MODULE 2

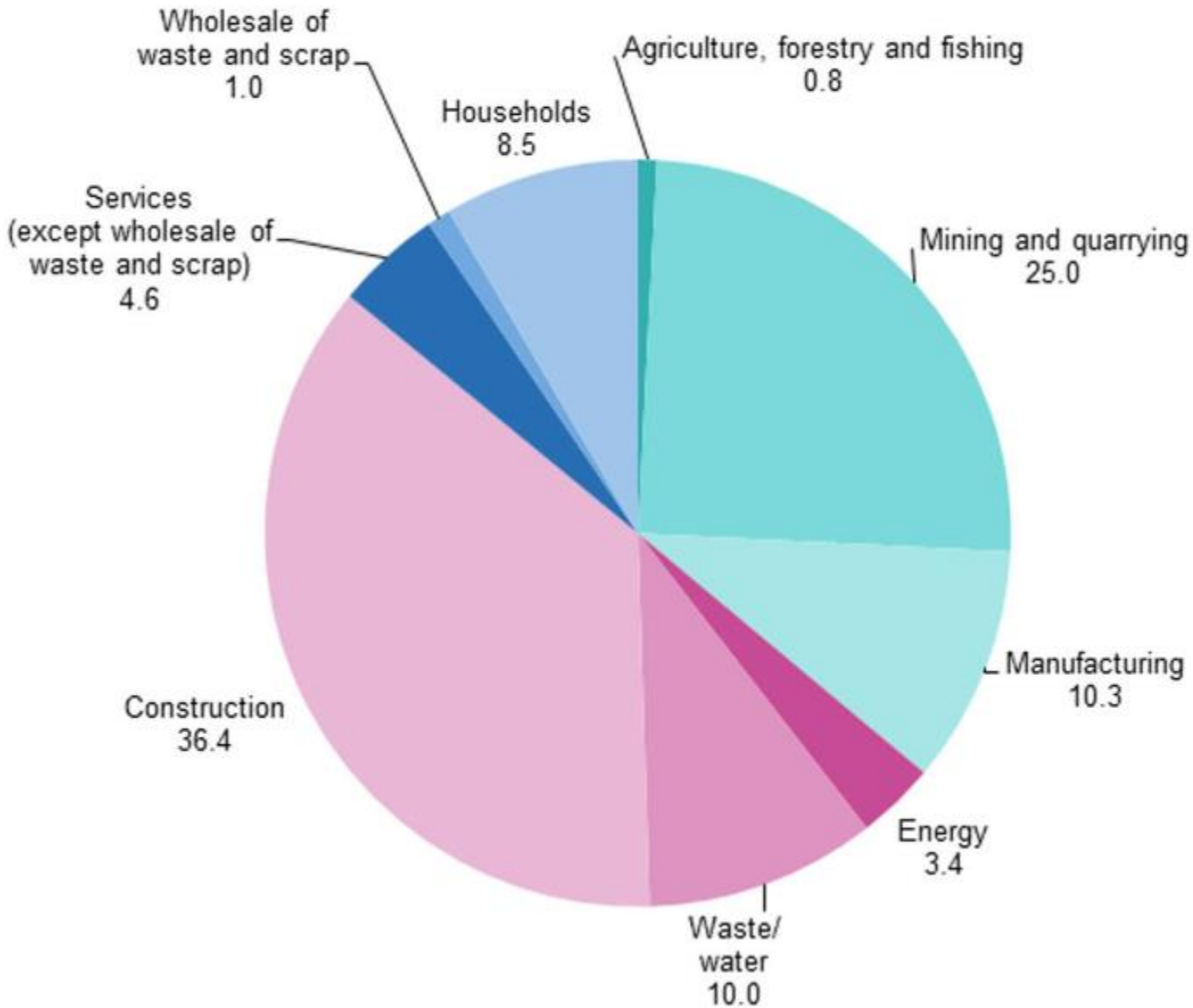
2.- Problem-solving techniques

2.1.- Solving-techniques to tackle circular economy problems

According to the United Nations International Development Organization (UNIDO), a circular economy "is a new way of creating value and ultimately prosperity." The circular economy "works by extending product lifespan through improved design and servicing, and relocating waste from the end of the supply chain to the beginning.

FIGURE 1. MODEL OF A CIRCULAR ECONOMY

FIGURE 2. WASTE GENERATION BY ECONOMIC ACTIVITY & HOUSEHOLDS, EU-28, 2016 (%)



2.2.- Getting the root of a problem

FIGURE 1. MODEL OF A CIRCULAR ECONOMY

SOLVING TECHIQUE 1 “TECHNIQUE OF THE 5 WHYS” OR “WHY”?

EXERCISE BASED ON THE TECHNIQUE OF THE 5 WHYS

FIGURE 1. MODEL OF A CIRCULAR ECONOMY

1.- I WANT TO OWN MY OWN BUSINESS

Why Do I Want to Do This?	It will allow me to have greater control over how I spend my time.
Why Do I Want to Do This?	I can have more flexibility in my life.
Why Do I Want to Do This?	I will be able to work from home.
Why Do I Want to Do This?	I will be able to spend more time with my son or daughter.
Why Do I Want to Do This?	**Supporting my family is the most important thing to me.**

Root Cause of Motivation

Problem

Our client is refusing to pay for leaflets we printed for him

Why?

The delivery was late, so the leaflets couldn't be used

Why?

The job took longer than we expected

Why?

We ran out of printer ink

Why?

The ink was all used on a large, last-minute order

Why?

We didn't have enough ink in stock, and couldn't order new supplies in time

Counter-measure

Find an ink supplier who can deliver at short notice, so that we can continue to minimize inventory, reduce waste, and respond to customer demand.

FIGURE 1. MODEL OF A CIRCULAR ECONOMY

Problem statement: There were many unhappy customers on yesterday’s shift who requested their money back.

The overbaked cupcakes

Problem statement: There were many unhappy customers on yesterday's shift who requested their money back.

Why? The cupcakes customers bought are dry and slightly burned.

Why? The cakes spent too long in the oven.

Why? Bakers did not take them out when the alarm went off.

Why? Bakers were short-staffed and overworked as a result.

Why? They did not have a plan in place for days when there are fewer bakers in the bakery.

Root cause: There is no plan in place for managing workloads when bakers are out sick

For example, the TV does not turn on.
Why doesn't it turn on?Because the remote doesn't work.
Why doesn't the remote work?Because it fails and does not send information to the TV.
Why don't you send information?Because I dropped it the other day and it started giving an error.
Why did you drop it?For not paying attention to where he was leaving it.
And why didn't you pay attention?Because I was too tired from so much work.

If we had only stayed with the first answer, we would have gone to buy new batteries and the problem would still not be solved. As you can see, I have given you a very, very practical example.

You have found the problem in the third question and the reason in the fifth.

EXERCISE

A business went over budget on a recent project.

Example of the 5 Whys Technique

Here's an example of how this technique could be used to figure out the cause of the following problem: A business went over budget on a recent project.

1. **Q: "Why did we go over budget on our project?"** A: It took much longer than we expected to complete.
2. **Q: "Why did it take longer than expected to complete?"** A: We had to redesign several elements of the product.

3. **Q: “Why did we have to redesign elements of the product?”** A: Features of the product were confusing to use.
4. **Q: “Why were the features of the product confusing to use?”** A: We made incorrect assumptions about what users wanted.

5. **Q: “Why did we make incorrect assumptions about what users wanted?”** A: Our user experience research team didn’t ask effective questions.

For instance, the underlying cause of our example problem was not that it was impossible to predict how long the project would take to complete, but rather a human error: The company’s user experience team did not ask effective questions.

In this 5 Whys example, you can see that the nature of the problem ended up being quite different from the answer to the first question. People will often initially blame a problem on something that is out of their control, such as a technological failure or an unpredictable situation, but that naturally fails to account for any human factors.

EXERCISE

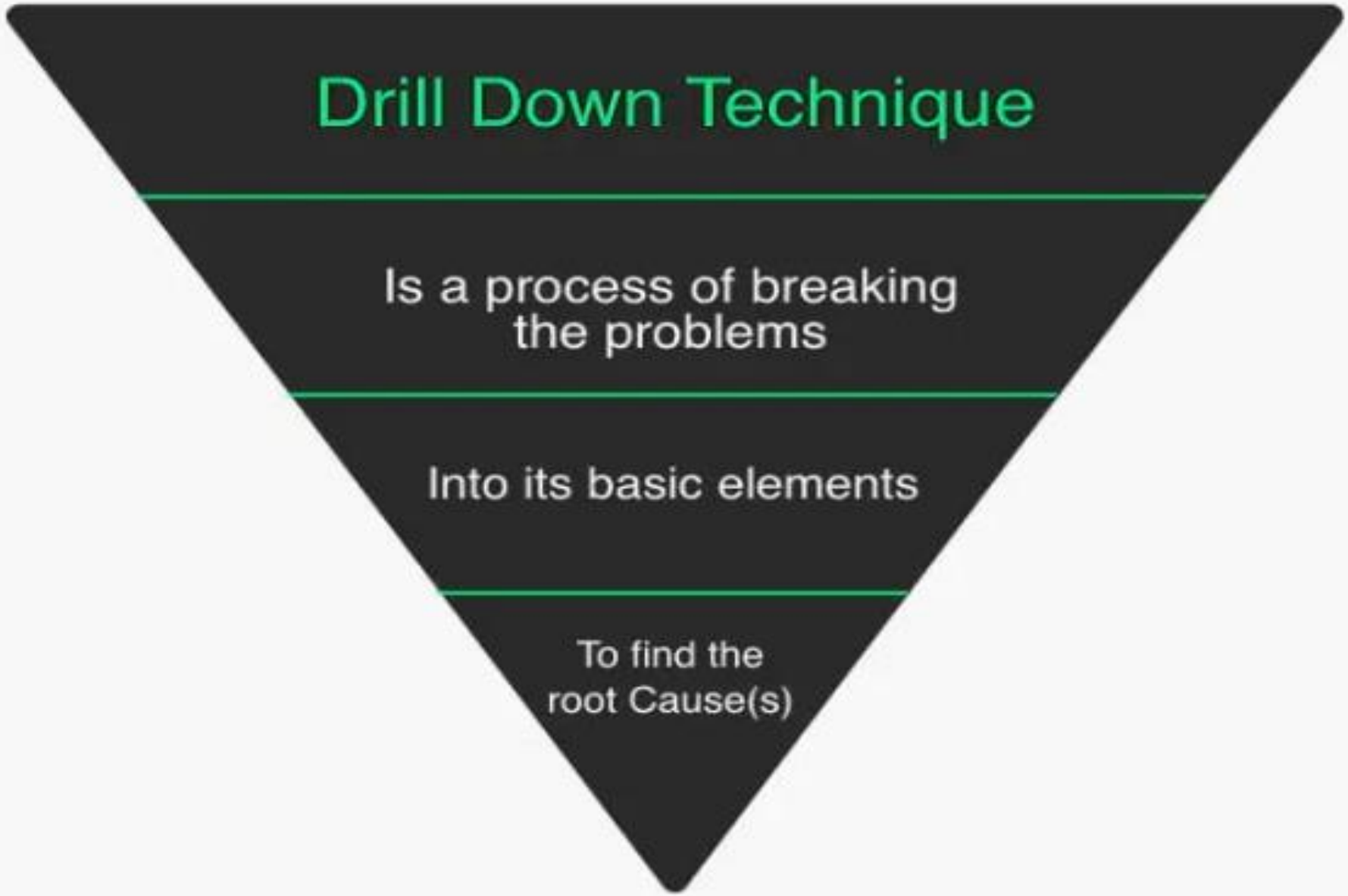
1.- STATE A PROBLEM AND TRY TO FIND A SOLUTION WITH THE TECHNIQUE “WHYS”?

2.3.- Breaking problems down into manageable parts

DRILL DOWN TECHNIQUE.

FIRST METHOD

(BY USING A CONCEPT MAP)


Drill Down Technique
Is a process of breaking the problems
Into its basic elements
To find the root Cause(s)

Drill Down is a simple technique for breaking complex problems down into progressively smaller parts.

To use the technique, start by writing the problem down on the left-hand side of a large sheet of paper. Next, write down the points that make up the next level of detail on the problem a little to the right of this.

These may be factors contributing to the problem, information relating to it, or questions raised by it. This process of breaking the problem down into its component part is called 'drilling down'.

For each of these points, repeat the process. Keep on drilling down into points until you fully understand the factors contributing to the problem. If you cannot break them down using the knowledge you have, then carry out whatever research is necessary to understand the point.

Drilling into a question helps you to get a much deeper understanding of it. The process helps you to recognise and understand the factors that contribute to it. Drill Down prompts you to link in information that you had not initially associated with a problem. It also shows exactly where you need further information.

FIGURE 1. MODEL OF A CIRCULAR ECONOMY

Example:

The owner of a windsurfing club is having complaints from its members about the unpleasant quality of the water close to the clubhouse. This seems like a huge problem. She carries out the analysis in Figure 1:

Figure 1: Drill Down Into Problem of Improving Quality of Sea Water

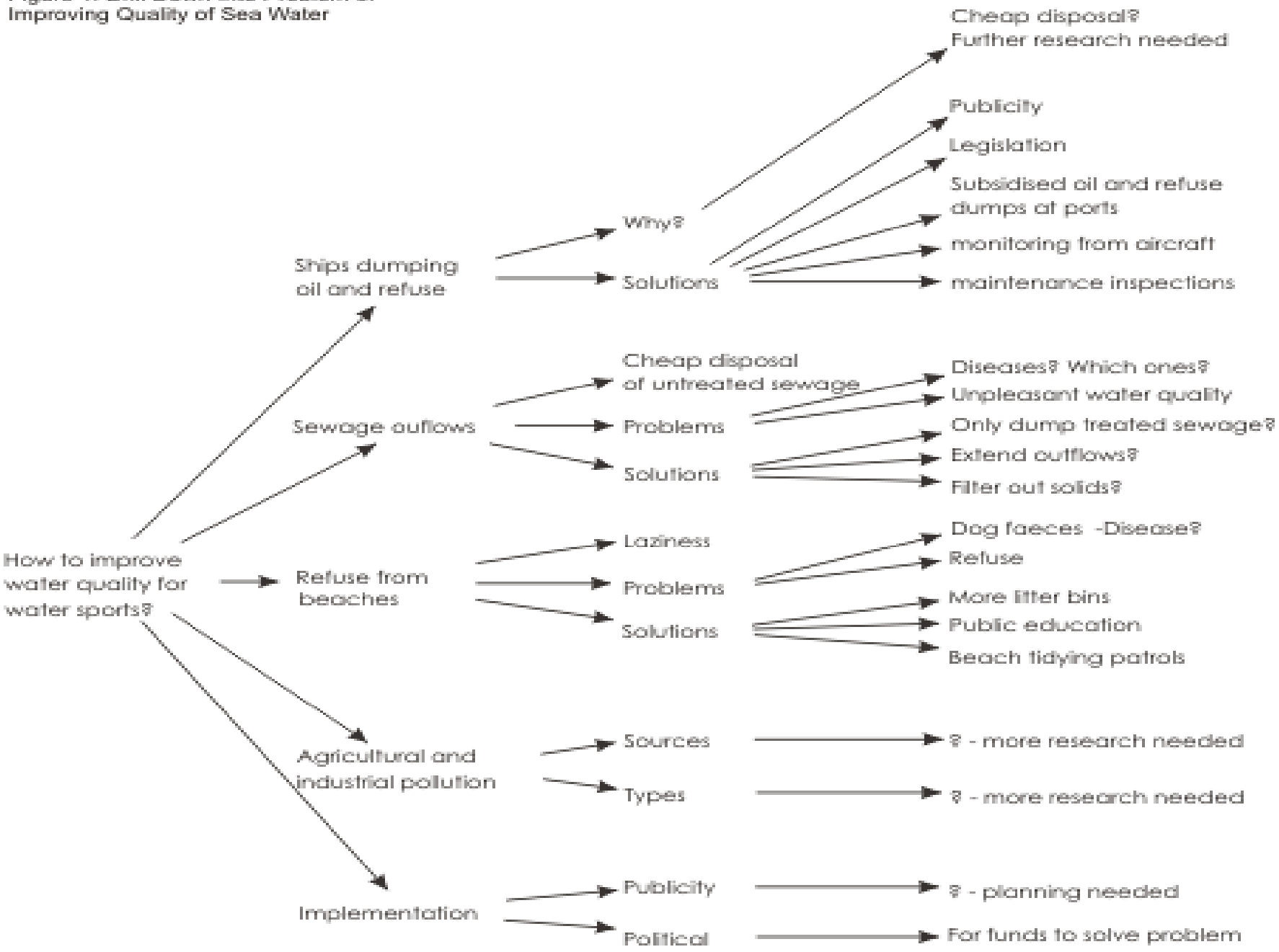


FIGURE 1. MODEL OF A CIRCULAR ECONOMY

Example:

Lack of responsivess to client enquieres.

DRILL DOWN TECHNIQUE.
SECOND METHOD.

DRILL DOWN TECHNIQUE SECOND METHOD.

The technique starts with a table with the key problem outlined in the first column, as shown below. The factors causing this problem are then outlined in the second column and the factors causing these problems follow in the third column.

Lack of responsiveness to client enquiries	Too busy to read emails	Bad timekeeping
		Unwillingness to reach out for help
	No one accountable for client interaction	Lack of organisational structure
		Poor delegation from management

The idea is to keep 'drilling down' until the true causes of the problem are found, i.e. in this instance 'bad timekeeping'. Solutions are then generated from these causes, the idea being that these solutions will be far simpler than any tackling the problem in the first column.

For example, an initiative to improve organisational structure may be a solution to this problem that would not have been clear from simply tackling the problem in column 1.

DRILL DOWN TECHNIQUE.
THIRD METHOD.

A drill-down is a process that allows you to gain an understanding of the root causes of the biggest problems in a department or area so you can design a plan to make the area excellent.

Step 1: List the Problems.

Quickly inventory all the core problems. Be very specific, as this is the only way to effectively find solutions. Don’t generalize or use the plural “we” or “they.” Name the names of the people experiencing the problems.

Step 2: Identify the Root Causes.

For each problem, identify the deep-seated reason behind the actions that caused each problem. Most problems happen for one of two reasons: 1) It is not clear who the Responsible Party is, or 2) The Responsible Party is not handling his/her responsibilities well.

To get at the root cause, keep asking “Why?” For example:

Problem:
The team is continually working late and is on the verge of burning out.

Why?
Because we don’t have enough capacity to meet the demand put on the team.

Why?
Because we inherited this new responsibility without additional staff.

Why?
Because the manager did not understand the volume of work before accepting the responsibility.

Why?
Because the manager is bad at anticipating problems and creating plans. [Root Cause]

Step 3: Create a Plan.

Step away from the group and develop a plan that addresses the root causes. Plans are like movie scripts, where you visualize who will do what through time to achieve the goals.

For example, the correct path might be to fire some people and replace them with better people, or put them in jobs they might not want. Everyone’s objective must be to get at the best answers, not the answers that will make the most people happy.

Step 4: Execute the Plan.

Execute the agreed-upon plan and transparently track its progress. At least monthly, report on the planned and actual progress to date and the expectations for the coming period.

2.4.- Identifying the likely causes of problems.

Cause and effect diagram/Ishikawa diagram

WHEN TO USE A FISHBONE DIAGRAM

- When identifying possible causes for a problem
- When a team’s thinking tends to fall into ruts

FISHBONE DIAGRAM PROCEDURE

1. Agree on a problem statement (effect). Write it at the center right of the flipchart or whiteboard. Draw a box around it and draw a horizontal arrow running to it.
2. Brainstorm the major categories of causes of the problem. If this is difficult use generic headings:
    1. Methods
    2. Machines (equipment)
    3. People (manpower)
    4. Materials
    5. Measurement
    6. Environment

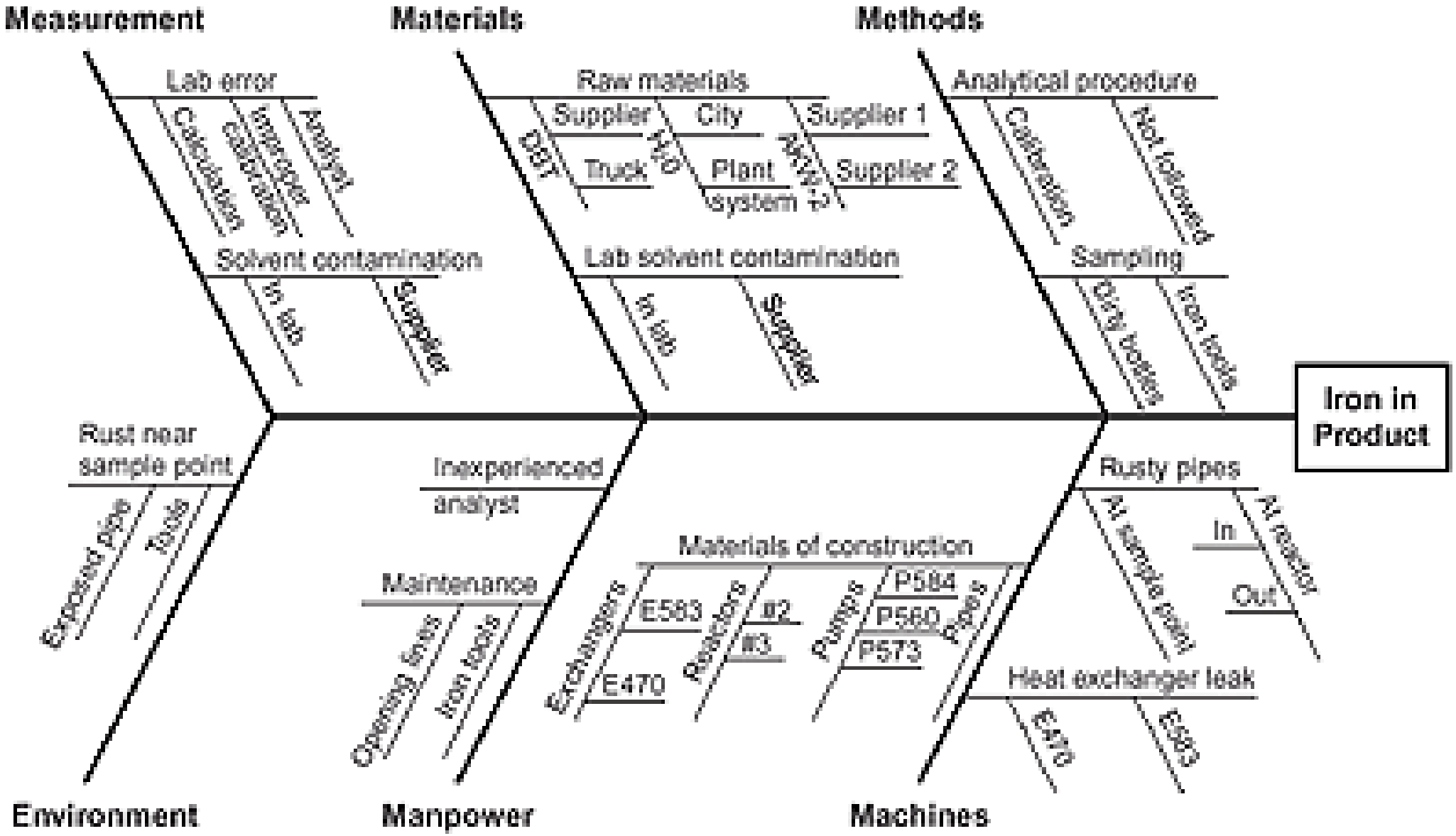
3.- Write the categories of causes as branches from the main arrow.
4.- Brainstorm all the possible causes of the problem. Ask "Why does this happen?" As each idea is given, the facilitator writes it as a branch from the appropriate category. Causes can be written in several places if they relate to several categories.

5.-Again ask "Why does this happen?" about each cause. Write sub-causes branching off the causes. Continue to ask "Why?" and generate deeper levels of causes. Layers of branches indicate causal relationships.

6.- When the group runs out of ideas, focus attention to places on the chart where ideas are few.

FISHBONE DIAGRAM EXAMPLE

This fishbone diagram was drawn by a manufacturing team to try to understand the source of periodic iron contamination. The team used the six generic headings to prompt ideas. Layers of branches show thorough thinking about the causes of the problem.


Measurement
Materials
Methods
Lab error
Calculation
Improper calibration
Analyst
Solvent contamination
In lab
Supplier
Raw materials
Supplier
City
Supplier 1
Dirt
Truck
Rain
Plant
Supplier 2
system 1
Lab solvent contamination
In lab
Supplier
Analytical procedure
Calibration
Not followed
Sampling
Dirty bottles
Iron tools
Iron in Product
Rust near sample point
Exposed pipe
Inside
Inexperienced analyst
Maintenance
Opening seals
Iron tools
Materials of construction
Exchangers
E583
E470
Reactors
#2
#3
Pumps
P584
P580
P573
pipes
Rusty pipes
At sample point
In
Out
At reactor
Heat exchanger leak
E470
E583
Environment
Manpower
Machines

For example, under the heading "Machines," the idea "materials of construction" shows four kinds of equipment and then several specific machine numbers.

Note that some ideas appear in two different places. "Calibration" shows up under "Methods" as a factor in the analytical procedure, and also under "Measurement" as a cause of lab error. "Iron tools" can be considered a "Methods" problem when taking samples or a "Manpower" problem with maintenance personnel.