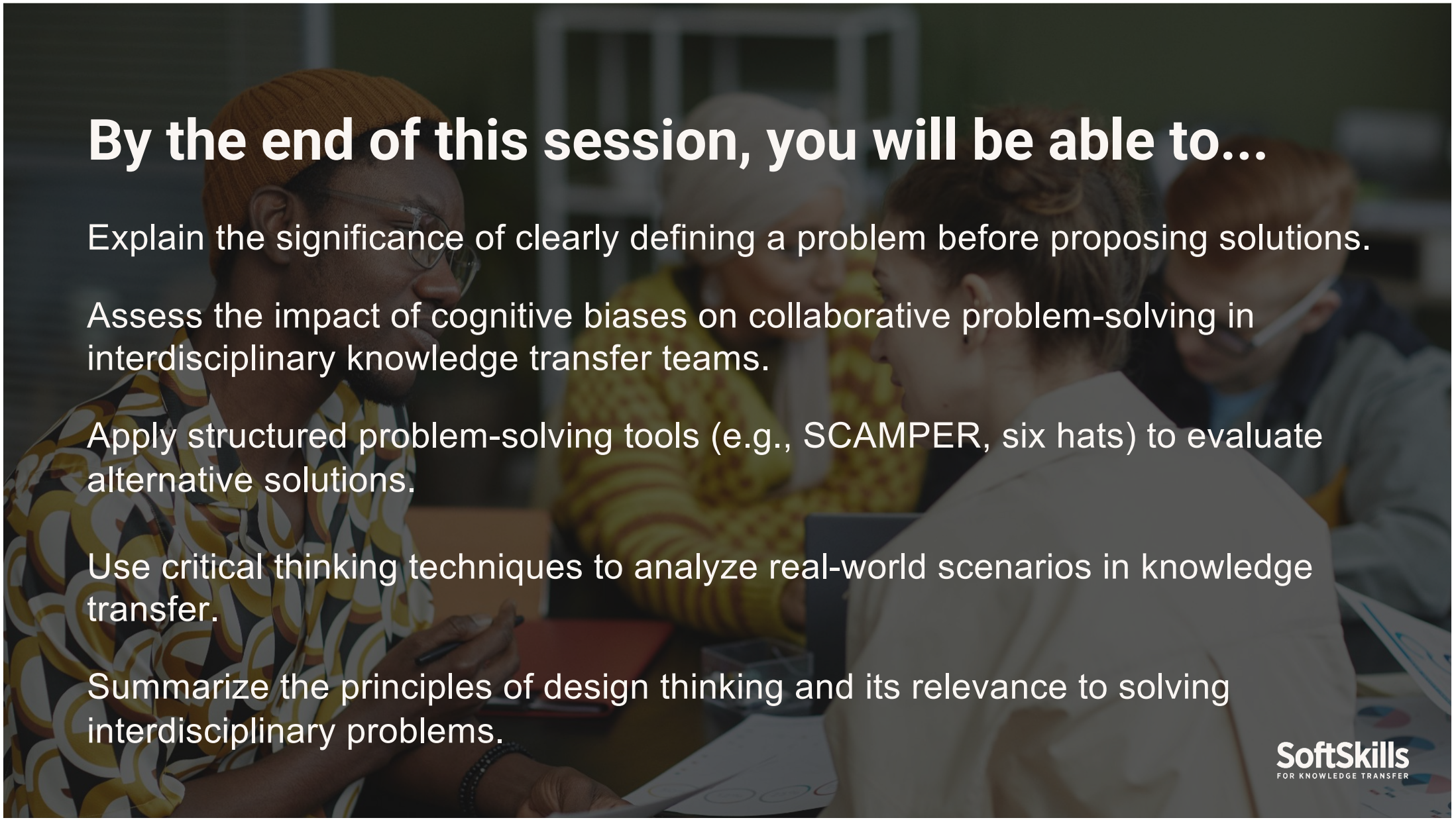
Welcome: Problem Solving for Knowledge Transfer

KTSoftSkills - Soft Skills for Knowledge Transfer
Project n. 2022-1-IT02-KA220-HED-000089663



By the end of this session, you will be able to...

Explain the significance of clearly defining a problem before proposing solutions.

Assess the impact of cognitive biases on collaborative problem-solving in interdisciplinary knowledge transfer teams.

Apply structured problem-solving tools (e.g., SCAMPER, six hats) to evaluate alternative solutions.

Use critical thinking techniques to analyze real-world scenarios in knowledge transfer.

Summarize the principles of design thinking and its relevance to solving interdisciplinary problems.

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Agenda

Time	Topic	
20 min	Introduction & Icebreaker Game	Group Exercise
60 min	Defining the Problem	Group Work & Mini Lecture
45 min	Irrational Side of Our Decisions	Group Exercises
15 min	Break	
30 min	Decision Making Tools & Critical Thinking	Mini Lecture
60 min	A Problem in KT Ecosystem	Case Study
10 min	Wrap up	Group Discussion

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Let's get to know each other better!

Check out the list of questions in the next slide.

Pick up-to 3 questions to ask each other.

Be authentic!

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- What books on your shelf are begging to be read?
- Which do you do more often: hum or whistle? Hum or whistle your answer.
- What's something you intended to do today, but didn't? Why not?
- What's the first thing that comes to mind when you hear the word "fun"?
- What's the best New Year's resolution you've ever made?
- What magic tricks do you know? Perform one now.
- What's your favorite item to cook? Why?
- Are you a hugger or a non-hugger? Why?
- Are you ever a high-maintenance person? Explain.
- Are you superstitious? Give an example.

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Group Work: What's the problem?

- Work in groups.
- Read the scenario together.
- Identify at least two different ways to define the core problem in the scenario.

A university research team has developed a highly innovative material with extraordinary heat resistance and durability. However, the Technology Transfer Office (TTO) is struggling to identify a viable market or industry application. The inventors are frustrated, claiming that the office is not doing enough to commercialize the work. Industry partners have shown interest in the science but walked away after due diligence. The university administration is questioning whether to invest further in patent protection.

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Debriefing

- What was your initial instinct about what the core problem was?
  Did that change during your discussion?

- Did your group members define the problem differently at first?

In complex innovation settings, the way we frame a problem is often the first and most crucial problem to solve.

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Examples of Possible Problem Definitions

“There is no market for the invention.”
“The TTO has not explored the right application domains.”
“The communication between researchers and the TTO is broken.”
“There is a mismatch between technical potential and commercial readiness.”
“The university lacks a strategic framework for evaluating early-stage IP.”

Each framing suggests a **different problem owner**, a **different type of solution**, and a **different route forward**.

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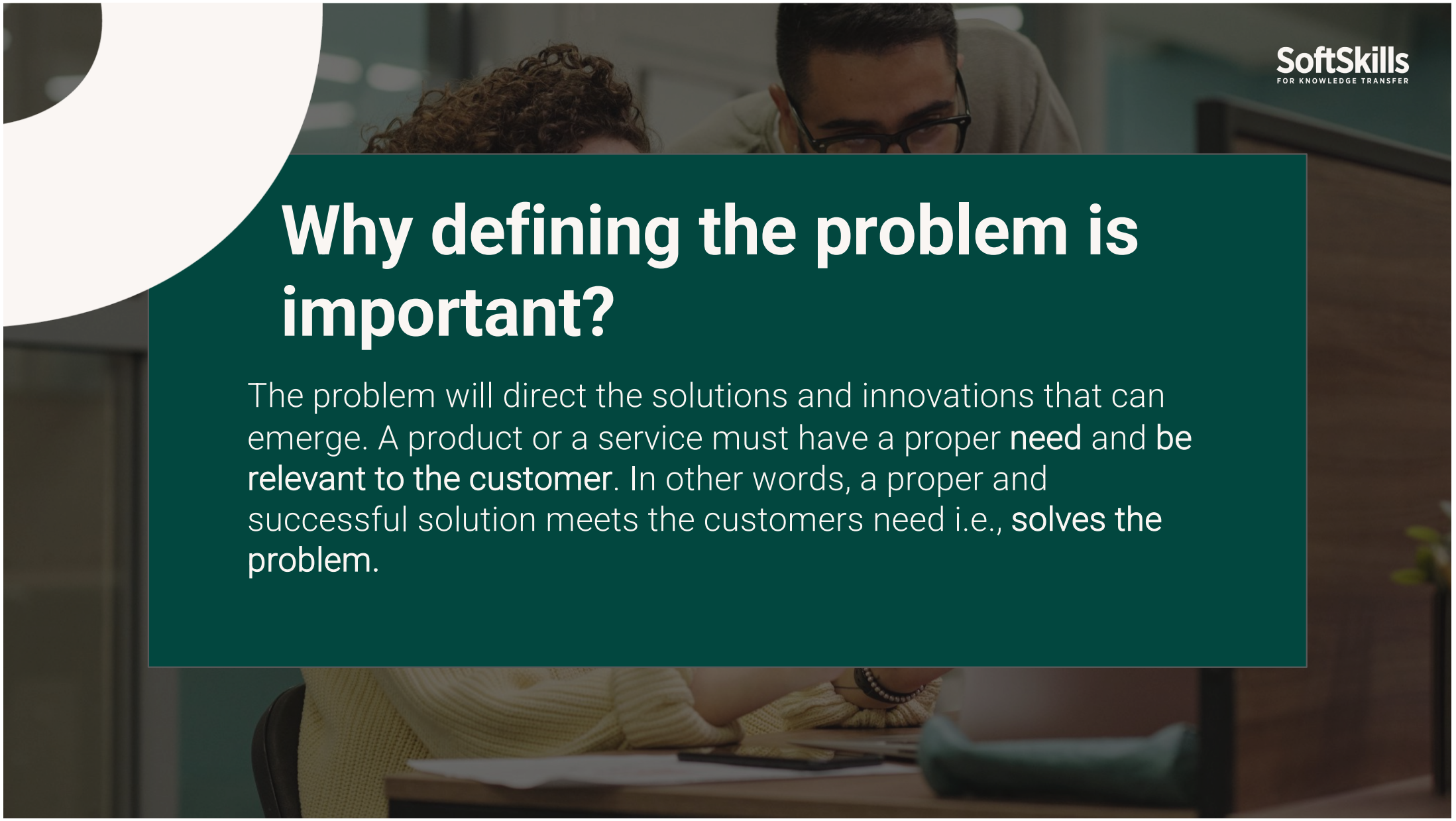
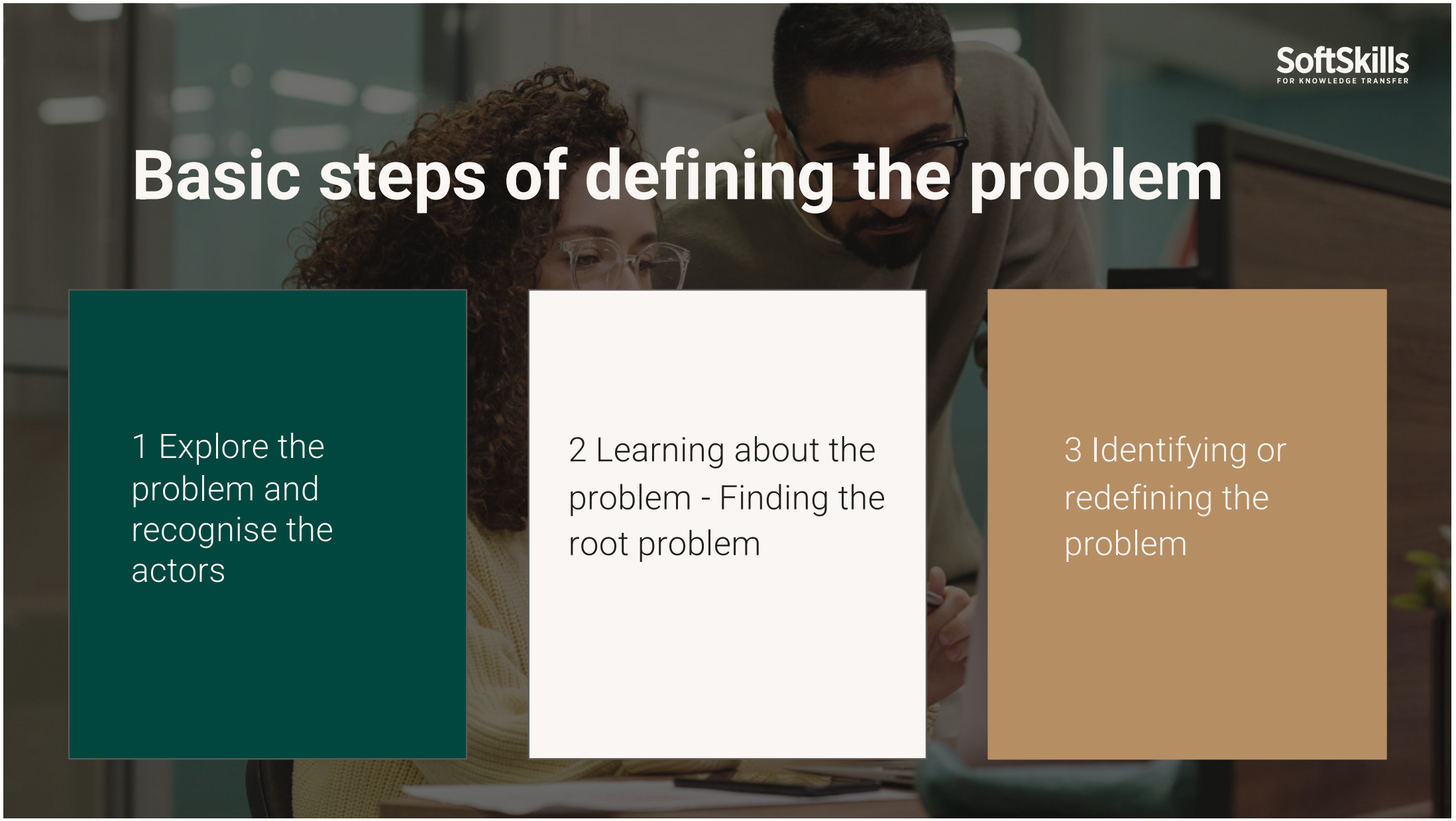


Why defining the problem is important?

The problem will direct the solutions and innovations that can emerge. A product or a service must have a proper **need** and **be relevant to the customer**. In other words, a proper and successful solution meets the customers need i.e., **solves the problem.**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Basic steps of defining the problem
1 Explore the problem and recognise the actors
2 Learning about the problem - Finding the root problem
3 Identifying or redefining the problem

1A Explore the problem

In problematic situations, the KT professional must facilitate cooperation to find a mutual understanding. Explore the problem by asking and answering questions.

- What causes the problem?
- Why is it a problem?
- How does the problem occur?
- Where does the problem occur?
- What are the consequences of the problem?
- Is the problem related to or caused by another problem?
- Who or what is perpetuating the problem?
- Who or what has an impact on the problem?
- Who suffers from the problem?
- Who or what benefits from the problem?
- What are the effects of the problem, who suffer from them?
- Consider is the problem relevant? In other words: what evidence you have that people care about the problem.

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1B Recognise the different actors

The role of the KT professional is to help understand that all actors have different objectives, motivations and needs!

Note that actors can also mean other than people, organizations and companies:
e.g. society, institutions, laws, general norms and assumptions, feelings & emotions etc.

Map out all the actors involved:

- Sufferers
- Frustrated parties
- All stakeholders that are involved in any way
- Enablers
- Beneficiaries
- Business operators: entrepreneurs, funders, users, customers, buyers, end-users, producers, suppliers etc.
- Research operators: university, researchers, funders, academic expectations, etc.

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2 Learning about the problem - Finding the root problem

It is important to know and understand motivations, underlying needs and pains of the different actors involved with the problem!

Don't assume! Find out, investigate, do research, ask, interview.

Methods to understand the problem:

- exploratory interview
- participant observation, surveys,
- qualitative and quantitative research (field research, trends research, articles, online ethnography, etc.), focus groups
- tools: 5 why’s, stakeholder map, empathy map

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3 Identifying or redefining the problem

Analyse and redefine the initial problem using research and insights that you gained in previous parts. There might be many problems. Define all and prioritise. "What is the actual problem", may seem basic, but is often missed.

A tip: Learn to identify the need by writing.
Describe the pure NEED - not the solution.

An example:
People need to get quicker from A to B.
Do not write the solution: People need to have better public transportation.

Look at the problem critically, question it and redefine the problem if needed.

Define the problem by writing:

- What (does/happens)?
- Who?
- How?
- Where
- To Whom?
- Why?

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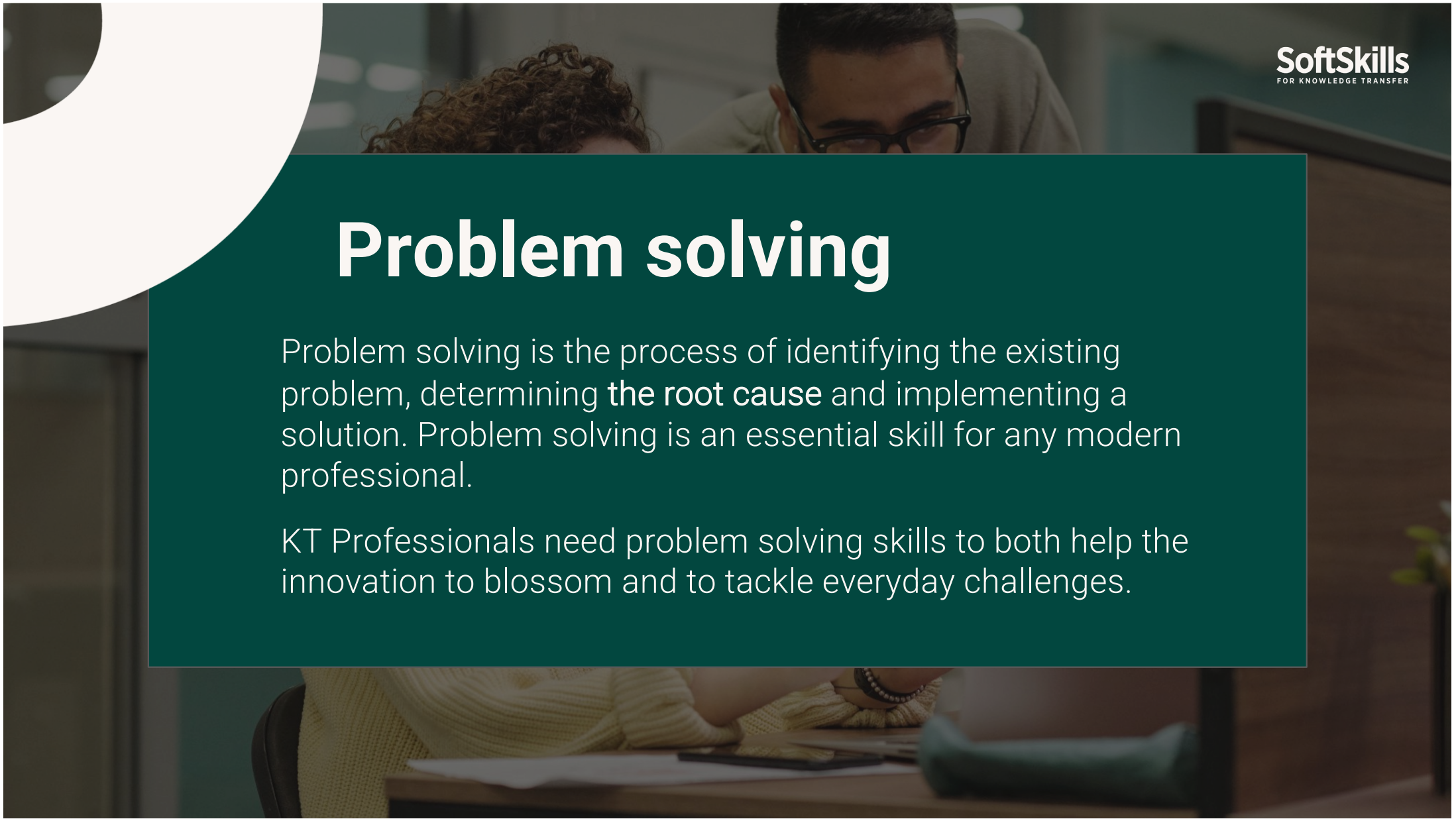

Problem solving

Problem solving is the process of identifying the existing problem, determining **the root cause** and implementing a solution. Problem solving is an essential skill for any modern professional.

KT Professionals need problem solving skills to both help the innovation to blossom and to tackle everyday challenges.


Cognitive Traps in Decision Making
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Irrational Side of Our Decision Making

The human brain is designed to process vast amounts of information quickly and efficiently.

In uncertain or time-constrained situations, we resort to intuitive thinking rather than deliberate analysis.

These shortcuts are often helpful, but they can also lead to predictable errors in thinking.

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What is the price of this planter & bench

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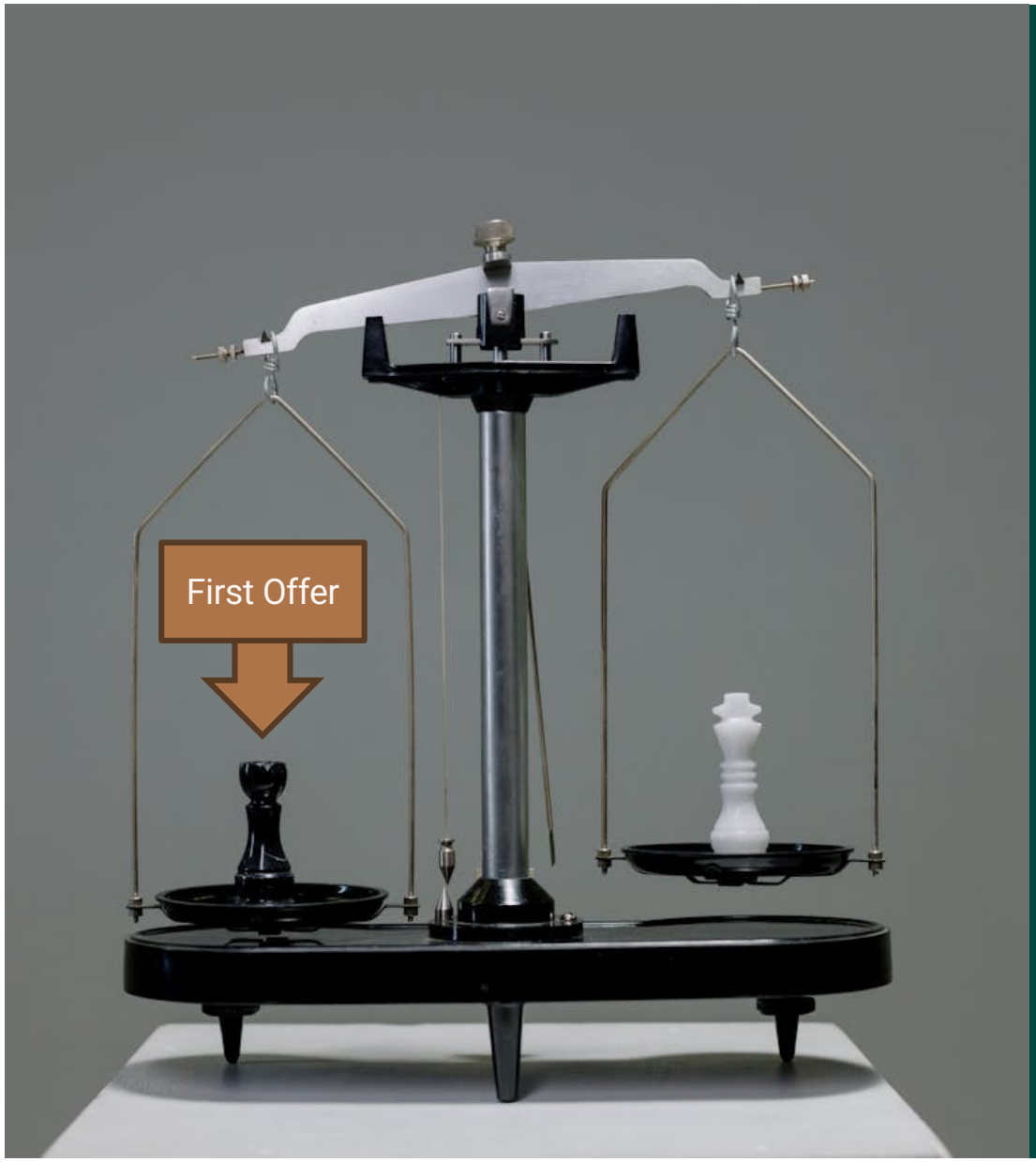

Anchoring

Relying too heavily on the first piece of information encountered (the “anchor”).

Example:
A seller names a high starting price, and it sets the tone for all further negotiation.

Tip to Avoid:
Seek out multiple reference points and question initial assumptions.

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Imagine that you are the Minister of Health when corona outbreak hits your country. The virus is expected to kill 60 people. Experts bring two alternative solutions for you to decide.

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For Group 1

Option A: 20 people will be saved.

Option B: 1/3 probability that 60 will be saved and 2/3 probability that nobody will be saved.

For Group 2

Option X: 40 people will die.

Option Y: 1/3 probability that nobody will die and 2/3 probability that 60 people will die.

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For Group 2

Option X: 40 people will die.

Option Y: 1/3 probability that nobody will die and 2/3 probability that 60 people will die.

LIVES WILL BE SAVED

POSITIVELY FRAMED

Popular option is risk averse.

PEOPLE WILL DIE

NEGATIVELY FRAMED

Popular option is risk seeking.

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Framing Effect

The way information is presented affects decisions more than the information itself.

Example:
People prefer a product labeled “95% fat-free” over one labeled “5% fat,” even though they’re the same.

Tip to Avoid:
Reframe problems in multiple ways before deciding.

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Sunk Cost Fallacy

Continuing a course of action because of previously invested resources (time, money, effort).

Example:
Keeping a failing project alive because "we've already spent so much on it."

Tip to Avoid:
Focus on future value, not past investment. Cut losses when warranted.

Reciprocation

The tendency to feel obligated to return favors or concessions, even when it's not rational or required.

Example: Accepting a proposal or agreeing to terms in a negotiation simply because the other party made a small concession first — not because the terms are actually beneficial.

Tip to Avoid: Pause and evaluate offers based on merit, not emotion. Ask: "Would I accept this if they hadn't 'done me a favor' first?"

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Confirmation Bias

Tendency to search for, interpret, or recall information in a way that confirms preexisting beliefs.

Example:
Only reading data that supports your preferred strategy while ignoring contradictory evidence.

Tip to Avoid:
Actively look for disconfirming evidence.
Ask: What would prove me wrong?

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Big Picture

Always keep in mind the big picture of what you want to achieve to avoid the trap of being lost in details.


Route to a solution
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Generating ideas

- Don't get too excited about the first ideas. They are often easy and obvious.
- In brainstorming aiming for quantity will help the team move beyond the obvious to more interesting and better ideas.
- Learning to let go ideas to make way for new ones is a skill.
- Don´t try to choose the perfect idea and then immediately investing massive resources in implementing it.
- Sometimes it is good to spot a few ideas which are “good enough” to kick off an experimental, evolutionary process.
- It’s not about what’s “right,” it’s about what’s “probable” and “possible.”

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How to make new ideas?

BY COMBINING several existing concepts
in a new or unexpected way.

BY ADDING. By studying and refining prevailing ideas and practices.

BY ABANDONING prevailing practices and thinking models.

BY TURNING OVER: Reverse.

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Methods for ideating

Facilitated brainstorming, 10 + 10 method

Future visions exercise to boost creativity and unlock thinking.
It's 2075 and your problem has been solved. Write news headlines where you tell how the change shows in thinking, action or behavior of people.

How might we –exercise.
In spite of (defined problem) **how might we** (help/reduce/create/xxxx xxxx) to (xxxxxxx) so they can (xxxxxxx)?

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Thinking with six hats

With each of them, you will think about your idea based on its view!

Red hat = feelings, emotions: How do you feel about the idea
Black hat = What are the potential weaknesses and risks of the idea?
Yellow hat = Benefits, advantages. Crazy possibilities of the idea?
Green hat = Environment, climate, social justice of the idea
Blue hat = Control, structure. What kind of regulations, policies, laws are involved?
White hat = taboos, aspects that people are embarrassed, uncomfortable, unwilling to face

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SCAMPER

S Substitute - components, materials, people
C Combine - mix, combine with other assemblies or services, integrate
A Adapt - alter, change function, use part of another element
M Modify - increase or reduce in scale, change shape, modify attributes (e.g. colour)
P Put to another use
E Eliminate - remove elements, simplify, reduce to core functionality
R Reverse - turn inside out or upside down

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Critical thinking
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What is critical thinking in KT process?

Framing the Problem

Apply critical analysis to ask: How does this finding translate into actionable insight for the business? Consider the limitations of the research and how it may (or may not) scale or adapt.

Building Bridges Between Worldviews

Use critical thinking to anticipate misunderstandings between academics and practitioners.
Translate academic language into business-relevant insights, and vice versa.

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What is critical thinking in KT process?

Think about the big picture & zoom in to the human level

What are the consequences at many levels: individual, community, business, biodiversity, environmental, research, societal, etc.

- SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)
- PESTEL analysis (Politics, Economics, Society, Technology, Environment, Law). Add new layers if needed: Demographics, Biodiversity, AI, Ethics, Research etc.

Futures thinking

What are the silent signals, trends, taboos, megatrends now?
What are those after 2, 5, and 10 or more years?

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What is critical thinking in KT process?

Interpreting Research Through a Strategic Lens

Apply critical analysis to ask: How does this finding translate into actionable insight for the business?

Consider the limitations of the research and how it may (or may not) scale or adapt.

Designing Experiments and Pilots

Don’t just transfer knowledge — test it!

Apply critical thinking to co-create controlled experiments or prototypes that validate knowledge before large-scale implementation.

- Engage people, customers, stakeholders in testing. Ask and listen to their feedback.

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What is critical thinking in KT process?

Reflective thinking and iterative doing

After a KT project, reflect critically: What worked, what didn’t, and why?

Feed this insight back into your practice to improve future knowledge transfer.

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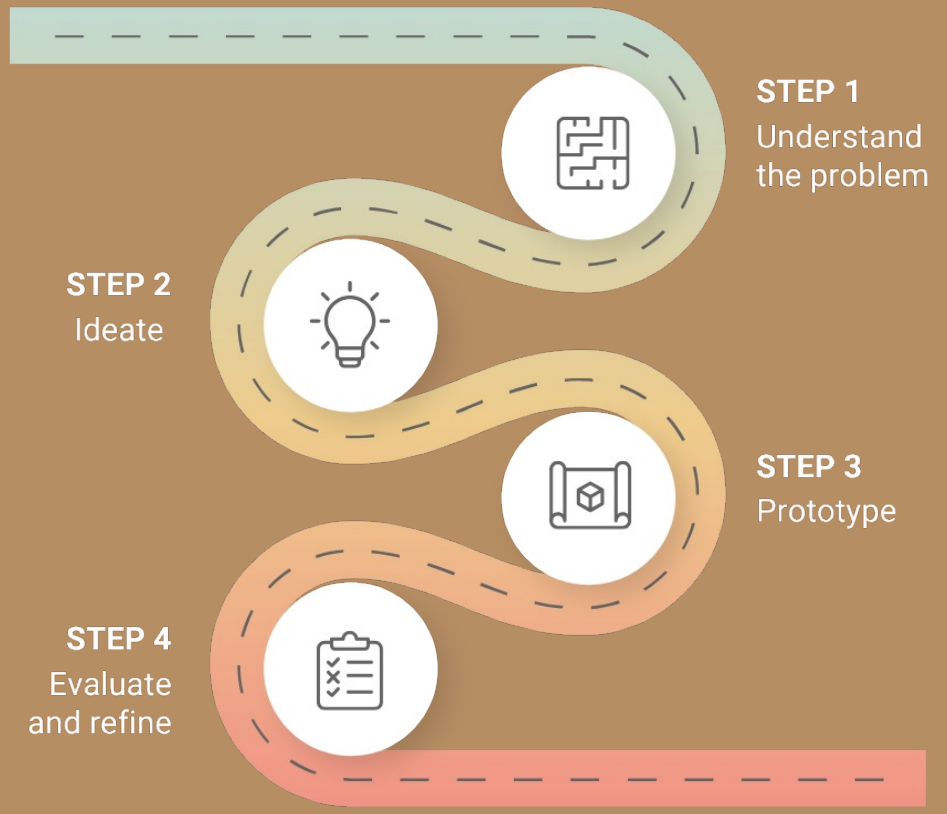
What's Design Thinking?

A human-centered approach to problem-solving that usually involves five key stages: Understand the problem, Ideate, Prototype, and Test.



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Core assumptions of design thinking.

DT is about understanding users' needs in a given situation or context, redefining initial perception of the problem or challenge, and creating innovative solutions through continuous improvement of solution prototype to adjust it to users' needs. DT encourages creativity and innovation.

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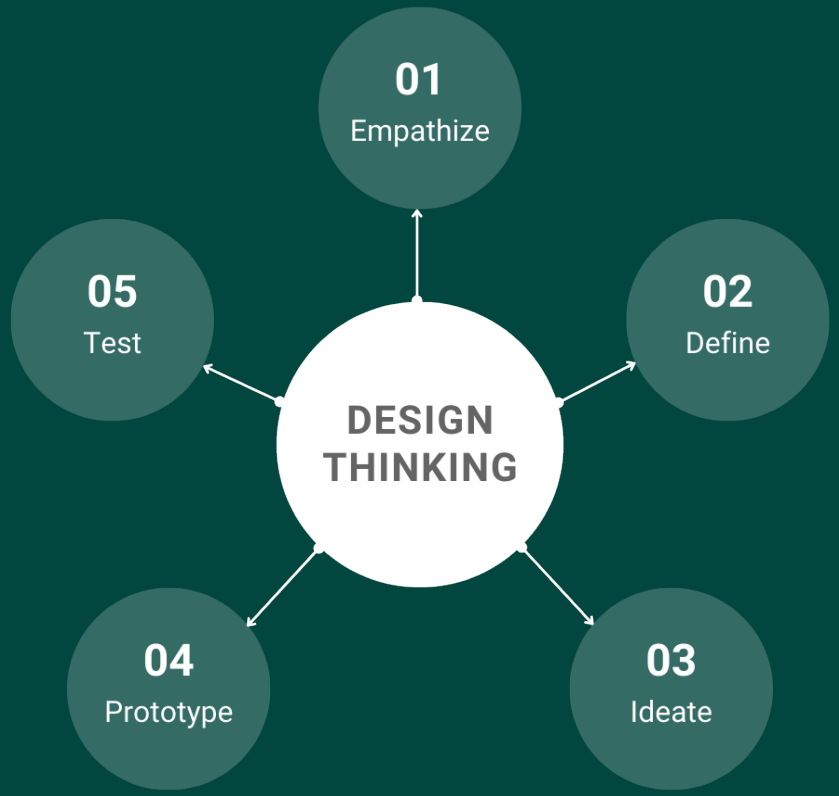

Brief description of the process and stages

Each stage of Design Thinking has various instruments, that team may adapt to the specificity of current project.
The DT process is flexible and stages are not always linear.
Teams may revisit earlier stages based on new insights gained throughout the process.

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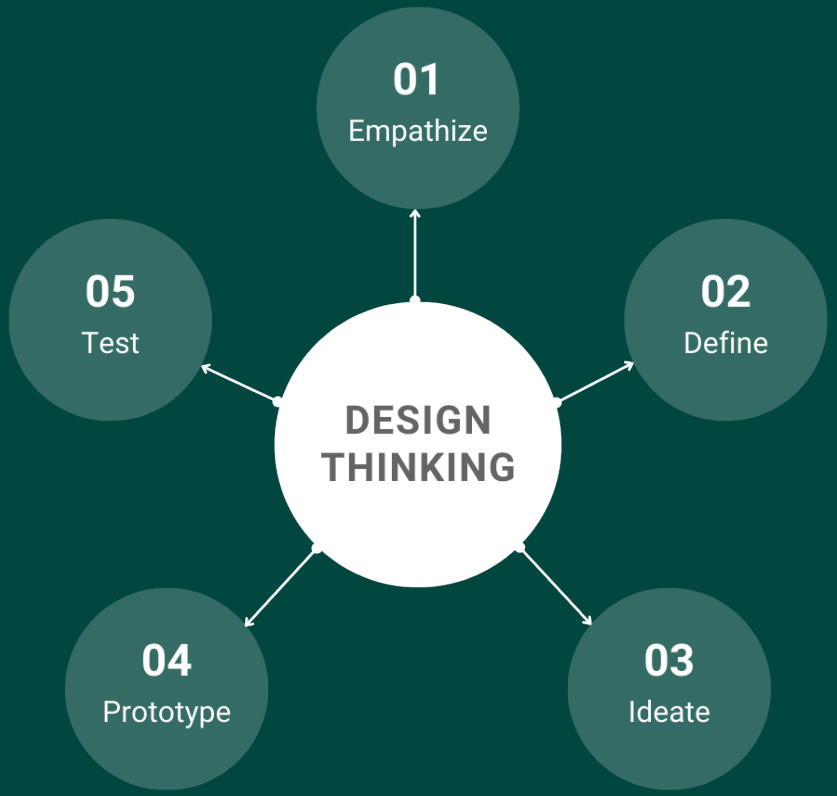

1. Empathize - involves understanding the users and their needs. It's about gaining empathy for the people you're designing for by observing them, interviewing them, and immersing yourself in their experiences.

2. Define - involves synthesizing the insights gathered from the empathy stage and identifying the core issues and user's needs, and ultimately the statement of an actual problem that needs to be solved. Statement usually has a form of How Might We question.

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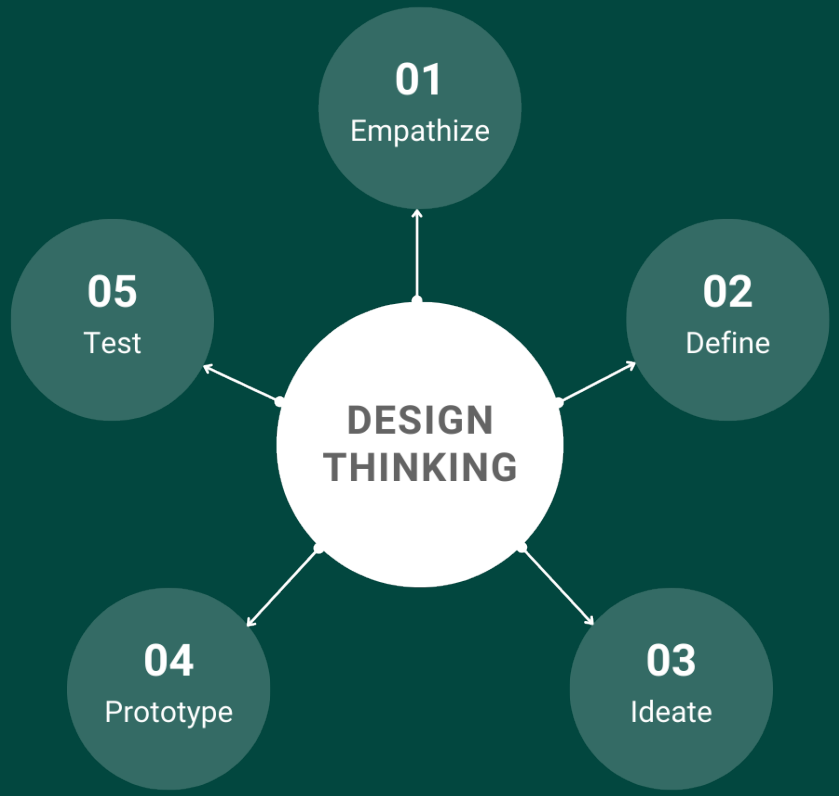

3. Ideate - focuses on generating a wide range of potential solutions to the defined problem, usually by applying brainstorming techniques.

4. Prototype – involves creating prototypes of selected potential solutions to make your ideas tangible and test them with users. First prototypes should be made fast and cheap.

5. Test - involves testing prototypes with real users to gather feedback and refine prototypes in order to get closer to the final solution.

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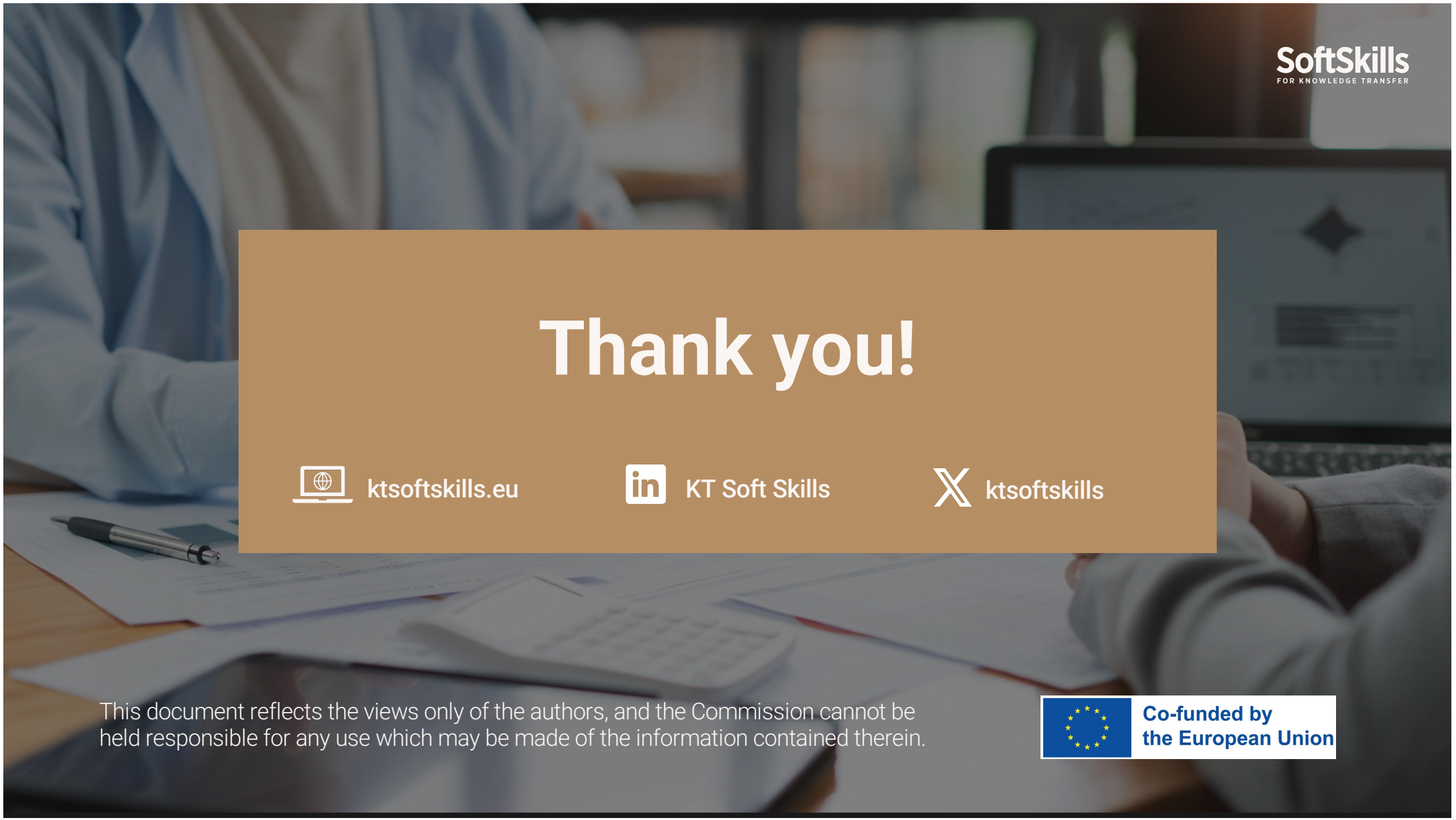

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Problem Solving for Knowledge Transfer Teaching Toolkit

Additional Print Out Materials (Not in this document)

- Problem Solving Module - Slides

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Problem Solving for Knowledge Transfer Syllabus

Duration: Approx. 4 hours

This course introduces the basics of problem-solving, an essential skill for everyone working in the knowledge transfer field. Problem-solving skills help to deal with challenges, task management, and change management. The participants will be confronted with critical-thinking techniques, which represent key tools for the definition and development of an action plan. Problem-solving skills – intended as the ability to identify a problem, understand its causes, develop a solution, and sustain positive results – will empower participants to think in a more analytical way and to be more effective in solution definitions.

With the combination of theory, real-world cases, and interactive exercises, participants will learn effective tools for problem-solving, creative thinking, quick experimenting and decision making. Mastering these skills ensures lower quicker and leaner management in knowledge transfer activities and ensures that you can solve any situation with a solution that satisfies all parties.

Intended Learning Outcomes (ILOs)

General objective

Learn the basics of problem solving and understanding the importance of problem-solving skills in knowledge transfer.

Specific ILOs

- ILO – 1: Explain the significance of clearly defining a problem before proposing solutions.
- ILO – 2: Assess the impact of cognitive biases on collaborative problem-solving in interdisciplinary knowledge transfer teams.
- ILO – 3: Apply structured problem-solving tools (e.g., SCAMPER, six hats) to evaluate alternative solutions.
- ILO – 4: Use critical thinking techniques to analyze real-world scenarios in knowledge transfer.
- ILO – 5: Summarize the principles of design thinking and its relevance to solving interdisciplinary problems.

Methods & Materials

Teaching Method(s)

- Group discussions & peer feedback
- Case study
- Frontal Lecture

Required Learning Materials (during-course)

- Course slides

Additional Learning Materials

- “Thinking, Fast and Slow” Book by Daniel Kahneman
- “Calling Bullshit: The Art of Skepticism in a Data-Driven World” Book by Jevin D. West, Carl Bergstrom
- The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems by Larry J. Leifer, Michael Lewrick, and Patrick Link
- A Video on Design Thinking Process https://www.youtube.com/watch?v=_r0VX-aU_T8

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Lesson Plan

20 min	**Introduction & Icebreaker** - Introduce the session objectives and timetable. Ask participants to play an icebreaker game to get to know each other a little better. Show the list of questions on **Slide 5.** Pair participants into groups of 2 or 3 people. Ask them to pick 1 to 3 questions to talk about. Objective: the activity aims to encourage people to get to know each other.	Group discussion
60 min	**Group work: What's the problem?** Split participants into groups of 3–4 people (for small class sizes, 2-people groups would also work). Show **Slide 6** to explain the activity. 5 min. Explain the exercise 15 min. Groups work on defining the problem 5 min. Each group shares their problem definitions 20 min. Debriefing & Group Discussion (Slide 7 – 8) 15 min. Theory (Slide 9 – 14)	Group work, discussion & mini lecture
45 min	**Mini experiments about the irrational side of humans** Explain the cognitive traps when we try to make a rational decision. Depending on the time, you can run a list of various experiments to explain each concept. ***Detailed instructions can be found in the next section.***	Group exercises
15 min	**Break**	-
30 min	**Theories** on problem solving techniques, SCAMPER, Six Hats, Critical Thinking, Design Thinking *More information on course slides*	Mini-lecture & Q&A

60 min	**Case Study – The Silent Startup** This exercise could be a facilitated classroom discussion with everyone's participation. Alternatively, groups of 3 or 4 people can be asked to propose a course of action to the problem. Each group presents their proposal in the classroom. Then discussion evolves around other questions on the case study.	Case Study
10 min	**(Optional) Action Planning & Closing** - Participants create action plans to apply problem solving skills in real-life situations.	Personal reflection

Detailed Instructions for Group Activities

Anchoring Experiment: Guess the Price

1. Show the first slide of this activity (Slide 18)
The slide has only the photo, no text. Do not mention what phenomena you are going to explain at this stage. You can just mention that there will be a fun experiment.

2. Divide the class into two groups (Group A and Group B)
If virtual: send private messages, use breakout rooms, or assign groups verbally.
If in person: hand out different versions of a printed question or split the room.

3. Pose the First Question Separately. Ask everyone to write down their answers individually on paper. Make sure that the groups don't see/hear other group's question

- To Group A (High Anchor): "Does this planter & bench cost more than 40.000 EUR?"
- To Group B (Low Anchor): "Does this planter & bench cost less than 50 EUR?"

4. Change to Second Slide and Ask everyone:
What is the price of this planter & bench?

5. Reveal Their Answers for the Second Question
Then compare the two groups' average guesses — Group A usually guesses far higher than Group B, even though both were asked for the same factual estimate.

[We expect to have higher estimates from the group who received the higher anchor – Group A]

6. Debrief Questions (to discuss as a group):

"Why do you think Group A guessed mostly higher prices than Group B?"

"Did the first number in the question influence you, even though it was clearly unrealistic?"

"Where might this happen in real life? In negotiations, forecasts, evaluations?"

Framing Experiment

1. Show the first slide of this activity (Slide 21).

2. Split the classroom into 2 groups. Give a different set of options to each group. Make sure they don't see what the other group received.

- For Group 1: Option A & B
    - Option A: 20 people will be saved.
    - Option B: 1/3 probability that 60 will be saved and 2/3 probability that nobody will be saved.
- For Group 2: Option X & Y
    - Option X: 40 people will die.
    - Option Y: 1/3 probability that nobody will die and 2/3 probability that 60 people will die.

3. Ask participants to raise their hand if they choose option A or X. Then compare how the distribution is between two groups. Although Option A and Option X are basically the same, the popularity of that option is different due to how they are framed.

We expect that Group 1 chooses option A, while Group 2 chooses option Y.

4. Explain "the Framing Effect" further with the help of Slide 24.

Big Picture – Selective Attention

1. Do not show any slides. Anything you mention can work against the experiment.

2. Make sure you have prepared the video. The participants should only see the video starting from the second 00:05. Try not to show the name of the video, or the first 4 seconds.

Video link (starting from 00:05):
https://youtu.be/vJG698U2Mvo?si=mCRzRe9nsVQo8Bsi&t=5

3. Watch the video. Pause after each question, have a quick discussion.

4. Show the slide (Slide 28) about the “Big Picture” to explain the concept of selective attention.

Alternative Video for the same exercise:
https://www.youtube.com/watch?v=LW_ZVvjP_Ms

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Case Study: The Silent Startup

Background

Dr. Smith, a university professor, contacts the Knowledge Transfer Office (KTO) with a serious concern: she has discovered that her PhD student, **John**, has filed **two patent applications** and incorporated a **startup company** — all without informing her or the KTO.

John requests that the university sign a **non-disclosure agreement (NDA)** before revealing any details about the patents. After the NDA is signed and the professor has reviewed the patent texts, she confirms she is **not an inventor**. However, she expresses **strong ethical concerns**, feeling betrayed by John's lack of transparency.

The KTO was also left in the dark, **never involved** in patent filing or startup formation.

John's position	Professor's position	KTO's position
The inventions are unrelated to his PhD project. He did not use university resources. The inventions were conceived outside university premises. The university has no claim to the IP.	John's know-how comes directly from his PhD work. University labs and bibliographic resources were indirectly used. John's actions were ethically inappropriate, even if technically legal.	Still under legal review. No clear evidence yet of IP belonging to the university. Needs to assess risk, reputation, and stakeholder interests.

New Development

John’s lawyer is pressuring the university to sign an agreement urgently, as the startup is seeking investment.

The lawyer’s proposal:

- No admission to university IP rights.
- A transactional agreement with a €10,000 lump sum payment as a gesture of goodwill.

Main Discussion Question

As the leader of the **Knowledge Transfer Office**, propose a course of action. Your goal is to:

- Protect the university’s legal and reputational interests
- Manage the professor's expectations and frustration
- Allow the startup to move forward
- Maintain a constructive relationship with all parties

Alternative Discussion Questions

- What evidence do you need to properly assess the university’s IP position?
- How do you address the professor’s concerns, even if legal action is not warranted?
- Would you accept the €10,000 offer? Under what conditions?
- How do you manage the time pressure from John’s lawyer?
- Would a long-term engagement or licensing agreement with the startup be preferable?
- What policies or communication protocols could prevent similar issues in the future?