



As a scientist with a doctorate in Physics, I have been working for many years as an engineer for a multinational German company in the field of problem-solving . Apart from actively working on cases, I support national and international areas as a trainer and coach. I conduct training programs in Spanish, English, and German.

What are you?

_____ A human being.

I mean, what work do you do?

_____ I am working on myself.

Are you doing something apart from that?

_____ Yes, when I get the time.

And what do you do then?

_____ That is not so important.

Author unknown

Dr. Oliver Friedrichs

Problem Solving

A systematic approach to solving problems



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Foreword

“All life is problem solving.”

Karl Popper, Austrian-British philosopher

“Madness is to repeat the same mistakes and expect a different outcome.”

Author unknown

“If something can go wrong, it will go wrong.”

Edward Aloysius Murphy Jr., US Air Force engineer

“Everything good in the world cannot be without the bad, and there is always more evil than good.”

Aleksej Andreevic Arakceev, Russian general and statesman

Who doesn't know it: There are days when everything goes wrong, and when it seems better to have stayed in bed. There can be many possible reasons for this:

- The alarm does not ring. You're late for work, and miss an important appointment.
- The wedding anniversary is due again and you just don't remember it at that moment, of course with fatal consequences — as any married person knows.
- You go to the doctor for a routine checkup. Afterward, you are told a diagnosis that devastates you.

There are plenty of such examples and everyone has experienced some of them first-hand. These are all problems that affect us in the course of our lives, for the most part catching us unprepared: sometimes they are hard on us, and sometimes less so.

The intuitive knowledge we build up over time is often of little help to us. In many cases, it is even a real impedance. It complicates the identification of causes and solutions and leads to an inconsistent and unstructured approach to problems. This book deals with this topic and shows you how to handle it.

The book is dedicated to a broad readership. Apart from undertaking a brief excursion into the world of technical problem-solving, it is, above all, about an approach to problem-solving that can be applied in everyday life.

On one hand, I would like to point out the difficulties in solving problems. By illustrating and explaining the processes that take place, I risk taking a look at the mirror. We are supposedly rational people, but we always make the same mistakes and fall into the same traps. And yet, often, we are not even aware of this.

On the other hand, I would like to present a set of guidelines that leads to better and more effective solution of problems through a systematic and structured approach. It is my main goal to make you think and encourage self-reflection. Sometimes the image we have of ourselves is quite different from reality. This applies to us all and we have to realize that we still have much to learn and improve upon.

What is this book not about?

If you are looking for something fundamentally new in this book, you will not find it here. Everything that is written here has already been described in more detail by someone else. There are many specialists on this subject, many very intelligent and technically outstanding people who have dealt with these topics throughout their lives, and have written very profound and important treatises on it.

I don't count myself among these specialists. I count myself among those who still have much to learn. I count myself among those who are interested in the new and

are curious about what life has to offer in terms of interesting things. From my own experience, there are lots of them just waiting to be discovered.

There's still time to put the book aside. Your own time is precious, and you should invest it well and sensibly. However, if you are still interested — despite this warning — I invite you to follow me on my short journey through the world of problem-solving.

Chapter 1 - What is problem-solving?

“The more hectic (some erroneously call it more dynamic) you are, the more effort you have to put into achieving a target.”

Richard Vizethum, entrepreneur and leadership coach

“Most energy is wasted in solving problems that will never occur.”

William Somerset Maugham, English narrator and playwright

“Most people spend most of their time thinking about problems instead of solving them.”

Curt Goetz, German-Swiss writer and actor

The approach toward problem-solving presented here can be applied to any type of problem. This includes both small, everyday problems as well as more complex ones. In industry, these can cause costs amounting to millions of euros, often requiring interdisciplinary work with the aid of a wide variety of statistical and analytical methods. The effect of a stopped production or a recall can sometimes even put at risk the existence of an entire company.

The following problem-solving procedure is common to all problems:

- Identifying the problem
- Understanding the problem
- Permanently solving the problem

These are the central pillars of the problem-solving method presented here. Similar to the row of domino stones shown in

Figure 1, all the three phases have to be run through one after the other to reach the goal: Only when the last stone has fallen is the problem solved. Recursions in the course of problem-solving, in which one has to return to previous phases, are not only permitted, but in many cases even required. In the course of this process, new, un-addressed aspects can arise, which require flexibility and readjustment.

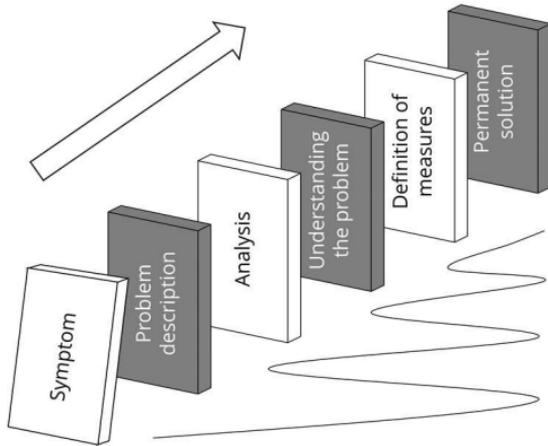


Figure 1: The problem-solving phases. The dark domino stones show the three pillars of problem-solving.

One has to consider that in reality, one has to deal with limited time and finite resources. Here it is up to the problem-solver to decide whether to proceed further in the problem-solving process, even if not everything is to 100% clear at that point.

The so-called Pareto principle has become famous in this respect¹. The Pareto principle is an economic rule of thumb which says that 80% of the results can often be obtained with only 20% of the effort. Conversely, this also means that the remaining 20% of the results require 80% of the effort. So, one needs to carefully consider whether it is faster, better and more effective to not aim initially at the maximum of effort.

The process for solving problems — as described above with the three pillars — sounds trivial at first glance. In reality, however, it turns out that this simple and obvious approach is scarcely followed. Popular mistakes made during the process of problem-solving are described in brief in the following:

You try to solve the problem before you have analyzed it sufficiently and understood the causes.

You want to get the problem off the table as quickly as possible and go straight toward implementing possible solutions. You give no second thought to whether these really make sense. You quickly get lost in something and you have no longer an eye for the real problem. In these cases, you make it sometimes even worse with the supposed solution than it was before.

Most people know of such an instance from everyday life with admittedly minor consequences: You are standing in front of a parking meter and want to pay for your car. For this, you have some coins left in your wallet, which unfortunately the machine does not accept. Now you start rubbing them against the metal of the meter and surprisingly it seems to work. The coins that failed before are now accepted.

What most people do not know is that this success has nothing to do with the rubbing. There is no physical effect based on rubbing the coins that could explain this.

The coins would have been accepted without such rubbing, simply through a repeated attempt. This actually happens quite often and no magic is involved. In this case, the problem would have been solved by itself.

Next time you go there to pay, take a closer look. The metal on many coin-operated machines is scratched by this supposed solution to the problem.

You start with the symptoms and not with the problem itself.

One at first sees only the apparent negative effects of the underlying problem, which we refer to as symptoms here. As in the case of an iceberg, where around 90% is below the surface, only a fraction of the actual issue can be seen (see Figure 2).

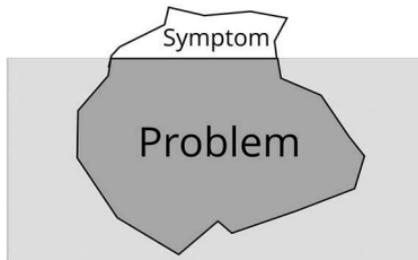


Figure 2: Iceberg model illustrating the difference in perception between symptom and problem

To confuse symptoms with the actual problem is a very popular mistake and often a reason why the solution to a problem fails. Different problems can show up in very similar symptoms, and if the problem itself is not defined precisely enough, the problem's solution can quickly become very complex. To investigate all possible causes for the observed symptoms — in order to find the real cause — can also lead ultimately to success, but, in most cases, it is a more expensive and time-consuming process. This often leads to a premature abortion of problem-solving or to a situation where the process seems to last forever, without seeing any progress.

As the internet forms an important part of our world, self-diagnosis by patients has turned out to be a big topic. Even before they consult a doctor, many people look for the causes of their complaints on the internet. Since they look up their symptoms, they find many possible causes, and often get scared of what they encounter. A headache can be caused by a cold but also by a brain tumor. Now it is the task of the doctor to calm down the patient and to determine the real problem and its causes. Many possible reasons can be ruled out if you possess the necessary expert knowledge, or you analyze the actual problem better and narrow it down.

You do not question enough.

Especially with problems in the social area, a lack of communication is often the real problem. Misunderstandings

arise as differing opinions and perspectives are not questioned and everyone creates one's own subjective picture.

The following story, which illustrates this phenomenon in a rather exaggerated manner, was published by Paul Watzlawick in his famous book *The Situation Is Hopeless, But Not Serious: The Pursuit of Unhappiness*²:

>> A man wants to hang a picture. He has a nail, but no hammer. The neighbor has one and our man decides to borrow it. But then and there a doubt occurs to him: "What if the neighbor won't let me have it? Yesterday, he barely nodded when I greeted him. Perhaps he was in a hurry. But perhaps he pretended to be in a hurry because he does not like me. And why would he not like me? I have always been nice to him; he obviously imagines something. If someone wanted to borrow one of my tools, I would of course give it to him. So why doesn't he want to lend me his hammer? How can one refuse such a simple request? People like him really poison one's life. He probably even imagines that I depend on him just because he has a hammer. I'll give him a piece of my mind!" And so our man storms over to the neighbor's apartment and rings the bell. The neighbor opens the door, but before he can even say, "Good morning," our man shouts, "And you can keep your damned hammer, you oaf!" <<

You don't go where the problem occurred.
(Go to Gemba)

Often, you try to solve problems from your desk or sofa. But many aspects only become clear when you go to the site where the event occurred. A picture often says more than a thousand words and, in many cases, this picture can only be completely obtained on site. To go where the problem is (to identify it) is known by the expression “Go to Gemba.”

In this context, on site means not only the physical location, but also going directly to the people concerned and discussing the problem with them. There the problem can appear to be very different from what was considered in the first place.

Nowadays, politicians especially are often accused of being removed far from reality and of not caring for what really moves the people. That's why they are asked to “Go to Gemba.” It is expected from politicians that they will approach their voters and listen to their concerns and needs. Why should we behave differently?

The underlying system is not understood well enough.

We consider ourselves experts on many topics, although we are far from that. This perception ranges from putting up the best football team for winning the championship to enthusiastically defending political opinions while talking with friends, neighbors, or colleagues. In many

cases, however, we lack the necessary know-how and easily fall for simple and superficial explanations and approaches. As a result, we see populism everywhere, and it's becoming more and more widespread.

We feel comfortable with simple explanations because we have the subjective impression that we can understand and explain the world around us. To the real, increasingly complex, and networked world, however, we are often exposed in a relatively helpless manner.

You are losing the overview (missing the structure and the systematic approach).

If there is no structure and no systematic approach, things get out of hand, and you get bogged down in the details of our tasks. It is easy to lose sight of the real problem here. As a result, you may again put the problem aside, or you may fall into the trap of hectic efforts and actions. Both are extremely unfavorable options for an effective solution to a problem.

This list could be extended with many more points. By recognizing our shortcomings, we quickly get to the point where we begin to doubt our self-image.

Why are we all making these mistakes?

The explanation for this can primarily be found in our

past. Humans have been around for more than four million years³. Over this period of time, thought patterns have developed that saved our lives in the past. If our ancestors heard something rustling in the bushes, it was often an advantage for them not to ask too many questions but to run and hide as fast as possible from a potential danger. Whoever did not do this fell victim, at some point, to one of the many dangers — and so was erased by evolution. From an evolutionary point of view, it was advantageous to think of a saber-toothed tiger first.

With humanity's rapid development within a few hundreds of years through events such as the agricultural, industrial, and technical revolutions, the conditions of our lives and, hence, the world have changed significantly in a very short period of time.

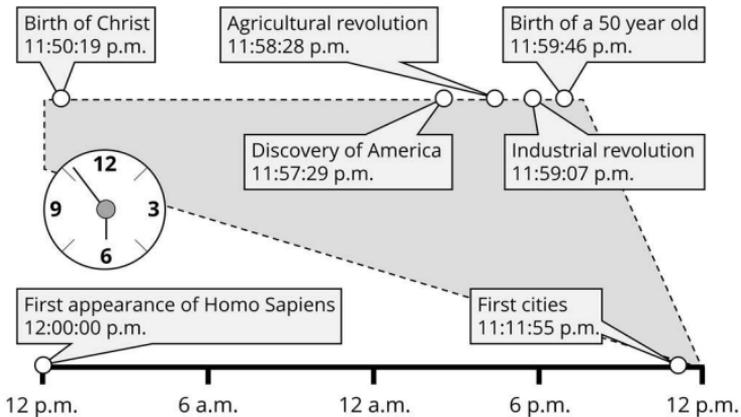


Figure 3: Human history in one day