IN *SIGN OF THE FOUR*

Unlike Mr. Holmes, the rest of us guess sometimes. When we face something that's broken or any problem in our lives, our frontal cortex lights up with one or dozens of ideas of what might be wrong and how to fix it. We might jot these down and quickly get to work.

Guessing is a natural brain function. In our evolutionary history, humans had to quickly make decisions with very limited information. We had problems such as "What tool should I use to deal with this saber-toothed tiger trying to separate me from my larynx?" Spending time studying your problem and finding the root cause behind your unfortunate conundrum was a behavior that natural selection quickly pruned from our family trees thousands of years ago.

And that natural tendency to guess is reinforced throughout our lives. In school, we are rewarded by teachers for being the first to raise our hands with a guess to the answer of a question. In order to promote self-esteem, teachers reward wrong answers, too: "good guess!" We're discouraged from simply saying, "I don't know."

In business we also naturally default to guessing. We're encouraged by others who crave quick action when problems arise—regardless of the quality. Spending hours staring at data or a broken machine can be seen as slow or lazy, whereas the employee that "rolls up their sleeves" and immediately tries something is seen as heroic.

I don't know when I first came across this issue, but the first example I can recall was while I was in a factory in Georgia. A piece of equipment had broken down, stopping the production line. A mechanic spent 8 hours changing a half-dozen parts until he got it back up and running. After production was back online, he told a story that has become very familiar to me: "I ripped it open and changed out this part, but that didn't fix it. And I also had to change this *other* part, and *then…"* He was celebrated by the leadership team for his tenacity and effort, but nobody asked whether he could have brought the plant online much faster by actually investigating what the root cause was. And it seems highly unlikely that four or five parts all failed at once.

This isn't problem-solving. It's solution-guessing. Truly solving the problem involves understanding what's wrong and why it happened, through investigation and understanding—not by spending days or weeks testing different guesses until, hopefully, one works.

WHY GUESSING FAILS

Through both nature and nurture, guessing has become a foundation of our problem-solving skill set. And guessing helps us resolve many of our problems, but only the easy ones. When a light bulb is off, we guess that flipping the switch will turn it on. If that doesn't work, we guess that changing the bulb will get the job done. If *that* doesn't work, we typically scowl at the light as we flip the switch a

few more times, and then go check the breaker-box: Aha! We flip the breaker, check the light, and bask in its glow.

What does the IT engineer at your company say when someone calls them to tell them their computer isn't working? "Is it plugged in?" Often asking three or four such questions solves the problem. If you suddenly start vomiting, you might guess that it has something to do with what you ate last night—and you might be right. But you might not.

Solution-guessing is a hit-or-miss technique. When a problem has two or three potential root causes, and when testing them is cheap and quick, it's entirely appropriate. But these are easy problems. Most persistent problems in our lives aren't easy by definition: They would not persist if they were easy to fix.

What would we do if the breaker wasn't flipped? Or if it flipped again after a few minutes, plunging us once more into darkness? Or if our light bulb blows out repeatedly? At this point, it's time to realize we don't have an easy problem on our hands, and guessing won't solve it. If you don't have a strong problem-solving skill set, you have three options: You might keep guessing, hoping you might resolve it. You might call in an expert—in this case an electrician—and they'll be able to use their experience to make an "educated guess," which can move easy problems along. But when that fails, you'll probably just cough up the money to replace whatever appears to not be working, or just live with it.

When you're facing a problem of moderate difficulty, there may be something like 50 potential root causes. Perhaps you've developed intermittent sneezing fits, or your motorcycle engine occasionally stalls out in the middle of the highway, or you're not making any progress on your diet. At work, perhaps your emissions are too close to the regulatory limit for comfort, or you suspect your sales force is not selling as hard as they can because they believe the supply chain won't be able to meet their commitments

to the customer. If you are really good at guessing—perhaps with the help of some colleagues—you might come up with 30 potential causes.

It takes time and resources to test every guess. With a long list, it's likely you'll waste lots of both. Worse, there's a good chance that the root cause isn't on your list, and you have no way of knowing until you've completed testing the entire thing, which might take months. What will you do next? Perhaps get a bigger group together to create a longer list of guesses?

Then you've got hard problems. These are the kinds of problems that might have hundreds or *thousands* of potential causes. The actual root cause is obscure or hidden. Shearing pipes in your water pipes might be due to invasive corrosive bacteria introduced at the local river. Your trouble sleeping might be caused by an allergy to yellow-6 dye in your macaroni. You are unlikely to be able to guess the causes to these, and *trying to guess wastes a lot of time*. Trying to implement some of these guesses is a shot in the dark and quickly uses up huge amounts of resources. Your brainstorming efforts will generate a list of some dozens of "possible root causes." You'll tirelessly grind through them and, months later, have nothing to show for it. Worse yet, with all of the random changes you have made, you've probably created new problems.

Brainstorming might be useful in situations where creativity is required. However, solving hard problems is not one of these. Rather than having one person guess at something, brainstorming is gathering a lot of people together to group-guess, which adds the further complication of groupthink and politics. Often this guessing is covered up with an elaborate "process" for prioritizing the guesses. You can do better than this.

At one food processing plant, they were making a product in a plastic cup with a seal on top—the sort you tear off in order to

eat. Customers were getting moldy food because the seals weren't working properly. You can imagine this was a fairly important problem for brand and food safety reasons. This corporation had invested heavily in Lean and Six Sigma techniques and had a sizeable organization dedicated to solving this problem. When we arrived, they had used a Fishbone-Diagram approach to identify over 200 potential causes and ideas to fix them (this was clearly a pretty hard problem).[2] On the surface, they had taken a very structured approach, but in reality, it's what I call "structured guessing." Any time you "come up with" many things to check that could be the cause, **you are guessing** (see Table 1.1)**.**

If you get from someone a list of 10 "potential" root causes, they *don't know what's happening.* If you've come up with 200, you have no idea at all what's happening. This number of ideas is far too many to search through with any reasonable effort: An individual or team is going to run out of time, resources, and energy long before they get through the list. And worse, when a team doesn't understand a problem or the system behind it, odds are good that the true root cause isn't even on the list. This is why guessing won't solve these problems.

Table 1.1: What people say to cover up guessing.
I have a hypothesis!
I have a theory!
I'm pretty sure X is true.
We listed the most likely options.
The group voted on this one.
I'm not guessing, I'm taking action.
I was right, so it couldn't have been a guess.
Our experience suggests…

Over a period of 4 months the food processing plant had invested one year of work and $200K trying out about one-third of these ideas, and they'd not gotten close to solving the problem. They had actually created new problems for their production line as they installed new drive-chains for the sealing equipment and made many other changes. When you make 50 changes to a production line, and only one in 10 causes a new problem, you've still created five new problems.

Taking an approach designed to solve hard problems took care of this issue in a few weeks, and demonstrated that the root cause wasn't on the original list. Not a single guess was made in that entire effort. But "structured guessing" had cost the business a lot, including time and money. We'll have a closer look at this example in Chapter 8, "Make Fact-Based Decisions," and Chapter 9, "Stay on Target."

THE CURSE OF LUCK

Imagine Sherlock Holmes trying to catch a serial killer with guessing. "Maybe it was the butler!" So we throw the butler in jail, but the serial killer strikes again! "Perhaps it was that shady fellow!" Six murders later we have seven more people behind bars waiting for the circus to end, but Sherlock has another hunch. "Maybe it was the chief of police!" At that point everyone rolls their eyes and tells Sherlock that he'd better not quit his day job. The practice of guessing so obviously fails in detective work that it's almost shocking that we guess when we have important problems to solve.

But let's say you guess, and you get lucky: You found a solution and implemented it effectively. You may or may not have spent a lot of time and resources on it. Unfortunately, some bad side effects come with this rare victory.

First, you've reinforced the habit of guessing in your mind or in your organization, fooled yourself into thinking it's a good strategy and is going to work again, and made the habit harder to break in the future. Whether or not it works, it's easy, and we find comfort in that.

Second, you haven't developed a deeper understanding of whatever you're trying to fix, whether it's yourself, a process, or a machine. Instead of spending time building some knowledge of the fundamentals that you can use in the future—new problems are popping up all the time—you've spent your time guessing and checking. So next time there's a problem, you're back to square one.

Third, and perhaps most importantly, you're not becoming a better problem-solver. While guessing might eventually get the job done for problems of moderate difficulty (although at great cost), you rob yourself or your team of critical skills development. When you get to truly hard problems, you're going to need all of the skill you can get: If you don't practice using the right behaviors and method to solve moderate problems then you will never master them, and you're going to get shellacked when you try to tackle the hard ones.

GUESSING IN POPULAR PROBLEM-SOLVING METHODS

Many businesses teach their people structured methods to help them solve problems. Structure can be very helpful in certain stages of the problem-solving method, adding rigor to defining the problem and finding a pattern of failure. These are important steps beyond simple guessing or brainstorming, and they are critical to quickly solving problems of fairly easy or moderate difficulty. Many direct the problem-solver to spend significant effort

studying the problem *in situ,* which is a significant step in the right direction away from solution-guessing at a table, in a conference room, or behind a computer. Understanding the pattern of failure allows a problem-solver to quickly eliminate some of the root causes by testing them against the pattern of failure. This can shorten the list of guesses and accelerate progress on some moderately difficult problems.

Where most of these structured methods break down is that they ultimately resort to guessing to determine what root causes may be. While they can help you solve some moderate problems, you still depend on the hope that your guessed cause is on the list you developed. Hard problems are immune to them.

For example, consider a classic problem-solving methodology such as the PackCorp Scientific Approach, which was popular in the 1960s and was one of the first to introduce rigorous problem definitions.[3] Its method has the following nine steps:

1. Pick a problem
2. Get knowledge
3. Organize knowledge
4. Refine knowledge
5. Digest
6. **Produce ideas**
7. Rework ideas
8. Put ideas to work
9. Repeat the process

Steps 2 through 5 are dedicated to studying a pattern of failure, which was a breakthrough in problem-solving. But step 6,

"produce ideas," depends on insight, inspiration, and brainstorming to determine potential root causes.

When you look at most popular problem-solving approaches, you'll find that they devolve into structured-guessing at some point. Many have steps such as, "develop possible root causes" or "deduce probable causes." Whenever we develop some list of possible root causes, we're guessing, even if it's structured guessing. Some of these guessing steps are disguised as "forming hypotheses" or other seemingly scientific approaches. Many of these methods are designed to focus on simple problems quickly, where one needs to just organize guesses—Five Whys is great for this. For hard problems, though, the likelihood that you'll include the true root cause in the list of "possible root causes" that you guess is tiny.

For sufficiently complex systems, it's inconceivable that one or a group of human minds could comprehend it in order to effectively guess the right root cause. The Fault Tree Analysis for Boeing's 747, which lists known potential causes of catastrophic in-flight failure, has *thousands* of elements.[4] In some in-flight failures, like TWA Flight 800, the root cause is not on the prebuilt FTA—there are just too many possibilities.

The structure that comes with some of these methods can accelerate problem-solving for easy and moderate problems by pointing them in the right direction. To solve truly hard problems, you'll need to use a method that doesn't involve guessing in any step. There are methods that avoid guessing, but they are rare. You should find one you like. The one I'm most familiar with can be found in Chapter 10, "How to Choose Your Method," along with some guidance on how to pick the method that's right for you.

DEALING WITH GUESSING

Let's be honest: You're going to have guesses. If you're working with a team, *they're* going to have guesses. That's fine, it's natural. These guesses are going to bounce around and might distract you if you're not experienced at solving hard problems.

If you or your team seem are distracted by guessing, I've found it useful not to suppress it but to write it down and get it out of your system. Put it in an envelope and *ignore it.* If in the end, you were right, pat yourself on the back.

This is actually a great exercise with a team: Get everyone to write down what they think the root cause to your tough problem is, and put them all in a box that you lock tight. Better yet, get them to write down what they think the root cause is, why, and what data they'd use to convince everyone else.

After the problem is solved, if your guess ended up being right, ask yourself if you had the data on hand to be able to decisively convince others to prioritize your guess over theirs. Until we actually *know* the root cause, there's no effective way to prioritize different guesses, and the best guess is likely to be lost.

IT'S NATURAL TO GUESS, AND YOU CAN STOP

I've been fortunate to work with some of the brightest talent in the world fresh out of universities such as MIT, Cornell, Queens, Oxford, and Cambridge. These graduates are brilliant young people and most have technical degrees of some sort that make them very familiar with solving problems. They have a deep scientific foundation. They've synthesized complex chemicals and built robots. But when they're faced with their first hard practical problem, I've found that they all guess and flail. But once they recognize how the compulsion to guess inhibits progress, they can handle hard problems with panache.

Great problem-solvers resist the temptation to guess at every stage of the process. Guessing is a tough habit to break, so get started!

NOW: STOP GUESSING

Remember, your brain is going to guess. When these guesses happen, recognize them for what they are and then let them roll off you like rain. If you're really struggling to let them go, write them down on a piece of paper and stick it in an envelope or a box. You can look at it later to see how close you got.

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