Co-funded by the
Erasmus+ Programme
of the European Union

Decisions in the context of fast changing environments

Rui M. Lima

(School of Engineering of University of Minho)

Curriculum Development
of Master's Degree Program in
Industrial Engineering for Thailand Sustainable Smart Industry

Class plan

As a specialist **I must know how to apply individual and group decision-making techniques** **To ensure that the decision made can be the best possible and have the greatest acceptance from those involved**	Decision making in organizations. Individual and group decision making. Debate and concepts.
	Activity.
	Decision making tools.
	Decision making simulation

Co-funded by the Erasmus+ Programme of the European Union

Decision styles
Assign 1 to 5, from “rarely” to “often”

Universidade do Minho

1. Establishing a plan is very important.
2. I try to find innovative solutions.
3. I like to analyze the problems in depth.
4. I get the information I need by consulting other people.
5. I always have to know what to do and when.
6. I have to fully understand the problems.
7. I like to discuss possible solutions with other people
8. I like to have a lot of written information to better analyze the problems.
9. I commit to a plan that I follow scrupulously
10. I don't mind taking risks to come up with the best possible solution.
11. I like others to help me decide, just as I like to help others
12. Finding alternative solutions is my strong point.
13. A decision is a task. So it must be well structured.
14. I study the problems until understand the underlying logic.
15. I am especially pleased to find creative solutions.
16. I pay close attention to what people say about my decision alternatives.
17. The most important thing about a decision is to understand the problem.
18. I believe that discussing possible solutions with other people favors my intuition to decide
19. New ideas attract me more than the solutions already prepared.
20. I don't need many opinions. I just want concrete and simple data to decide quickly.

Co-funded by the Erasmus+ Programme of the European Union

The Dark Knight - Joker's Social Experiment

https://youtu.be/K4GAQtGtd_0

Universidade do Minho

Decision making in organizations

Group and individual decision making

Activity

Decision making tools.

Decision making simulation

As a specialist
I must know how to apply individual and group decision-making techniques.
To ensure that the decision made can be the best possible and have the greatest acceptance from those involved

Co-funded by the Erasmus+ Programme of the European Union

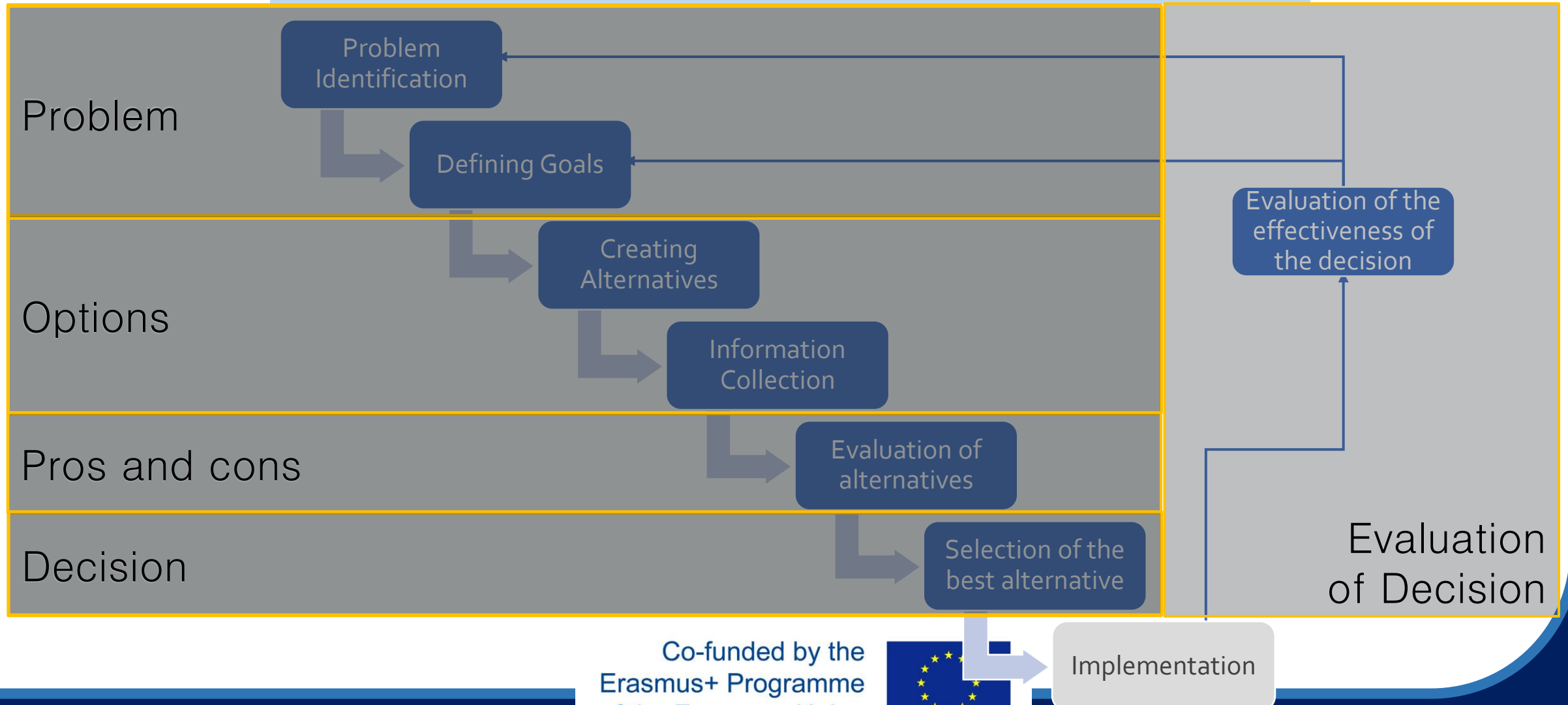
DECISION-MAKING

Universidade do Minho

DECISION-MAKING

Co-funded by the
Erasmus+ Programme
of the European Union

DECISION-MAKING



Co-funded by the Erasmus+ Programme of the European Union

DECISION-MAKING

1. PROBLEM?
   - What is the problem to be solved / decision to be taken?
   - Goals?
2. OPTIONS
   - What are the possible options or choices to make that decision?
3. PROS AND CONS
   - What are the possible results (Pros and Cons) for each of the options? (Not all options have pros and cons)
4. DECISION?
   - Select a decision?
5. Revaluation?
   - When and how will I evaluate the decision again?

Co-funded by the Erasmus+ Programme of the European Union

DECISION MAKING LIMITS

Universidade do Minho

Individuals do not always have all the information necessary for the best decision;

Human information processing capacity is limited.

Co-funded by the Erasmus+ Programme of the European Union

GROUP DECISION MAKING

PROS AND CONS?

Photo by Annie Spratt on Unsplash

Universidade do Minho

Co-funded by the Erasmus+ Programme of the European Union

✳Benefits

Groups generate more information and knowledge

The group provides different points of view.

Decisions are more easily accepted.

Disadvantages

They require more time.

Groups can extreme positions, increasing risk

They create ambiguity in responsibility.

Groups are subject to political games.

Mobilization for consensus and not for open discussion

INDIVIDUAL DECISION MAKING ADVISABLE?

Photo by Cristofer Jeschke on Unsplash

Universidade do Minho

Co-funded by the Erasmus+ Programme of the European Union

✳It is advisable

When time is tight

When problems are simple and require simple decisions

If an expert is available.

If the organizational culture is competitive

...

It is not advisable

If the problem can be divided into several parts.

If the decision requires interdisciplinarity.

If the problems are complex and require creative strategies.

If there is a need for the group to accept the decision.

DECISION STYLES (SLIDE 3 QUESTIONNAIRE)

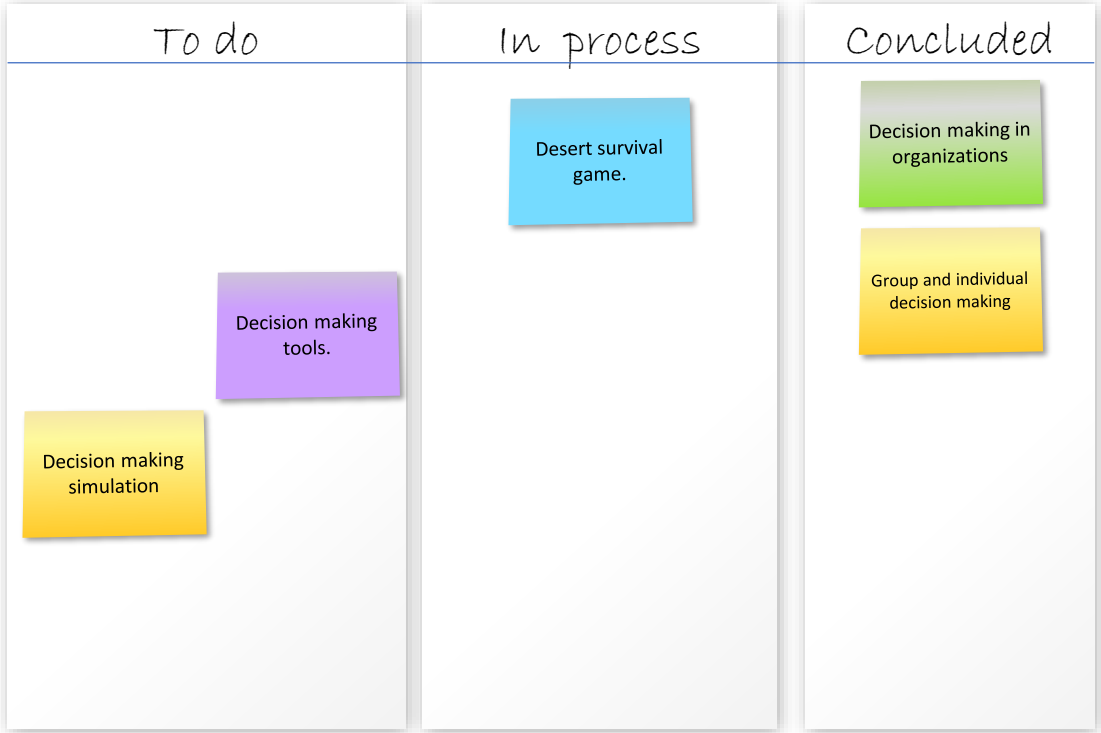
Universidade do Minho

	Logical - rational	Intuitive
Faced with high cognitive complexity High tolerance for ambiguity	▪ Analytical (Q1, 5, 9, 13, 20) ▪ Troubleshooting perspective ▪ Detailed analysis ▪ Lots of information ▪ Many alternatives	▪ Conceptual (Q3,6,814,17) ▪ Broad view of problems ▪ Creativity ▪ Lots of information from different sources
Faced with low cognitive complexity Low ambiguity tolerance	▪ Director (2,10,12,15,19) ▪ Focus on results ▪ Quick reaction ▪ Minimum information ▪ Few alternatives	▪ Behavioral (Q4,7,11,16,18) ▪ Focus on decision acceptance by others ▪ Little information ▪ Intuitive processes
	Task / technique	Social / people

Co-funded by the Erasmus+ Programme of the European Union

DECISION-MAKING

As **a specialist**
I **must know how to apply individual and group decision-making techniques.**
To **ensure that the decision made can be the best possible and have the greatest acceptance from those involved.**



Co-funded by the Erasmus+ Programme of the European Union

Desert Survival Game

Photo by Finding Dan | Dan Grinwis on Unsplash

Universidade do Minho

Co-funded by the
Erasmus+ Programme
of the European Union

DESERT SURVIVAL GAME

- It is 10 am on an August day and the group has just suffered a forced landing in the Sonora Desert, in the southwestern United States. The pilot and co-pilot of the small jet performed a forced maneuver, and the jet hit the ground and burned, leaving only the carcass. Both died and neither of the other passengers was injured.
- The pilot was unable to transmit his position before the accident. However, just before the impact, he said that they were 112 km southeast of a mining field, which is the closest inhabited place and that they were also about 104 km off the route indicated in the VFR flight plan.
- The surrounding area is relatively flat and, with the exception of a few cactuses, it appears to be desert. The latest weather forecast indicated that the temperature was expected to reach 43.3 degrees Celsius that day, which meant that the temperature in the ground could rise to 55 degrees Celsius.
- Everyone has light clothes: short-sleeved t-shirts, socks, normal shoes; all have handkerchiefs. Altogether, their pockets contain $ 2.83 in coins and $ 85 in notes, a pack of cigarettes and a ballpoint pen.

Co-funded by the Erasmus+ Programme of the European Union

DESERT SURVIVAL GAME

- **YOUR TASK**
  - Before the plane went up in flames, your group was able to select and carry 15 items. Your task is to order these items by their importance, starting with number 1 for the most important and reaching 15 for the least important.
- **ASSUME THAT:**
  - The number of survivors is the same as the members of your group;
  - You are the people who are in that situation;
  - The group agreed to stay together;
  - All items are in good condition.

Co-funded by the Erasmus+ Programme of the European Union

DESERT SURVIVAL GAME

Universidade do Minho

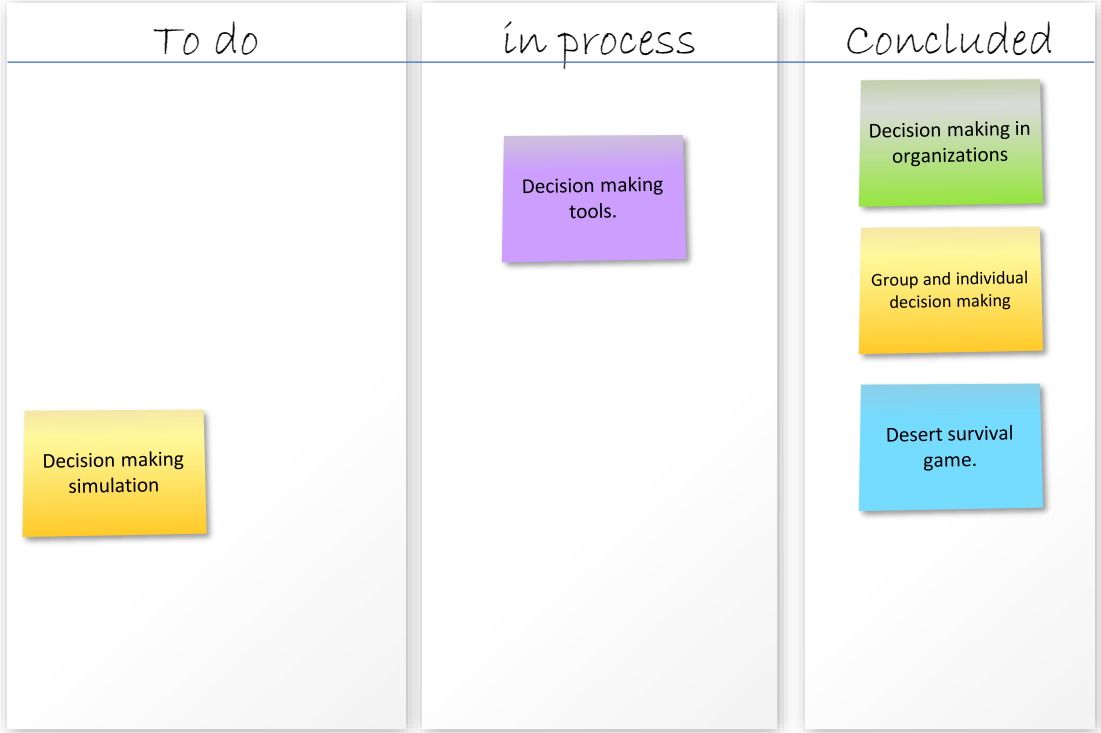
Items	Individual	A	Esp.	B	Group
Bottle of salt tablets (1,000 tablets)			15		
Purse mirror			1		
Two liters of Vodka			14		
One overcoat per person			2		
Book “Edible Animals of the Desert”			13		
One liter of water per person			3		
Area air charter			12		
Flashlight with four batteries			4		
Magnetic Compass			11		
Parachute (red and white)			5		
First aid box with gauze			10		
Switchblade			6		
One pair of sunglasses per person			9		
Plastic raincoat (large)			7		
45 caliber pistol, loaded			8		

Co-funded by the
Erasmus+ Programme
of the European Union

DECISION-MAKING

Universidade do Minho

As a specialist
I must know how to apply individual and group decision-making techniques.
To ensure that the decision made can be the best possible and have the greatest acceptance from those involved.



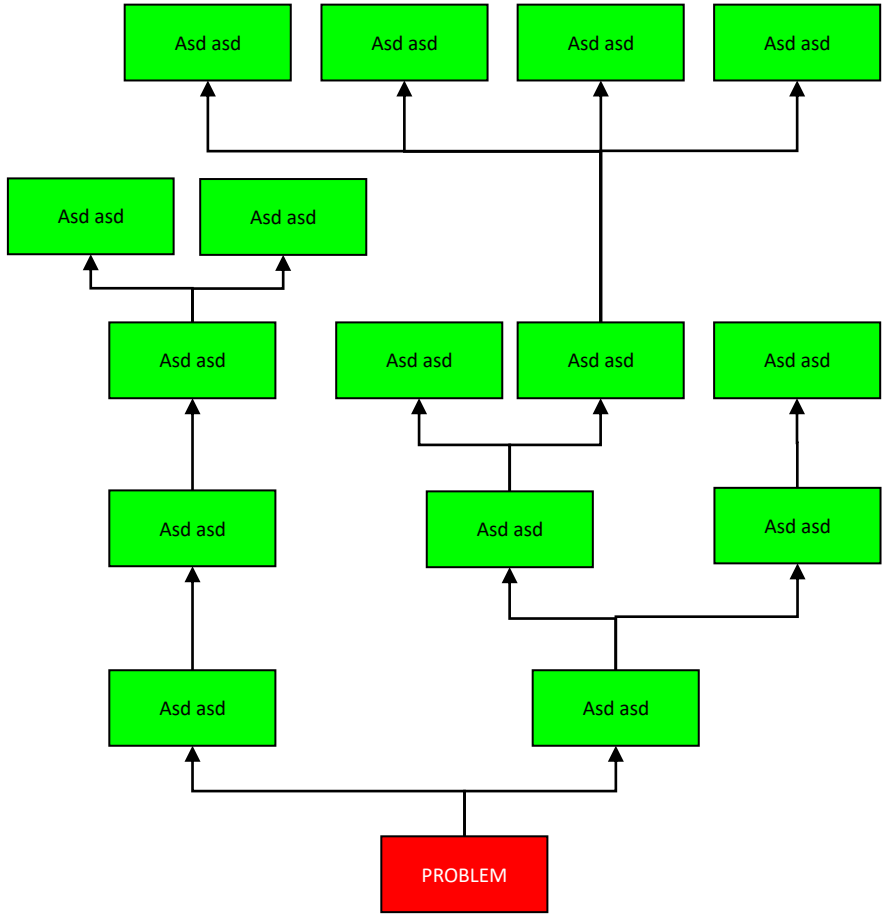
Co-funded by the Erasmus+ Programme of the European Union

DECISION TREE

Technique that **consists of graphically drawing the consequences related to each alternative;**

It allows to predict different scenarios;

Some rationality can be included, for example, staggering what is considered the best and what is considered the worst alternative.



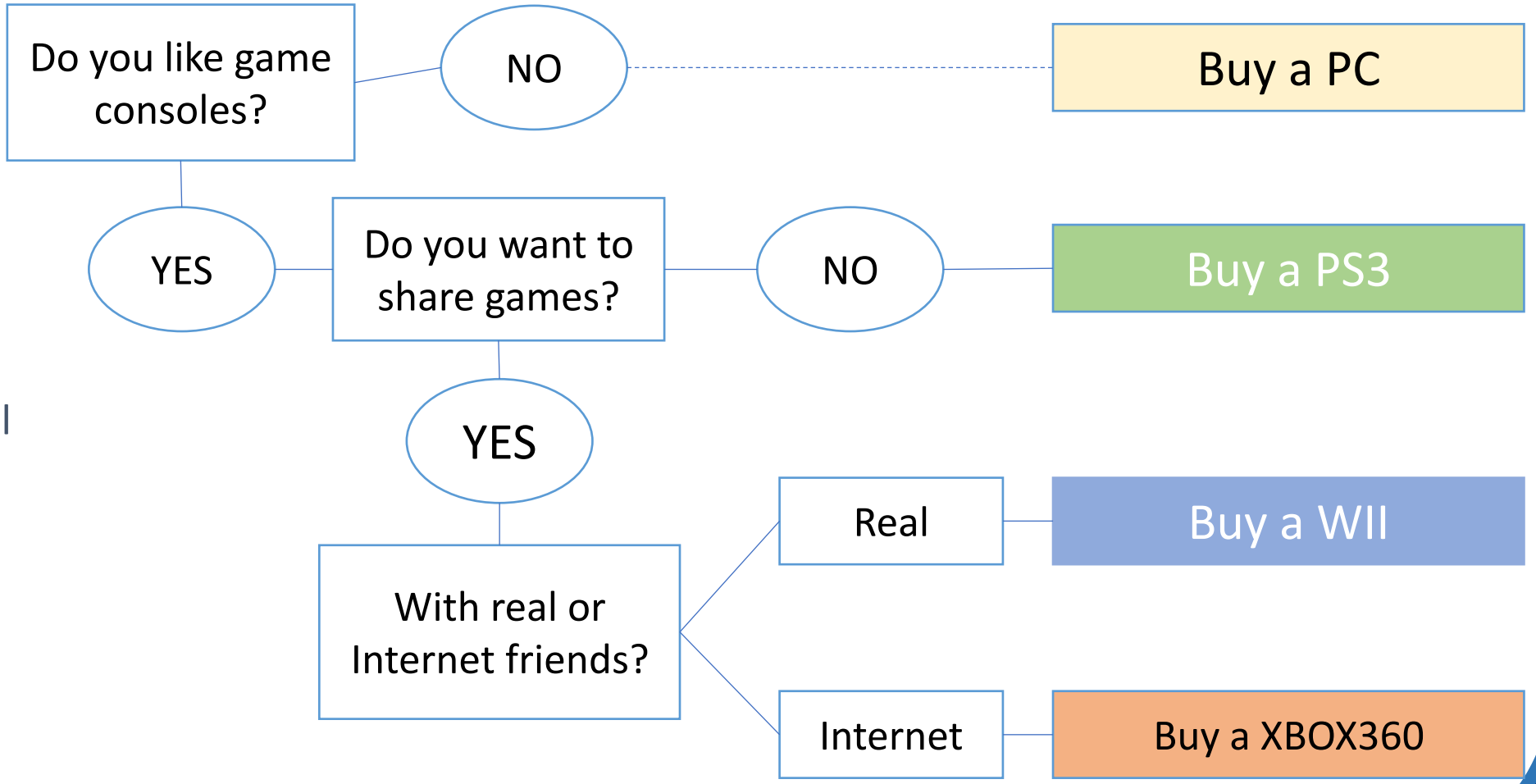
Co-funded by the Erasmus+ Programme of the European Union

DECISION TREE

Universidade do Minho

Make decision to buy a playing system

Simplified and personal decision tree



Co-funded by the Erasmus+ Programme of the European Union

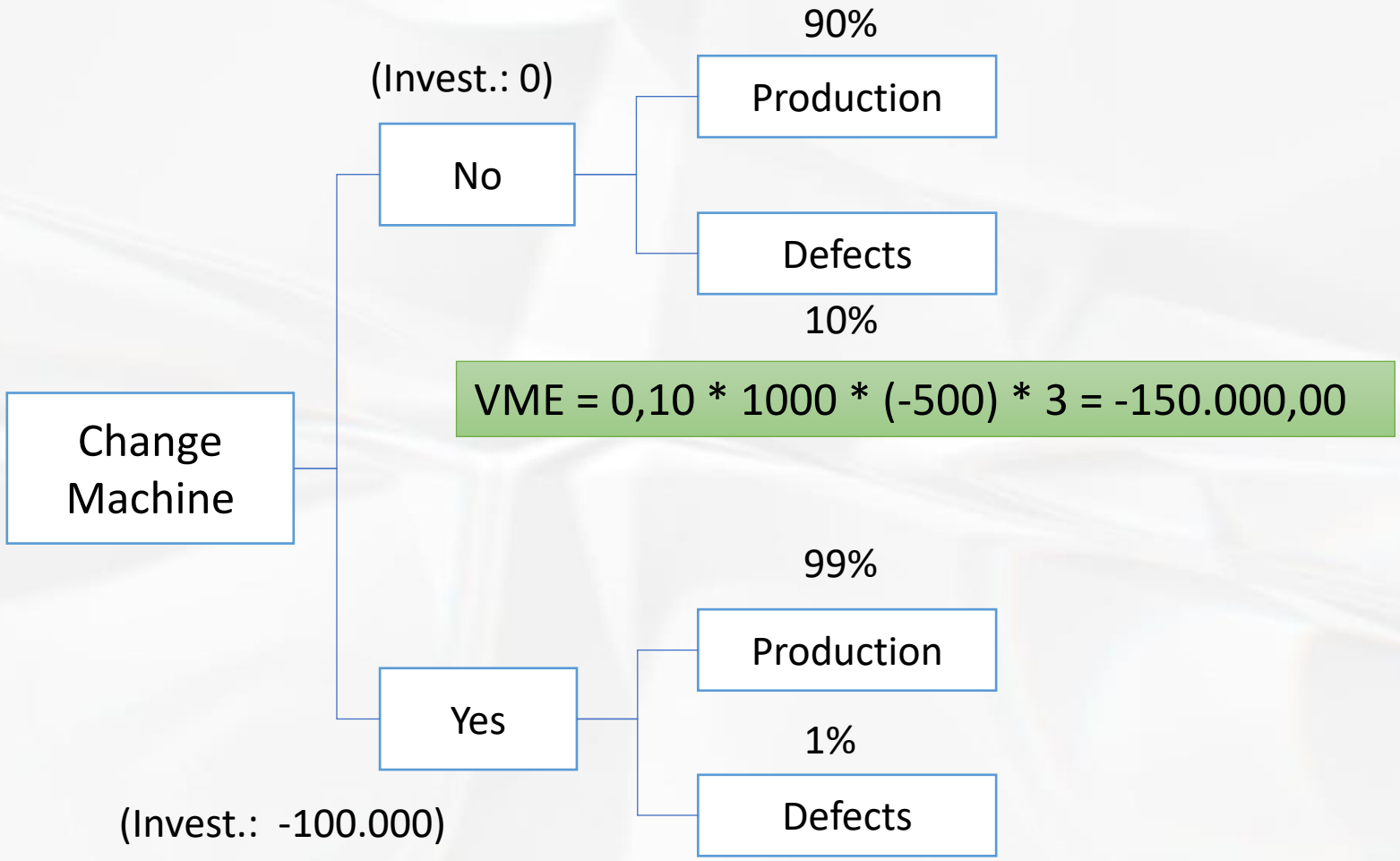
DECISION TREE

A machine is in production for a project that will end in three months. The production is **1000 pieces per month**.
The current machine has deteriorated in performance and the parts it produces are being rejected at a ratio of 10 for every 100.
The supplier offered, for the cost of € 100,000, the exchange for a new machine, for immediate delivery, with a performance of only one rejected part for every 100 produced. The cost for the loss of each rejected piece is 500 €.
Should the project manager replace the current machine with the new one?

Co-funded by the Erasmus+ Programme of the European Union

Decision tree

Expected Monetary Value - EMV



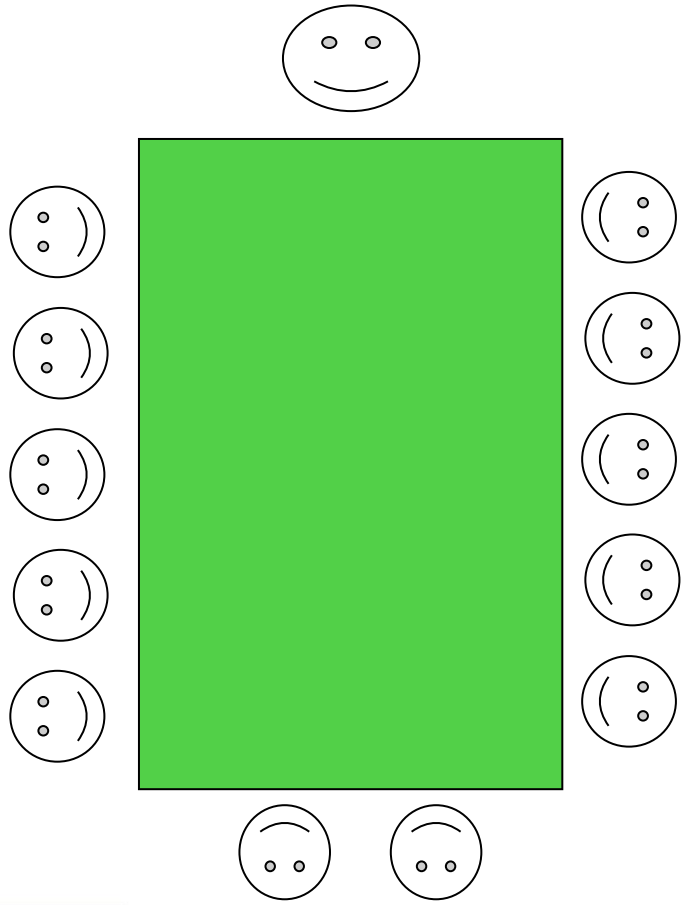
VME = [0,01 * 1000 * (-500) * 3] + (-R$100.000,00) = -115,000,00

DELPHI TECHNIQUE

It consists of **gathering and systematizing the opinion of several experts** in a single decision.

Individual decisions… then aggregated successively until stability is achieved

“Delphi is based on the principle that forecasts (or decisions) from a structured group of individuals are more accurate than those from unstructured groups”



Greenberg & Baron (1995)

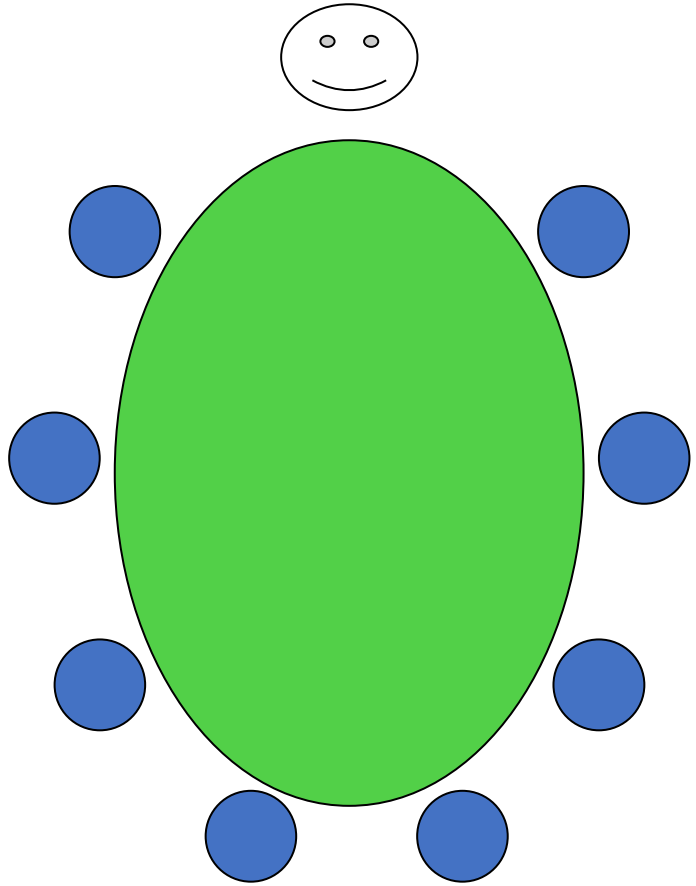
Co-funded by the Erasmus+ Programme of the European Union

BRAINSTORMING

The purpose of this technique is **to create a substantial number of innovative and creative ideas;**

Subsequently, they are **exposed, discussed and analyzed;**

It is important that **creativity and freedom of expression are not inhibited.**

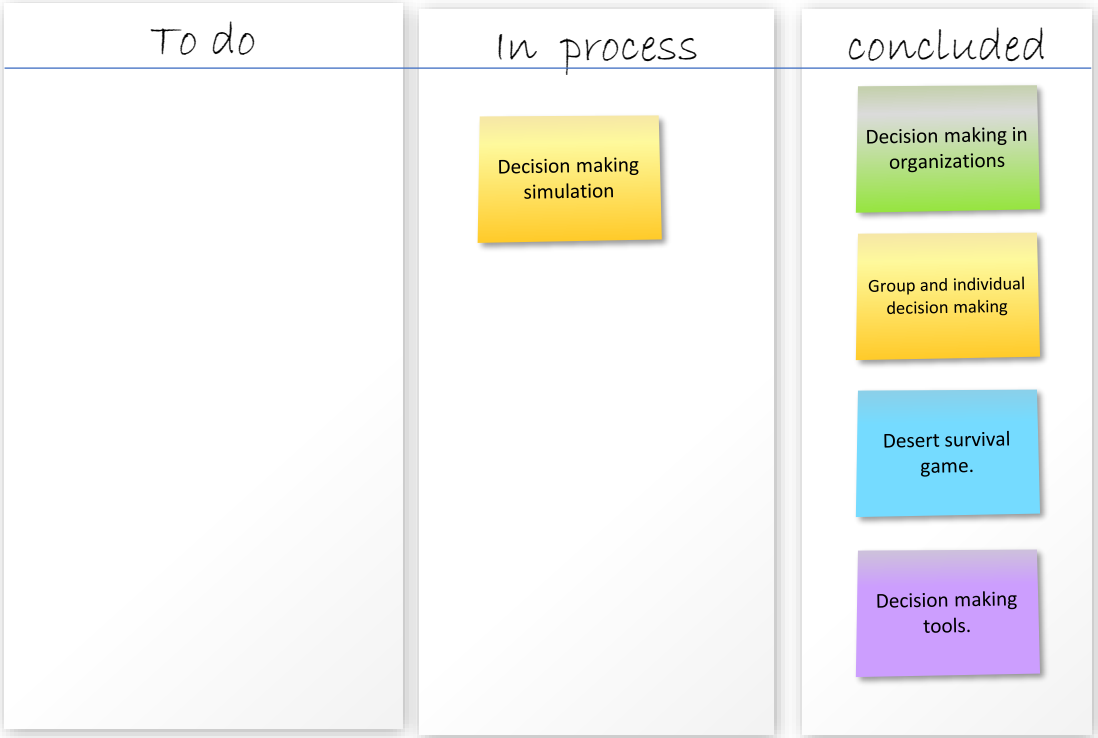


Co-funded by the Erasmus+ Programme of the European Union

DECISION-MAKING

Universidade do Minho

As a specialist
I must know how to apply individual and group decision-making techniques.
To ensure that the decision made can be the best possible and have the greatest acceptance from those involved.



Co-funded by the Erasmus+ Programme of the European Union

5 STEPS FOR DECISION MAKING - simulation

Photo by Paola Aguilar on Unsplash

Maria's television is broken, and her goal is to buy a different one.

She is trying to decide whether to buy a new one now or wait a few months to collect some money.

Co-funded by the Erasmus+ Programme of the European Union

1 – What decision should be made?

Co-funded by the
Erasmus+ Programme
of the European Union

2 - What are the possible options or choices to make this decision?

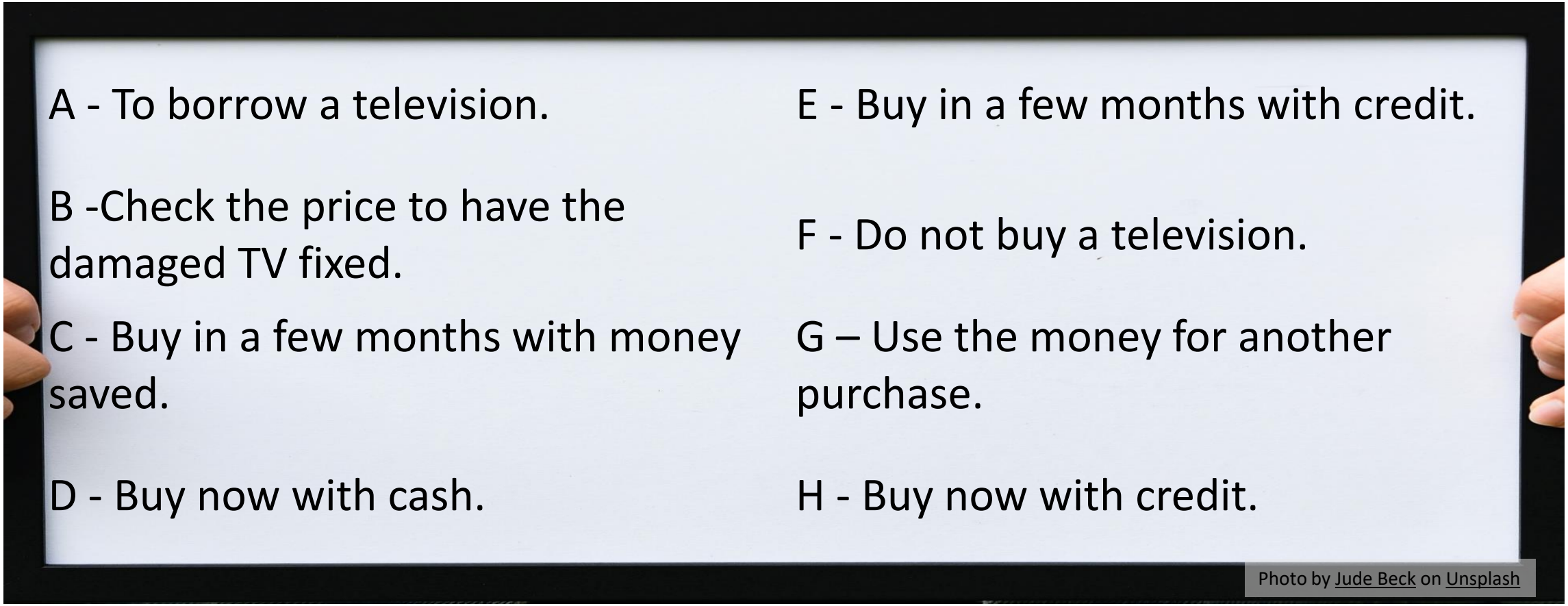


Photo by Jude Beck on Unsplash

Co-funded by the Erasmus+ Programme of the European Union

3 - What are the possible results (pros and cons) of each option? (Not all options have pros and cons)

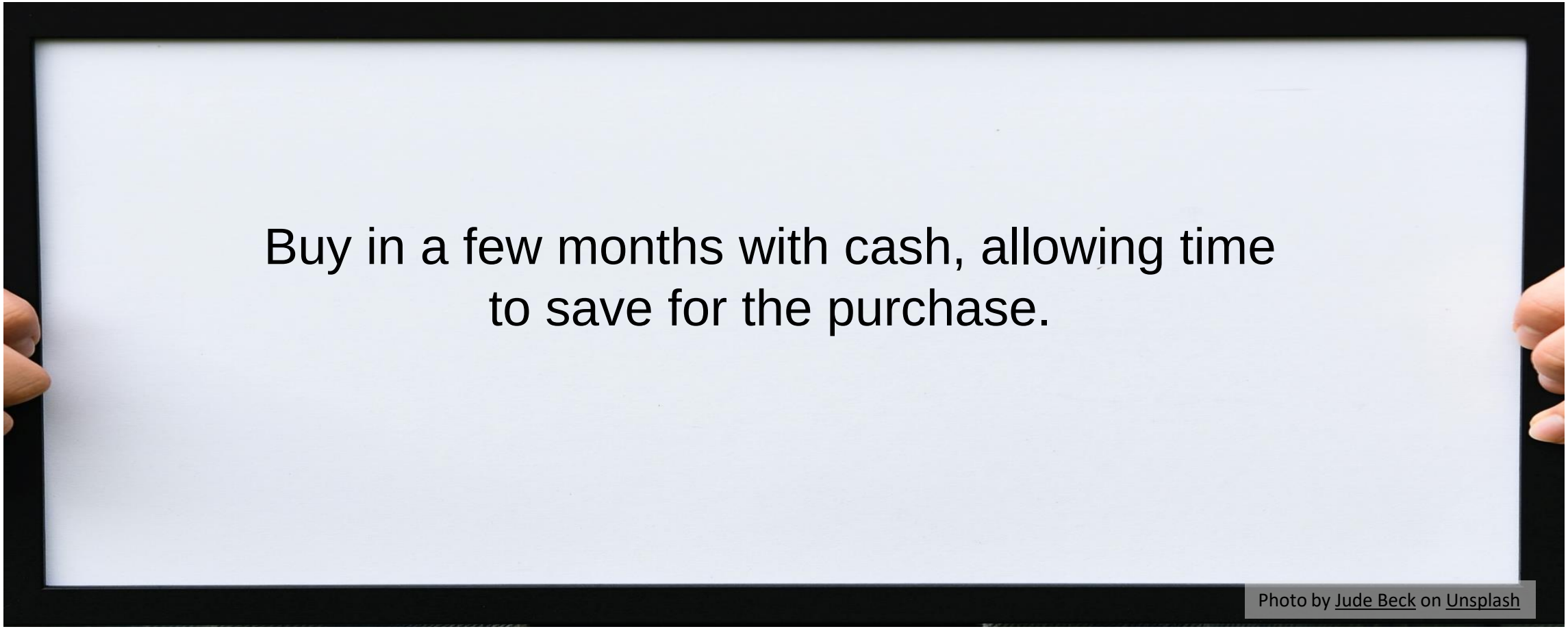
Universidade do Minho

	Pros	Cons
A	The money that would have been spent can be saved	The person I borrowed may want the television back.
B	I can have enough money to get it fixed.	The arrangement bill may be larger than what I want to spend on television.
C	I can save money to make the purchase	
D		Money may not be available for other expenses or purchases.
E		There will be a credit payment to be made. There may be no money available for payment of the credit.
F	I can spend time doing other things.	I can lose the option of entertainment, news, etc.
G	Can I buy something else with the money	I lose the option of home entertainment.
H		There will be a credit payment to be made. I may not have money available to pay the credit.

Photo by Jude Beck on Unsplash

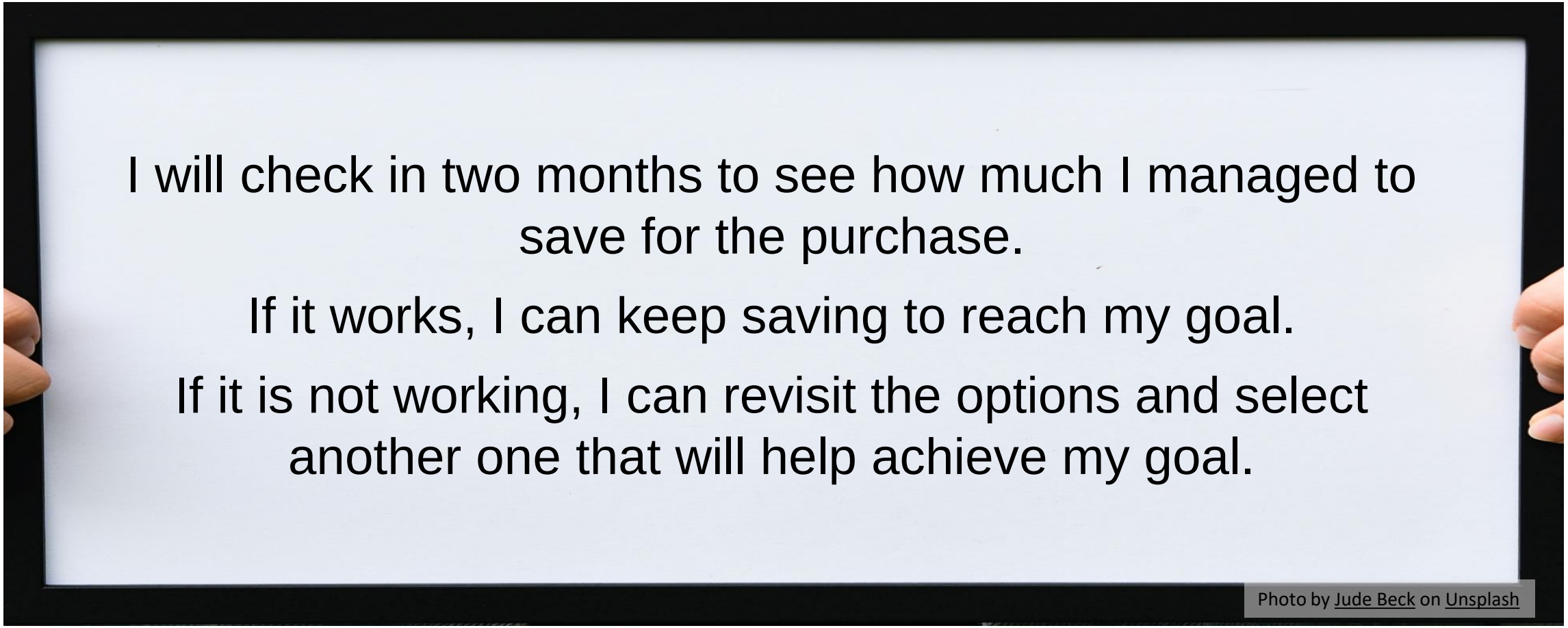
Co-funded by the Erasmus+ Programme of the European Union

4 - What is the decision?



Co-funded by the
Erasmus+ Programme
of the European Union

5 - When will I evaluate a decision again?



Co-funded by the Erasmus+ Programme of the European Union

MSIE 4.0

Co-funded by the
Erasmus+ Programme
of the European Union

Thank You

Curriculum Development
of Master's Degree Program in
Industrial Engineering for Thailand Sustainable Smart Industry