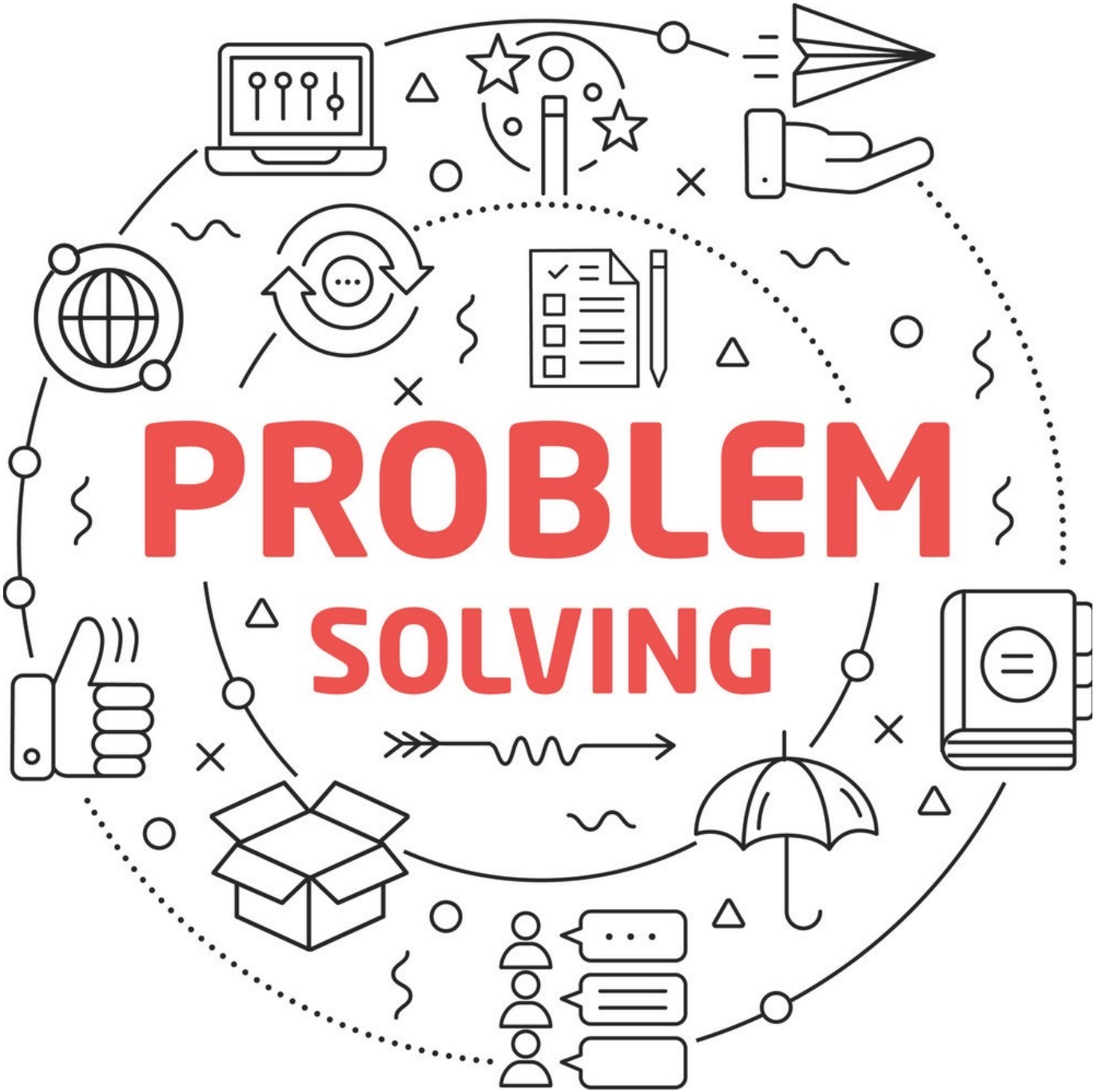
Problem-Solving Skills for University Success

SSL101 – MOOC 2


PROBLEM
SOLVING

Problem Solving

- Fishing game
- What is problem?
- Problem-Solving process
- Quiz

The fish game

https://cloudinstitute.org/fish-game

The fish game

- You have **10 days** to fish. The money you make from these fish will need to support your family for the next month. Each fish nets **$2**.
- Each day, you'll choose whether you want to take **none, one, two, or three fish** for the day. There are *two other fisher folk* also trying to catch as many fish as they can - they will follow your lead, and base their catch on yours.
- The lake in which you are fishing can **only support 20 fish** (that is the carrying capacity of the lake). Every night, the fish that remain after a day of fishing will **reproduce at a rate of 25%.** However, the total number of fish can't exceed 20.

The fish game

Remember: The object of the game is to have as many fish as possible at the end of the game.

Reflection – Who won the game?

Options	Number of day	Number of taken fish	Amount of Money	Number of fish remained
Take 3 fish per day	3	9	18$	None
Take 2 fish per day	6	12	24$	None
Take 1 fish per day	10	10	20$	12

Reflection – Who won the game?

- Did you ever make it through 10 days of fishing without depleting the fish stock in the lake?
- If you didn't make it through all ten days of the game, you know that one or more fisher folk took "too much“.
- One or more of you used up more natural resources (fish) faster than the earth could replenish them, thus creating an "unsustainable" fishing practice (no more fish).
- If you took "too much," think about why you did so.

Reflection – Who won the game?

- People all over the world have common reasons for taking "too much" and acting unsustainably (they want to provide the most they can for their family, they want to get what they can while it is still available, etc).
- The interesting thing is that no matter what your particular reason, it didn't work in the end.
- The very thing you did to "win the game" was the very thing that caused you to lose the game!

Reflection – Who won the game?

Which of the following did you assume was the objective of the game:

- Have as many fish as possible for yourself after playing all ten days?
- Have as many fish as possible for the whole group after playing ten days?
- Have as many fish as possible in the lake after ten days?

Reflection – Who won the game?

- The fact is that they are all correct!
- The only way to win is for all the "players" (the fisher folk, the fish, and the lake - also known as variables in the system) to win, because the fisher folk are **interdependent** on one another and on the fish, the carrying capacity, the replenishment rate, and the health of the lake.
- If you play this game as a zero-sum game (where there is only one winner and the rest are losers), **both you AND all the other "players" will lose** this game. In light of the context of interdependence, this game must be played as a non-zero sum game, where everyone can win.

Reflection – The fish game

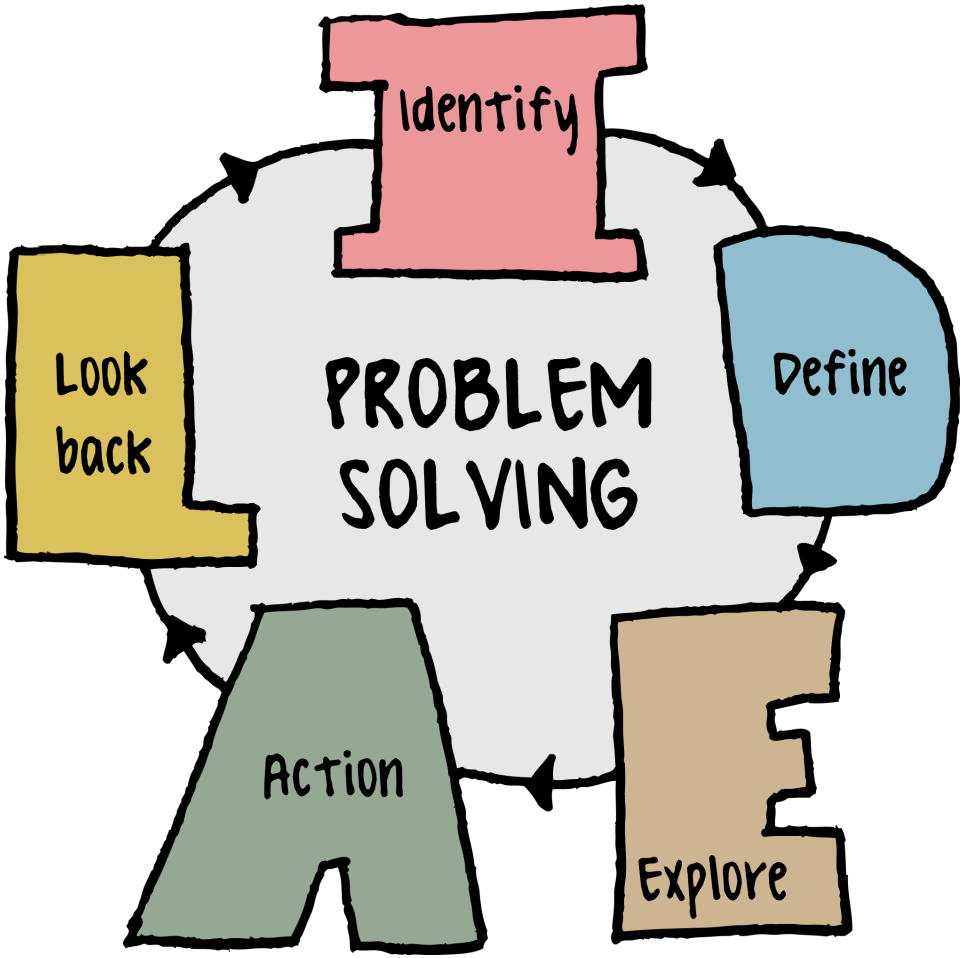
- This is an example problem solving in which the problem is ill-defined.
- The real/core problem is hidden at the beginning (have as many fish as possible).
- The real/core problem is how to fish sustainably.

→ It is necessary to have problem-solving process/strategies.

What is problem

- The gap between the current state and the desired state.
- It refers to a situation, condition, or issue that is yet unresolved.

Problem-Solving process



IDEAL Problem Solving Strategy

- **I** – Identify the problem
- **D** – Define the cause
- **E** – Explore possible strategies
- **A** – Action
- **L** – Look back and Learn

IDEAL is one of the finest problem solving strategies because it is a general theory.

Step 1 - Identifying the problem

- The real problem may not be the one that you're facing right now.
- People often jump straight into solving the problem without really figuring out if they understand what the real problem is.
- If you don't understand what the terms of a problem are, you will struggle to find a solution no matter how good you are at problem solving.
- Keep asking "What exactly is the problem"

Example – What is the real problem?

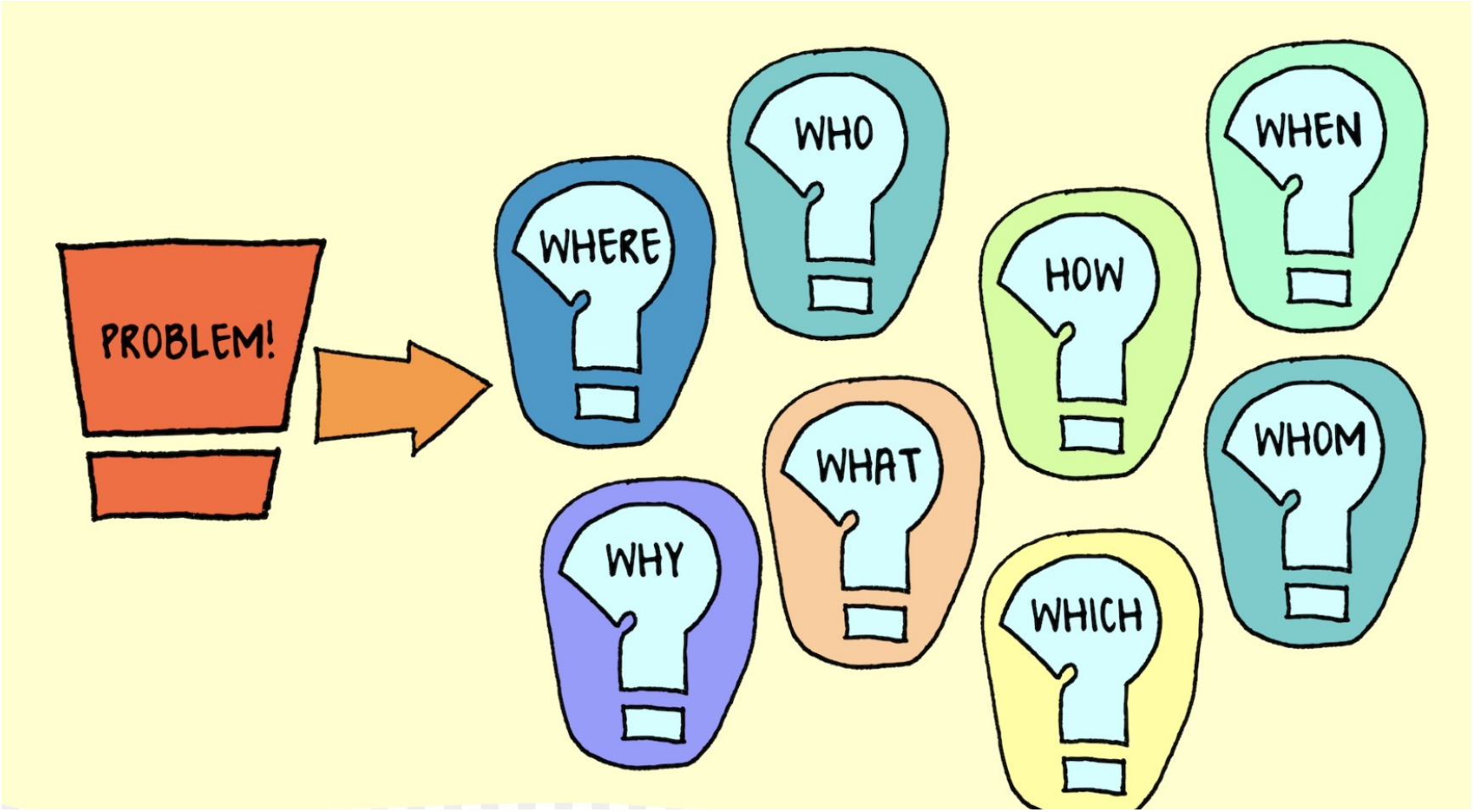
- A student and his professor are backpacking in Alaska when a grizzly bear starts to chase them from a distance. They both start running, but it's clear that eventually the bear will catch up with them. The student takes off his backpack, gets his running shoes out, and starts putting them on. His professor says, you can't outrun the bear, even in running shoes. The student replies “I don't need to outrun the bear. I only need to outrun you.”

→ The student defines the real problem as simply a matter of out running his professor. The bear will stop running once he has caught one person.

Strategies to define problem

- Visualizing the problem
- Drawing a representation.
- Focusing on the units of measurement
- Defining key words and phrases.

Strategies to define problem – Asking questions

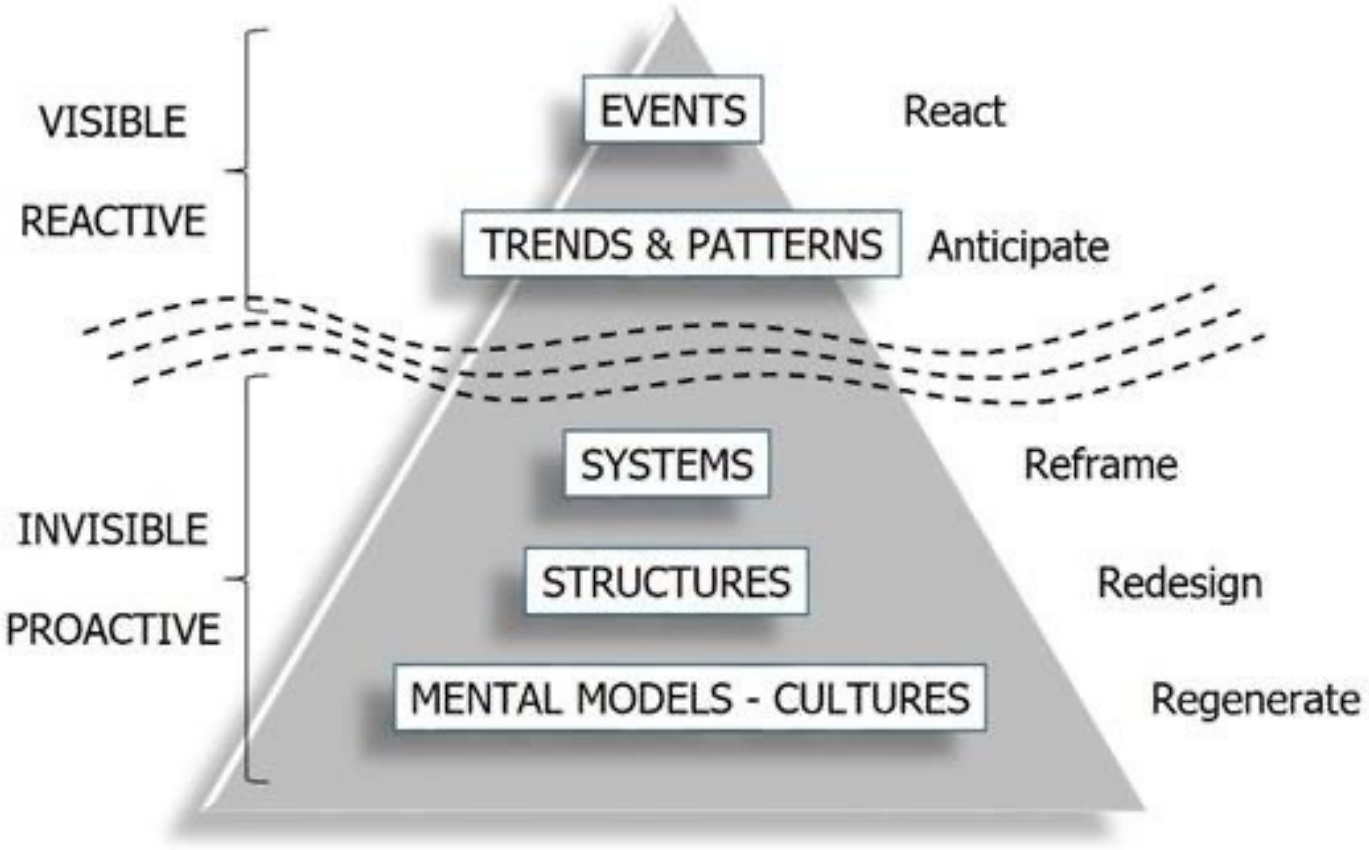


Strategies to define problem – Starting with What you Know

- The first question we need to ask ourselves when problem solving is “What do I already know”.
- Making a list of everything we know about the problem, brainstorming or drawing a mind map, concept map.

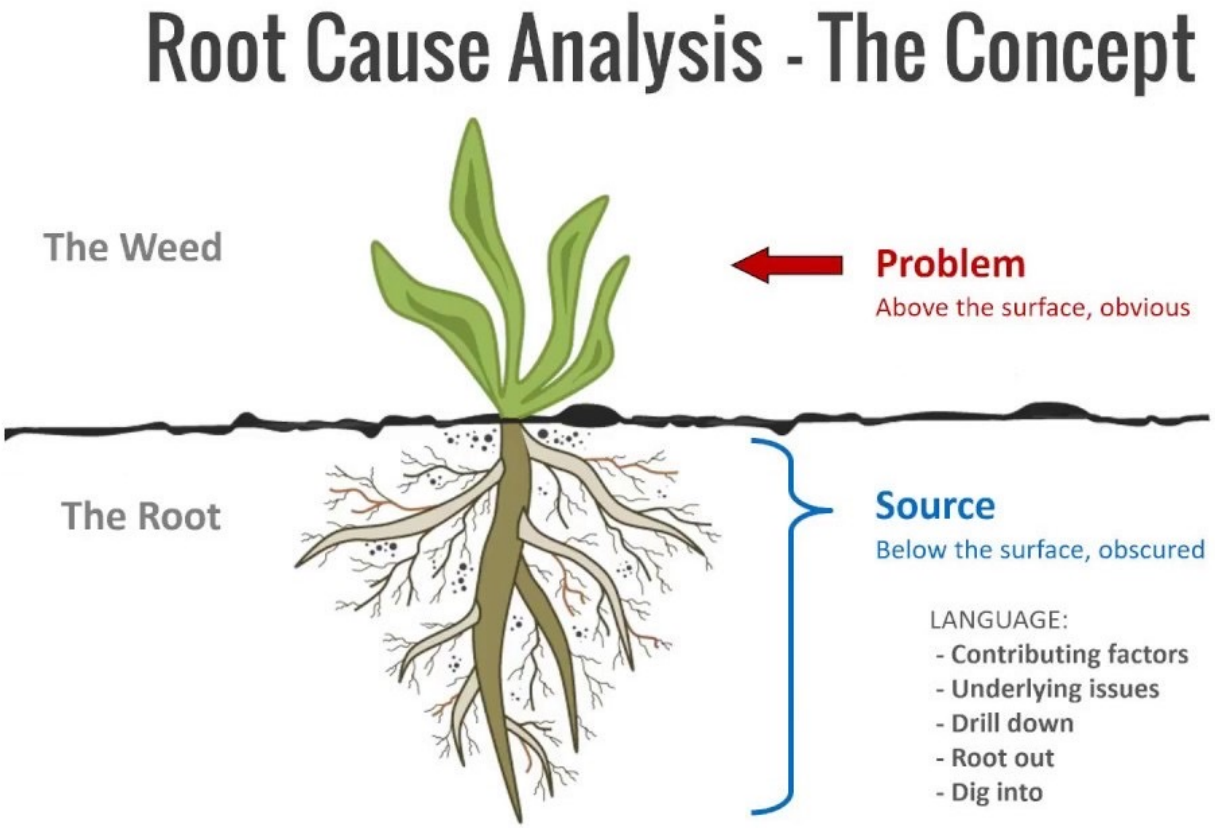
Strategies to define problem – Levels and systems

- Think beyond the initial problem in terms of levels and systems.



Step 2 - Defining the cause

- Finding out all the possible reasons.
- Define deeper cause of each reason.



Step 3 - Exploring possible strategies

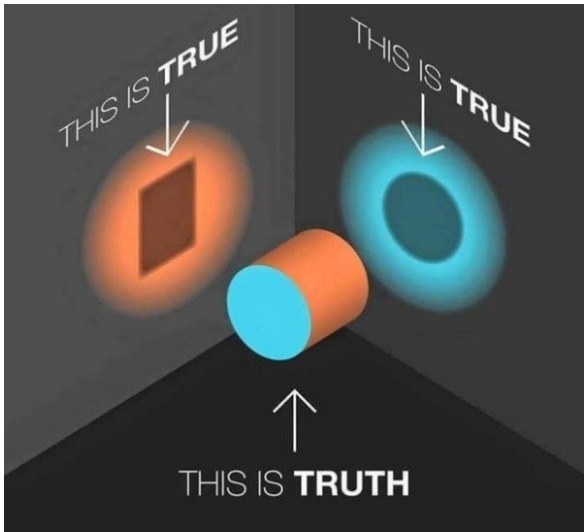
- It's common for people to pick the first solution they think of and do it without thinking about why.
- Brainstorm: think about all the possible solutions and strategies that can be implemented.
- Analyse each solution by listing all their pros and cons.
- Choose the best option out of the solutions you arrive at: Which is the best solution? Is it safe? How might people feel about it? Is it fair? Will it work?

Exploring possible strategies - Special Cases

- Focusing on similar or specific problems and cases to solve problems is an approach that is used in the sciences, social sciences and humanities.
- By comparing and contrasting with other instances of a problem, by using examples or by working through specific cases, we can often find strategies for dealing with a problem. In addition to this, by working with special cases and specific examples, more nuanced and detailed solutions may also be suggested.

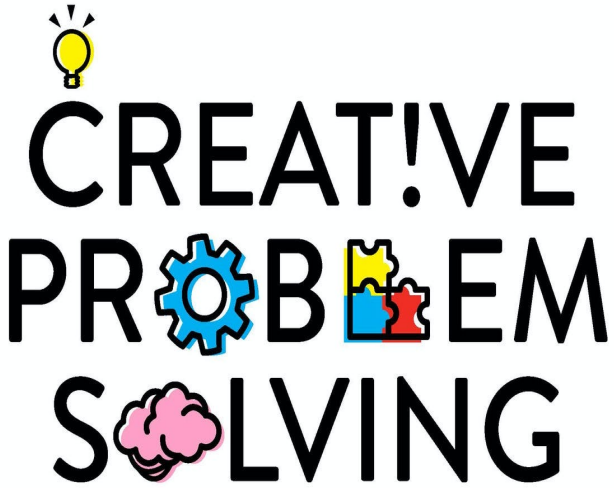
Exploring possible strategies – Seeking Different Perspectives

- Ask someone else what they think about the problem. Other people, particularly those who have different backgrounds, cultures, genders, experiences or interests to us will often see a problem completely, differently.
- Combining ideas, knowledge or theories from different fields can often stimulate completely new ways of thinking about a problem.



Exploring possible strategies – Using Creative Strategies

- Using analogies, brain storming, talking things over with other people, or concentrating on anomalies.
- A random juxtaposition.
- An intermediate impossible (negative brainstorming).
- Doing the opposite or working backwards.



Step 4 - Action

- Choose from the list of possible solutions and start acting on it
- What additional testing and observation needs to be done to confirm the validity of the solution?

Step 5 - Look back and Learn

- People often forget to look back at the process and justify their solution.
- Analyze the pros and cons and the repercussions that occurred when that option was adopted: Is it working? (if not, then go through process again) What will you do the next time the situation occurs?

Quiz

Consider the following problem from a Landscape Architecture course:

"A local government has put out a tender for a park design in the middle of a newly-residential area. They have plotted out an area of 2 hectares in a rough polygon shape. The area is relatively flat, but is surrounded by ten-story apartment buildings on three sides, a busy road to the north and a small side-street on the last side towards the east. The local population is a mix of young families, local university students and young professionals and is very multicultural.

The brief for the park indicates that it should "embody the community spirit" and "encourage a fit and healthy lifestyle". Develop a proposal that answers the brief and is both sustainable and ecological."

What is the goal this problem? *Check one option.*

- A proposal that embodies the community spirit and encourages a fit and healthy lifestyle.
- A proposal that is sustainable and ecological.
- A proposal that fits into the 2 hectare polygon
- Both a. and b
- Both b. and c
- a., b. and c

Quiz

Consider the following problem:

Two cars are stopped at either end of a 100km highway. At the same time, they both start driving towards each other. Car A travels at 20km/hr and car B travels at 30km/hr. At the same time as the cars start, a dog jumps out of Car A and runs towards car B at 50km/hr. When the dog reaches car B, he immediately turns around and runs back to car A. He repeats this until the cars collide.

If the dog stops running as soon as the cars meet, how far has he run?

Use the equation: speed = distance/time.

Is this an example of:

- An ill-defined problem
- A well-defined problem

Quiz

Consider the following analytical task from a university course:

“In what ways will Information and Communication Technologies (ICTs) fundamentally change the nature of how we learn?”

What is the main underlying assumption in this task?

Refer to lesson 4.2a and 4.2b. *Check one option*.

- Information and Communication Technologies will fundamentally change the nature of how we learn.
- There is more than one way in which ICTs will change the nature of how we learn.
- Information and Communication Technologies are the future of education.
- Information and Communication Technologies enable us to learn better.

Quiz

Considering the same question:

“In what ways will Information and Communication Technologies (ICTs) fundamentally change the nature of how we learn?”

At university, are you able to disagree with the underlying assumption in this question?

Refer to lesson 4.2a and 4.2b. *Check one option*.

- Yes
- No
- Only during a tutorial

Quiz

Consider the following exam format:

Exam: Worth 40%, 2hours with 10 minutes extra reading time.

- **Part 1: 10 Multiple-choice questions, 10%**
- **Part 2: 5 Short Answer Questions, 25%**
- **Part 3: An 800 word Essay, 65%**

In general, how much time would you allocate for the multiple choice questions?

Refer to lesson 5.3a and 5.3c. *Check one option.*

- No more than 15 minutes in total.
- No more than 5 minutes in total
- 4 minutes per question (read, understand, strategize, check).
- Half an hour (3 minutes per question)

Quiz

Imagine that you are taking a course in Landscape Architecture. As part of the course you need to give a 10 minute group presentation on sustainable design for urban parks. The presentation needs to include:

- **A definition of sustainable design for urban parks**
- **The principles for sustainable design**
- **Three examples of sustainable design for urban parks**
- **An analysis of each of the example parks in relation to the principles**

There are four people in your group: you, James, Rie and Ali.

Consider the example answer from Question 5: "One person does one of each for the four points. For example, James writes the definition, you write the principles, Rie finds the examples and Ali writes an analysis for each of Rie's examples. You come together at the end and make the presentation. "

Is this a good distribution of tasks? Refer to lesson 5.3a and 5.3b

Check one option.

- Yes, as each person has a clearly defined task
- Yes, as the tasks reflect the strengths of each member of the group
- No, as the tasks don't reflect the strengths of each member of the group
- No. The tasks are not evenly weighted: there is a lot more involved in analyzing something than there is in finding an example