## Introduction

Let's assume you have a complex problem in your life that you want to solve.

For example, **you can't find a good job,** have no money, or are unhappy about your life.

"**Just go find a job,**just go earn more money, and just be happy!" is **NOT a good answer**to these problems.

Why?

Because these trivial answers immediately jump to the solution and don't tell anything about HOW to find a good job, HOW to earn more money, and HOW to be happy.

One must break down a complex problem into more minor problems, analyze them, and then extract the key findings to know how to solve the problem.

This process will **create actionable insight** and steps to get to the solution.

This is why breaking down a complex topic is essential in any problem-solving process.

Now Let's go step by step to see.

## Understand Complexity

Usually, the complex nature is rooted in multiple dimensions of the problem. They are:

* **Unknown Relations**: Too many variables in the problem need to be discovered.
* **Too ambitious goal:** The solution tries to achieve many goals at once, which itself became a problem
* **Dynamic growth**: The problem itself is emerging and sometimes changes.

Taking the previous job-finding example, there can be many reasons why getting a job is hard:

* Your competency is low, and nobody wants to hire you
* You have skill but your asking salary is too high
* You have skills, but you want a job outside of your expert domain
* You have a high standard and are only applying to certain companies
* The macro economy is terrible, and most companies don't hire now
* You are unlucky, and your CV never gets seen by recruiters

All these factors could contribute to the result that you don't get your desired position, but in the end, we are still determining which factor contributed the most for sure. Often the problem can not be quantified or even qualified because you need to learn more about them. They have too many variables and their relations could be clearer from a Blackbox perspective.

## Start With the MECE Breakdown

Everybody has heard about the **Divide and Conquer** **Method** before. But how to really divide a big problem into more minor problems?

The answer is to use [**MECE**](https://en.wikipedia.org/wiki/MECE_principle) categorization (**mutually exclusive and collectively exhaustive**).

## Understand Mutually Exclusive

If you create two categories to break down your problem, ensure they are mutually exclusive. It means that one subproblem can only belong to **one** of the two categories and not both. For example:

* **Human and thing**: these two categories are also mutually exclusive. You can either be a human or a thing, but not simultaneously.
* **Animal and suckle animal**: these two categories are not mutually exclusive. A cat is both an animal and a suckling animal.

## Understand Collectively Exhaustive

Collective exhaustive means that the sum of all defined subcategories covers all aspects of the initial problem. Example:

* **Potato and non-potato**: this group collection is collectively exhaustive because anything in the world can be either a potato or not a potato.
* **Insects and humans**: this group collection is mutually exclusive **but** **not collectively exhaustive** because there are also animals like fish and cats that are neither human nor insects. Another group needs to be added to this group to exhaust it collectively.

## Keep The Breakdown Meaningful

Once we apply the MECE breakdown technique to a complex problem, ensure the breakdown tree has l**ess than 3 layers** **and less than 6 categories on the same layer**.

If the breakdown is too complex, we create a new problem rather than solving the initial one. Humans can only memorize a limited amount of topics and visually track a limited amount of objects.

Ideally, the problem breakdown can be seen on one paper slide so that you and other people can understand the breakdown immediately. If your breakdown requires two PowerPoint slides, then you might need bigger categories to create a higher level of abstraction.

## Search with Breadth-First

Asking the right question to further deep dive into each subproblem. This is a non-trivial process that also requires a bit of planning.Use the[**Five Ws technique**](https://en.wikipedia.org/wiki/Five_Ws) to ask **questions about how**, **where**, **what**, **who**, **why**, **and what**. This is a breadth-first search to find all relevant aspects of the current problem. Still using the previous job finding example:

* Who: To which company do you apply?
* When: Is there a business cycle season where companies hire more than usual?
* Where: They don't hire in your city but in another?
* Why: Maybe they don't hire your position but another position?
* What are the other jobs you can look for (aside from your desired position)?

## Search with Depth-First

Sometimes you only need to find one huge root cause. Elon Musk, the promoter of the [**first principle**](https://fs.blog/first-principles/), asks what the REAL root cause of anything is. It would help if you kept asking why to find the most important root cause. Example:

1. Is it only you who can't find a job, or is the entire job market terrible?
2. If it is only you, then your job expectation is too high.
3. If your job expectation is not high, maybe you didn't apply to enough companies?
4. If you applied to enough companies, your CV might be wrong.

After going through all sub-causes, you might get a better idea of where the actual root cause might be.

## Analyze The Found Sub Problems

You also don't know the solution to any sub-problems or even never know they existed. Ask yourself the following questions:

**Do I need to solve sub-problem X to get an initial result, or can I also solve Z to get to initial result?**

* If your answer is **yes**, then this sub-problem can be substituted. It can be avoided if solving problem Z is easier to solve.
* If your answer is **no**, you have found the root problem of your initial problem, which is also a good thing. The next step would be to solve this problem.

Repeat the process until you understand all of the sub-problems and **the relation between your sub-problems** and your initial problem.

## Solve The Trivial Problems First

Once you have gotten the overview of your subproblems, you can judge and compare them. You will also be able to compare and see which of the subproblems is a hard problem and which is a trivial one. The more trivial problems you find, your breakdown process is more successful.

**Sometimes, it is clever to solve the easiest problem first instead of the most important one.** By doing this, we are cleaning up the list of problems and reducing the problem's complexity.

As mentioned before, in a complex problem, there are many variables that we don't know. We can **eliminate** what we already know FOR SURE and put them aside first. Then we continue to break down problems we have yet to learn to deep dive into.

## Conclude Possible Outcomes

After doing the work and traversing through the sub-problems and sub-sub-problems, you may find one of the following scenarios:

* **Your initial problem is a combination of smaller, less complex problems:**This is good news because the complexity is lower, and solving a set of less difficult problems is still easier than solving one big complex problem. Still, a lot of work needs to be done to solve them.
* **Your initial problem is almost a delegation of another bigger problem**: For example, a German delivery company wants to reduce its labor cost. This might be highly linked to another social and economic problem the birth rate is low in industrialized countries, so each human service costs more. Your business is tight to the average market price on that market (which naturally is a much bigger problem because it affects all businesses, not yours). If this is the case, then your initial problem needs to be rephrased or changed to avoid an unsolvable problem. Instead of hiring more people, you could improve your IT service to enable each delivery specialist to deliver quicker and more packages in less time.

## Stand On the Shoulder Of Giants

You are not the first person trying to solve your particular problem. Many people may have it already before in a similar form. Ask your colleague or find experts from different fields to hear their thoughts. One of the experts is Google or any other kind of search engine.

If you feel you have already depleted all your research capabilities, then you can try these steps:

* **Try to research a related keyword:** Instead of looking for "jobs near me," try searching for "delivery jobs within 12 km" or "service jobs in my town."
* **Try to go to Google's second, third, or fourth result page!** Yes, many people only look for the first result and ignore the other potential chances of finding the right solution. Google's algorithm is improving, but still, sometimes your desired result is hiding at the bottom of page 2.
* **Try other search engines.** Someone may have done a video on Tik Tok about your problem before. Still, you only use Tik Tok for entertainment, not for problem-solving. This is a common fallacy for people to use one tool for one purpose, even if a tool can have multiple purposes.

## Summary

Breaking down the problem is an essential part of problem-solving skills. The next step is to engineer solutions to solve the problem. This will be covered in the next chapter.