MANUAL DESIGN THINKING

IN VOCATIONAL EDUCATION

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EDUCATION ARCHITECTS

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DESIGN THINKING AS A METHODOLOGY FOR EFFECTIVE PROBLEM-SOLVING

Introductory remarks to the ‘Design Thinking in Vocational Education’ Manual

The modern world, vocational education has been facing a myriad of challenges that result from dynamic changes in the labour market, advancing digitalisation, as well as growing societal expectations. In the face of said changes, it becomes necessary not only to adapt curricula, but also- to introduce innovative working methods that will make education more flexible, practical and tailored to the needs of students and employers.

The ‘Design Thinking in Vocational Education’ manual has been created as the response to the aforementioned challenges. It offers comprehensive support for vocational teachers, educators and educational solution designers.

The potential of Design Thinking is increasingly being taken advantage of in the field of education, as design thinking is an excellent response to challenges of the modern world. It is the world, in which creativity, innovation, as well as problem-solving skills are becoming key competences.

The advantage of Design Thinking (hereinafter referred to as DT) over other methods of designing education-oriented change is the fact that it places the learner (a pupil or a student) at the centre of the process, making it possible for teaching methods to be better tailored to his or her actual needs and expectations. Said method also promotes active learning through exploration, experimentation and solution testing, rather than by means of passive knowledge acquisition. It encourages idea sharing, teamwork, and facing challenges that require critical thinking and creativity. Moreover, Design Thinking changes the way cooperation is perceived when it comes to the education process. Instead of an individualistic approach, it promotes teamwork as a method of tackling problems and, as a result, helps develop interpersonal skills such as communication, argumentation and joint decision-making. What is more, Design Thinking places great emphasis on empathy, being the ability to understand and empathise with other people's needs.

In education, it directly translates into a more diverse and inclusive approach to teaching, where different perspectives and experiences are not only accepted, but also desired. Finally, Design Thinking is an iterative process. It means that learners can gradually improve their ideas basing on previous experiences and feedback. The discussed model of education makes education more flexible, dynamic, as well as adapted to the rapidly changing conditions of the modern world.

The Design Thinking methodology also redefines the role of a teacher or an educator, who becomes more of a moderator of educational processes than a 'knowledge provider'.

Such individuals support the students' thinking process, ask questions, inspire reflection, as well as help draw conclusions, instead of providing ready-made answers. The discussed change in the teacher/educator-learner relationship fosters a collaborative educational environment in which all participants of the learning process are active knowledge creators .

With the potential of Design Thinking in mind, especially when it comes to simultaneously enriching the teaching process and developing innovative and creative competences, we have undertaken the creation of this handbook, 'Design Thinking in Vocational Education' (hereinafter referred to as the Manual), with the aim being the practical implementation of the presented methodology in the vocational education-oriented environment.

PROJECT BACKGROUND

The ‘Design Thinking in Vocational Education’ Manual has been developed as part of an international project carried out by partners from Poland, Spain and Cyprus.

The aim of the project has been to enrich the educational offer in the field of VET in the area of designing and creating educational tools and services.

This Manual has been developed in order to support teams and institutions involved in designing and implementing educational services and products in the field of vocational education. It is a practical tool allowing for implementing a new, creative, as well as empathetic approach focused on the needs of the end user. The proposed solution is based on the Design Thinking-based methodology, whose key element is the systematic consideration of opinions and expectations of diverse user groups at each and every stage of the design process.

Objectives adopted within the scope of this study are in line with the programme's priorities, in particular the horizontal one: social inclusion and diversity in all areas of education, which supports activities promoting social inclusion and respond to the needs of a wide range of audiences, including those being disadvantaged in the education market. The inclusion of the Design Thinking method in the process of creating educational tools allows for the specific needs of disadvantaged groups to be taken into consideration, which stems from the very essence of this method. It is based on close cooperation with end users, analysis of their expectations and challenges, as well as the creation of innovative solutions tailored to them.

The introduction of a tool that takes into account accessibility for people with diverse needs while at the same time developing competences in the area of sensitivity to individual circumstances of recipients into the vocational education market is in line with objectives set out within the framework of the project as well as supports the implementation of equal opportunities and social inclusion in education.

The project predominantly focuses on the following objectives:

Inclusion and diversity

by ensuring equal access to education for all students, regardless of their background, social status or life-specific situation, the project contributes to improving social cohesion and reducing educational exclusion.

Increase of the attractiveness of the vocational education and training (VET) sector

by implementing modern teaching methods, such as Design Thinking, the project contributes to improving both the quality and dynamics of the educational process, making it more adapted to changing needs of the labour market.

Adjustment of the VET-related offer to the needs of the economy

the development of vocational education programmes takes into account a balanced set of skills adapted to all economic cycles, changing work patterns, as well as the growing importance of key competences.

The Design Thinking method, which is the basis of the approach taken advantage of within the scope of the project, focuses on designing educational services tailored to the needs of the recipient, taking into account such elements as: human-centred design, prototyping culture , storytelling, and radical collaboration between the service creator and the recipient. A key aspect of this method is building empathy on the side of both the educator (a teacher or a trainer) and the learner (a recipient) through continuous solution testing , consultations with users, and systematic consideration of feedback.

Said approach leads to the development of a wide range of key competences, including: learning how to learn, mastering civic and social competences, learning entrepreneurship, initiative, cultural awareness, expression. The aforementioned competences are the foundation of effective functioning in the labour market. They also directly translate into the ability to adapt to dynamic economy-specific changes.

As a result, the Design Thinking process described in the Manual enables the creation of an open and participatory educational environment, in which the creator of the educational process remains in constant contact with the recipient. What is more, the teaching process itself becomes inclusive and attractive, predominantly due to the factual participation of recipients in shaping the educational offer. The result of implementing the Design Thinking approach is a trainer designing educational services basing on factual needs of participants and a teacher who actively engages students in the learning process.

The partnership between organisations from different European countries has allowed for the exchange of knowledge, experience and good practices, which has in turn contributed to the creation of a comprehensive tool supporting teachers in the teaching process.

From the international cooperation-oriented point of view, the Manual not only addresses educational needs at the local level, but also takes into account European educational priorities, which form the foundation of the entire project. It highlights how empathy, creativity and innovative approaches can help create more inclusive, attractive, as well as effective curricula. It offers support to VET teachers and educators, enabling them to design classes that not only take into account needs of individual students, but also enhance the prestige of vocational education and develop key competences that may be of use in the future.

We would like to encourage readers to discover possibilities offered by the design methodology, as well as to become inspired and use it creatively in their everyday educational practice. We are convinced that Design Thinking offers a wide range of techniques and tools that can be applied in a variety of educational cases, both while working with students directly and while designing curricula or education-related processes.

Importance of Design Thinking in vocational education

Design Thinking (hereinafter referred to as DT) is an innovative approach that focuses on people, especially – on their needs, expectations and aspirations. In vocational the case of education, the application of this methodology allows for a better understanding of students, designing more personalised educational paths and developing key competences, such as creativity, critical thinking, as well as the ability to work in a team. The Manual shows how DT can be a tool for reducing the gap between education and the labour market, while at the same time supporting an inclusive and diverse approach to teaching.

In the context of vocational education, the use of DT allows for:

- Better understanding of students' needs: Through an empathetic approach, teachers can develop curricula and educational environments that better meet students' expectations and aspirations.
- Development of key competences: The DT process promotes creativity, critical thinking and collaboration-oriented skills, which are essential in today's labour market.
- Innovation in teaching: Transferring DT methodologies from business to education introduces innovative teaching methods, increasing the attractiveness and effectiveness of vocational education.

Target groups
This Manual is chiefly aimed at two main groups of recipients, namely:

Educators, trainers and educational tool developers – individuals who create training programmes, applications, games, as well as other solutions to support the teaching process in their daily work. The publication aims to provide them with inspiration and specific tools that can be utilized in their attempts to design educational products, processes and services, especially in non-formal education contexts.

Vocational education teachers – individuals working in the VET education system, including professionals working with young people and adults in the field of vocational education on a daily basis. The Manual offers said group practical guidance on how to incorporate innovative working methods into their everyday teaching.

→ The Manual has been designed in such a way that both groups can find content tailored to their specific needs in it. The structure of the publication is divided into theoretical and practical sections, which allows for its flexible use, depending on the context of work.

Purpose of the publication

The main purpose of this publication is to support teachers and designers of innovative educational solutions when it comes to adapting the Design Thinking methodology to specific needs of vocational education and training (VET). This publication has been developed as a practical guide to Design Thinking, which not only introduces the theoretical foundations of design thinking, but - above all else - provides practical tools that can be taken advantage of in everyday educational work. By presenting design methods, techniques and tools, the Manual aims to help teachers introduce the discussed innovative methodology into vocational schools and support them in designing creative and engaging forms, methods and teaching programmes.

We would like the Manual to be a response to growing challenges of contemporary vocational education. In this context, its first specific objective is to facilitate the implementation of Design Thinking in vocational education processes. Even though it is widely used in various industries, this methodology is still not commonly used in vocational education. Due to said fact, the publication aims to provide teachers and educators with specific tools and guidelines enabling them to adapt the discussed methodology to the context of their classes. From presenting the basic principles of Design Thinking, through practical applications, up to examples of specific exercises and tools, the Manual aims to make it easier for teachers, educators and trainers to incorporate design tools into their everyday teaching practice.

The second important specific objective of the Manual in question is to increase the attractiveness of vocational education in such a way to better adapt it to changing requirements of the labour market. The modern labour market requires employees not only to possess specific technical skills, but also – to be equipped with the ability to solve problems creatively, think critically and work in a team. The 'Design Thinking in Vocational Education' Manual shows how - by means of incorporating design practice into teaching processes - it is possible to increase students' engagement by creating classes that not only develop professional skills, but also prepare them for the challenges that the upcoming future may bring.

Vocational education faces various challenges resulting from a rapidly changing labour market, technological transformation and growing employer-oriented requirements. A key problem when it comes to the discussed form of education is the need to flexibly adapt curricula to changing industry and technological standards. Traditional approaches often fail to keep up with the speed of modern change, leading to a gap between skills of graduates and real needs of the labour market. Thanks to its iterative nature and focus put on user-specific needs, Design Thinking allows for better identification of said changes and the creation of more flexible and adaptive curricula that can be regularly improved basing on feedback from employers and students.

Additional challenge while taking vocational education into consideration is the development of social skills (or the so-called 'soft skills'), such as cooperation, creativity, communication, and problem-solving. They are increasingly seen as key skills in almost every industry. Traditional vocational education tends to focus on developing technical skills, while at the same time 'neglecting' the development of social skills. Design Thinking, as a methodology focused on teamwork, empathy, critical thinking, as well as creativity, naturally supports the development of social competences.

An equally important challenge while discussing the specificity of vocational education is the need to prepare students to work in diverse environments and to manage diversity, which is increasingly becoming the norm in the global economy. Traditional teaching methods tend to overlook the development of skills required to understand other perspectives and work in diverse teams. Design Thinking not only teaches how to manage such teams, but also shows how to benefit from diversity.

Finally, vocational education must prepare students for a future in the case of which uncertainty and the need for continuous learning become the norm. As an iterative and flexible process, Design Thinking helps students develop adaptability, openness to change, as well as the ability to seek solutions in an independent manner. The aforementioned are key competences in the era of technological transformation and rapid changes in the work environment.

In the context of the challenges faced by vocational education as such, Design Thinking is becoming an extremely valuable tool that can take vocational education to a new level of development, making it more adapted to contemporary realities and both needs and expectations of learners and employers. Learners can begin to perceive learning as an active process that is closely linked to their future career path, whereas employers can see vocational education as a process that meets the requirements of the modern market and the specific nature of particular industries. Due to said fact, Design Thinking can become a bridge between education and the labour market, supporting the development of future professionals and increasing the competitiveness of the economy.

Manual structure

In order to fully meet the needs of both groups, the structure of the Manual has been carefully planned. It has been divided into two main parts. The first part introduces the reader to the basics of the Design Thinking methodology, explains key concepts and assumptions of design thinking, as well as discusses individual stages of the Design Thinking process and touches upon benefits of utilizing it. Its purpose is to familiarise the reader with the essence of design thinking as a method of effective problem solving.

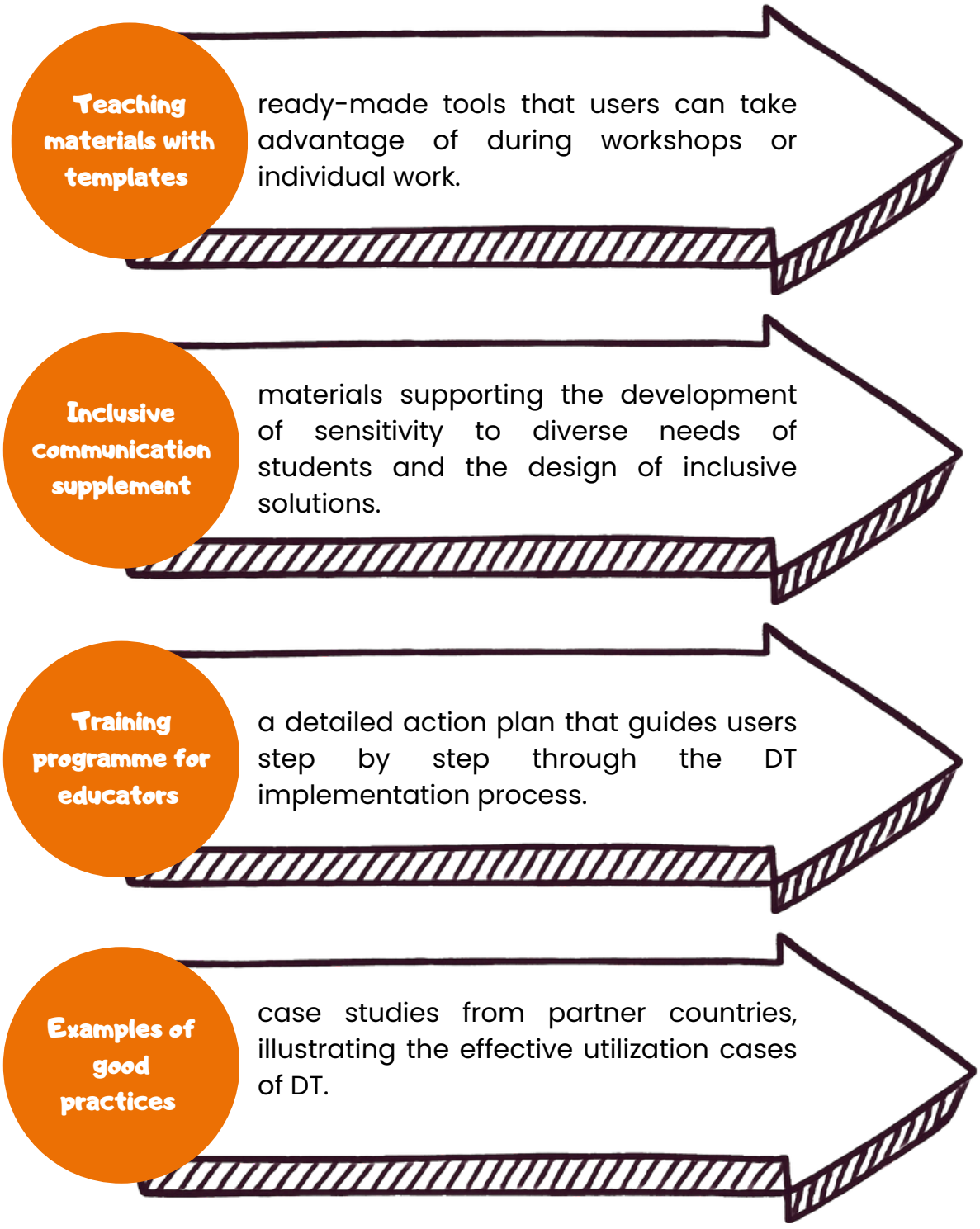
The second part of the publication in question focuses on a detailed discussion of the stages of Design Thinking. It is oriented towards presenting techniques and practical design tools that can be immediately used in educational activities. Each subchapter of this part contains a description of individual stages of Design Thinking: empathize, define, ideate, prototype, and test. The chapter on empathy focuses on gaining a deep understanding of users, their needs and context, as well as opting for techniques such as interviews, observations and empathy maps. It emphasises the importance of diverse perspectives and iterative approach to exploring experiences, which is the foundation of the design process. The section devoted to definition describes methods for collecting and analysing data that can be taken advantage of to precisely identify the problem and formulate the design challenge in a clear and user-centred way. The section dedicated to ideation encourages creative thinking through the utilization of creative techniques and tools, making space for innovative ideas. Prototyping is an experimental phase in which preliminary versions of solutions are created and tested, with improvements being made basing on the test results. Said section describes principles of prototyping and most commonly used methods of creating prototypes. The last chapter of the second part of the Manual is oriented towards the testing phase. It describes how conducting research on solutions with the participation of users enables the refinement of products and services in response to their real needs.

While working on this manual, we have been guided by the need to create practical material that would provide factual support in designing educational processes and solving real-life challenges. Each chapter has been developed in an accessible and structured manner so that the recipient can easily implement what he or she has learned in his or her daily work.

At the end of each chapter, there is a ‘Knowledge in a nutshell’ section. It is a short, practical summary of the most important content, together with practical application examples that will help the reader translate theory into practice.

Additional materials

Techniques, tools and suggestions for specific applications of Design Thinking principles are considered to be integral parts of the Manual, which makes it a practical guide for anyone who wants to implement the discussed methodology in their educational activities:



Accessibility of content for both target groups

The manual has been designed in order to meet the needs of both main target groups:

- Vocational education teachers will find detailed instructions and exercises that they can directly implement in their teaching endeavours.

- Educators, trainers and developers of educational tools will be able to take advantage practical examples, techniques and explanations to help them create modern educational solutions.

The 'Design Thinking in Vocational Education' Manual creates space for discovering new possibilities and creative use of the methodology in everyday vocational education. Its aim is not only to transfer knowledge and specific techniques or tools useful in education, but also to inspire the VET sector to take up the challenges of the transformation of vocational education. The Manual in question encourages experimentation and adaptation of educational processes to changing educational challenges. In this context, Design Thinking can become an effective tool when it comes to creating innovation in vocational education, bringing a new, more flexible, as well as engaging approach and solutions to this area.

Glossary:

Manual – this'Design Thinking in Vocational Education' Manual

DT – Design Thinking

VET teachers – individuals who work with young people and adults in vocational education on a daily basis.

Educators, trainers, creators of educational tools – individuals who create training programmes, applications or other educational solutions; all individuals involved in the creation of new educational processes, products and solutions.

VET (Vocational Education and Training) – vocational education and training, covering various forms of learning aimed at preparing participants for a specific occupation, improving their professional qualifications or retraining. VET combines theoretical learning with practical skill acquisition, responding to the needs of the labour market and supporting the development of professional, personal and social competences that are vital to function in a dynamically changing employment-oriented market.

SEN (Special Educational Needs) – they refer to situations in which a student needs individualised support in the learning process due to his or her diverse needs, developmental characteristics, health status, or other individual circumstances. Said support may include, among other things, adapting teaching methods and materials, providing professional assistance, as well as creating an accessible and friendly educational environment, so as to allow everyone to participate fully and equally in education and develop their own potential.

Glossary:

Iterative – should be understood as an approach based on the gradual improvement of solutions through the repeated repetition of specific stages of work. In an iterative process, each subsequent version of a solution is based on experience and feedback from previous stages. Said approach makes it possible to systematically adapt designed tools, services or products to actual needs of users. Iterativity is one of the key elements of the Design Thinking method, enabling the creation of effective, functional, as well as user-friendly solutions.

Social facilitation – in the context of this publication, it is treated as a psychological phenomenon whereby the presence of other individuals as observers or co-participants influences the level of task performance by an individual. This influence is considered positive in the area of DT and results in higher quality of work, level of engagement and ultimately - better results being achieved.

Augmentative and alternative communication (AAC)

A set of methods, tools and technologies supporting or replacing speech and writing in the case of individuals who have difficulty communicating verbally. AAC includes both simple strategies (such as gestures, pictures, and communication boards) and advanced technological solutions (such as speech-generating applications or eye-controlled communication devices).

AAC can serve as:

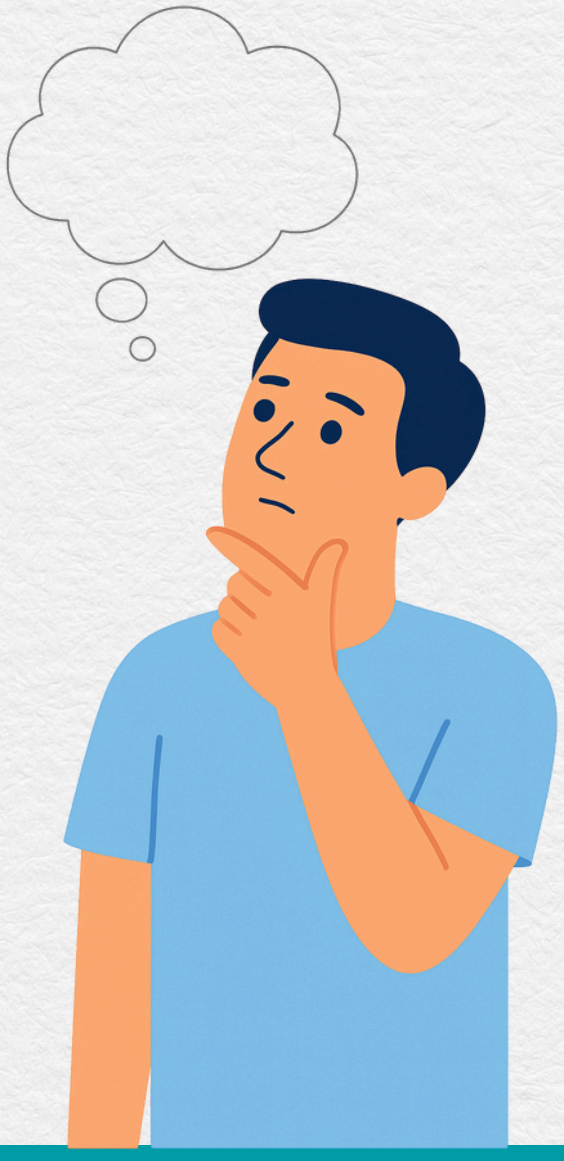
- an alternative – when it completely replaces speech (e.g. in non-speaking individuals),
- an augmentive – when it complements speech (e.g. in individuals with articulation difficulties).

It is used, inter alia, while working with individuals with aphasia, autism, genetic syndromes, neurological damage, or other forms of communication difficulties.

Chapter 1

1. DESIGN THINKING AS AN EFFECTIVE PROBLEM SOLVING METHODOLOGY

HOW TO UNDERSTAND DESIGN THINKING? A FEW WORDS ABOUT THE NATURE OF DESIGN THINKING



1.1 Why is designing an effective way to solve problems?

Have you ever wondered why design is such an effective way to deal with certain problems? It all starts with those problems. Here is something people have always been doing: they have been trying to find solutions to difficult situations. You know what? Difficulties are not just moments that annoy us. They are also moments that force us to think and act.

In fact, a positive approach to problems can bring many benefits. In addition to helping us solve them, it also allows us to better understand how the world works. What is even more important, it creates new possibilities for us.
In said sense, problems can be seen as challenges. Design, which is one of the tools for solving problems, becomes a way to use our creativity and drive our development.

What is Design Thinking exactly? It is nothing more than a way to change reality. It is shaping the world in a specific form, improving people's lives by transforming the environment around them.

Design has the form of both thinking and doing. It is a way of formulating questions and answers that leads to positive changes. Howeer, it is also a specific process that requires to take certain actions to solve problems.

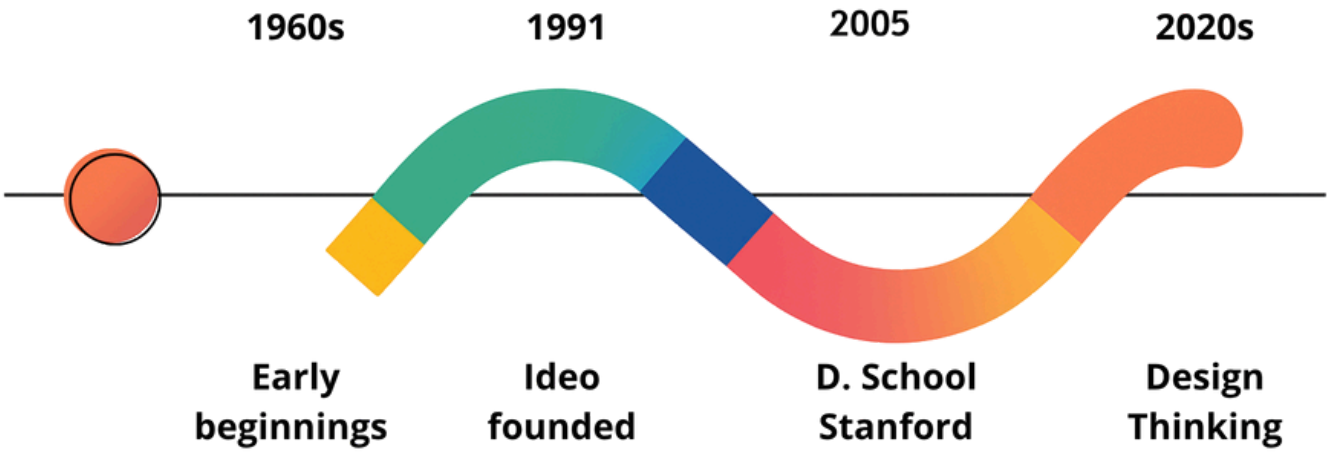
What really makes Design Thinking so unique? It is the fact that it not only helps us deal with problems, but also gives meaning to our reality. It is also a way to understand people's needs and adapt to them.

Design Thinking is not just a technical activity, but also a philosophy of life. It is a way of thinking that makes us active creators of our environment that ready f or changes benefiting both ourselves and others.

1.2 What is Design Thinking?

Design Thinking is an approach based on empathy, creativity and problem solving. It is a method that takes advantage of design tools to deal with various challenges in fields of both business and society. Moreover, it also has a wide range of applications in education.

A brief history of Design Thinking. Even though the history of design thinking began in the 1960s, the popularity of this method dates back to the end of the 20th century and the beginning of the 21st century, predominantly - to the establishment of the IDEO consulting and design company (1991) and creation of a design institute at Stanford University called d.school (2005). The development of design thinking during this period was primarily associated with two brothers, Tom and David Kelley. The 'design thinking' term was coined by Tom Kelley, CEO of IDEO, which was founded by his brother, David.



What exactly does Design Thinking mean? It is troublesome to define it unequivocally. It can be described as a method, a set of principles, or even an art. In short, it is an approach that combines analytical thinking with creativity in order to solve problems.

Design Thinking focuses predominantly on people, namely – on understanding and meeting their needs. It is an empathetic approach that takes the user's perspective into account. Nevertheless, it is also important that Design Thinking aims to achieve concrete results by solving real problems. The effectiveness of actions is measured by the satisfaction of people's needs, technical feasibility and economic viability.

Design Thinking is considered to be an open methodology that can be used by people from different fields to solve virtually any problem. It emphasises learning by doing, collaboration and participation at every stage of the design process.

The Design Thinking-oriented process is characterised by non-linearity and creativity. It is a search for innovative ways to solve problems by means of opting for creative techniques and tools. Therefore, Design Thinking is not only a method of problem solving, but also a way to inspire innovation and creative thinking.

All the aforementioned factors make Design Thinking an extremely useful tool when it comes to both the business world and solving social problems. It is a creative approach that gives people tools to create innovative solutions by focusing on specific problems and human needs.

1.3 Design Thinking: A new approach to design

Design Thinking brings with it the courage to experiment, break conventions and be open to innovation. It is not just a set of rules, but rather – a completely new paradigm for creating both technological and social innovations.

Tom Kelley describes Design Thinking as a mixture of different methods, procedures, cultures, and tools that together form a specific 'design mosaic'. Said mixture makes Design Thinking unique. It combines spontaneity and imagination with rationality and analytical thinking, making it possible for a better understanding and fulfilment of human needs.

What is even more, Design Thinking is a movement forward. It is a transition from creating products to designing human relationships and solving social problems. It focuses on social integration, diversity of needs, as well as the entire spectrum of human capabilities.

It is more than a design method. It is a true revolution in the approach to design. Design Thinking rejects conventional frameworks and opens the door to experimentation. It allows for the creation of new, innovative solutions focused on each potential recipient, who becomes an active and important participant in the entire process, therefore becoming a creator himself or herself. In this way, we can transform the social world and human relationships towards full integration.

1.4 Design thinking: Focus on people

Design thinking is an approach that emphasises understanding human needs and aspirations. It focuses on creating solutions from a human perspective. It means that the design process takes into account how people think, feel and act.

Human-centricity, or focusing on individuals, is a key element of Design Thinking. It is a belief that most of problems we encounter are human-specific problems. Therefore, an empathetic approach and understanding of people's needs at every stage are crucial in the design process.

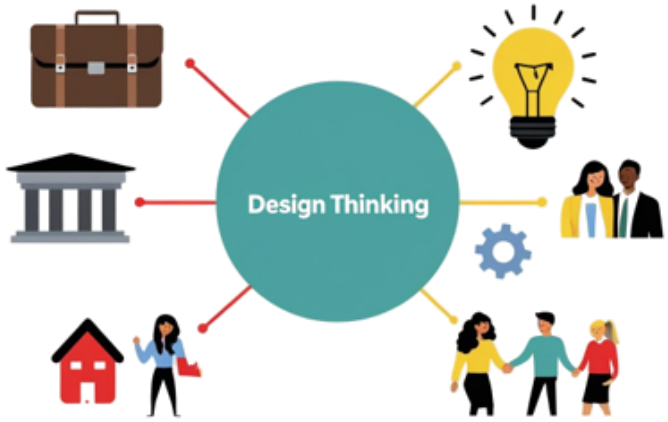
Empathy plays a key role when it comes to Design Thinking. It is not just about asking people about their needs, but also about putting oneself in their shoes. **Human-centred design aims to create solutions that not only meet users' needs, but also provide them with a positive experience.**

Customer centricity, or focusing on customer needs, is an integral part of Design Thinking. Said approach focuses on meeting customer needs by providing them with valuable solutions. Thanks to Design Thinking, it is possible create innovations inspired by people and developed for people.

In summary, Design Thinking is an approach that puts people at the centre of the design process. It focuses on empathy, understanding user needs and creating solutions that truly serve him or her. It makes design more effective and efficient, and allows people to enjoy better products and services.

1.5 What is design thinking for?

Design thinking is an approach that was originally developed in the field of design. Nevertheless, today it permeates almost all areas of life. It is a universal problem-solving method that can be utilized by both professional designers and individuals from outside said field.
Design Thinking is based on creativity, collaboration and empathy, making it a useful tool in a variety of situations.
Where exactly can design thinking be used? The discussed method can be applied practically anywhere – from business to education...and even in private life. Entrepreneurs, civil servants, teachers, and private individuals can take advantage of Design Thinking to create innovative solutions in various areas, such as products, services, communication, and interpersonal relationships.
Why is it worth using Design Thinking? First and foremost, because the method in question helps better understand user needs, use resources more efficiently, eliminate errors more effectively, as well as improve interpersonal relationships. Design Thinking can increase people's engagement, make better use of their knowledge and skills, and democratise both processes and activities.



In summary, Design Thinking is an extremely useful tool in today's world, in which the demand for innovative solutions is constantly growing. It is a universal method that can be applied virtually anywhere where creative thinking and problem solving are needed.

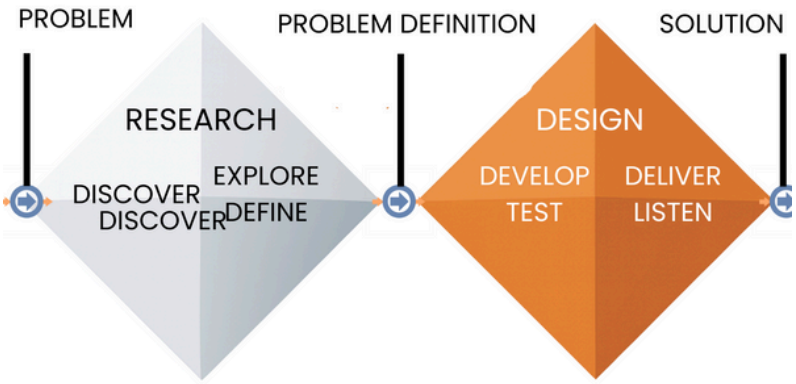
Design Thinking is an open, exploratory process that focuses on creative approaches and unconventional solutions. Therefore, it is not suitable for situations where a precise goal and predictable results are of utmost importance. In processes that require careful planning and certainty of results, Design Thinking may turn out to be insufficient.
It is worth keeping in mind that Design Thinking may be effective in solving problems that are more open-ended, multidimensional, and require a creative approach. Nevertheless, while dealing with a technical problem that has a clear solution or requires a specific method, it may be worth opting for more traditional approaches. It is vital to understand the specifics of the problem and select the right method to solve it.

1.6 Structure of the design thinking process

Design thinking is a process. It means that it consists of a specific sequence of activities that are carefully planned and focused on achieving a desired goal. Design Thinking can be essentially explained as a continuum of interconnected steps.

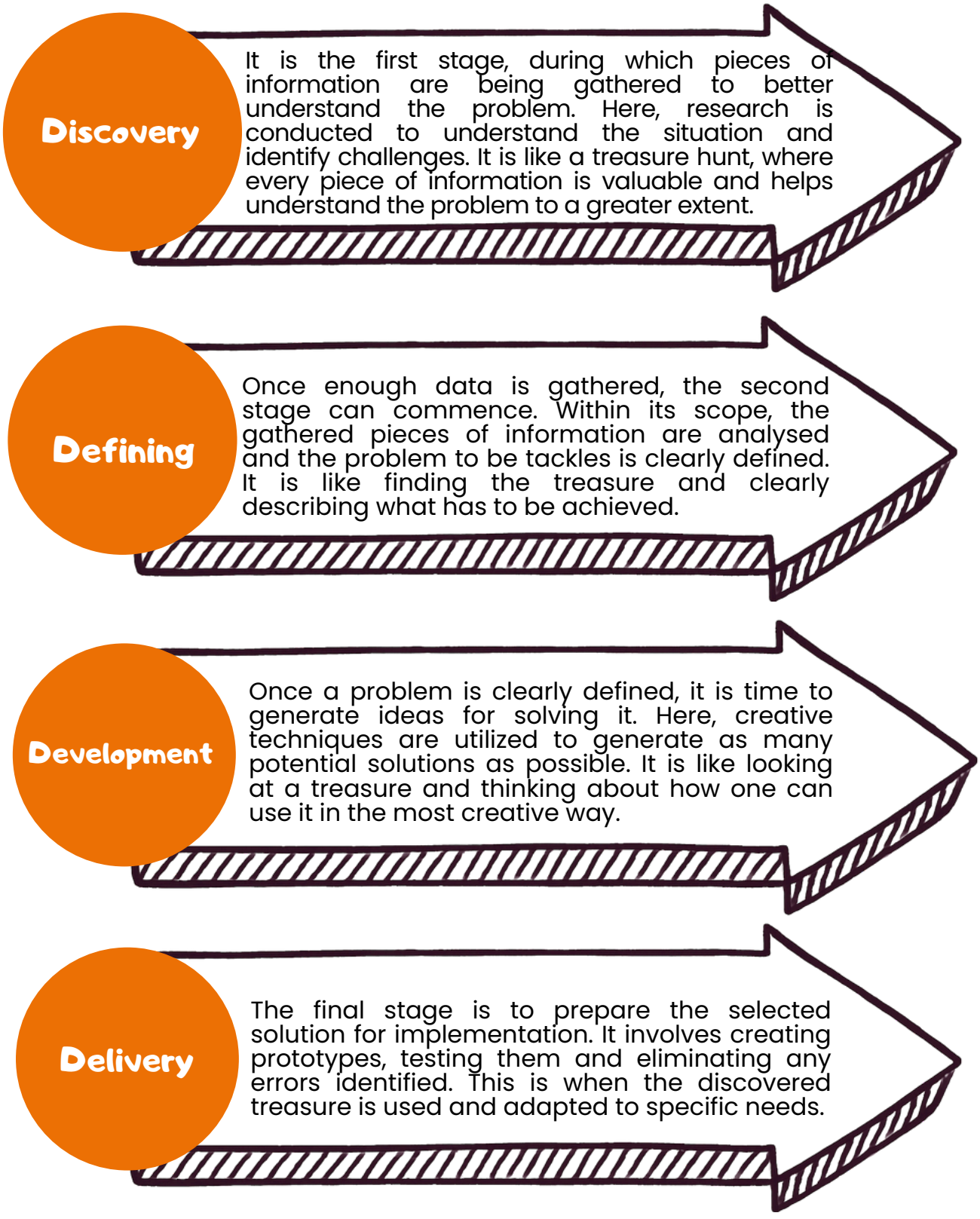
There are different models of Design Thinking, each of which can be useful in specific contexts and utilized for specific purposes.

The Double Diamond model and the Stanford School Design Thinking model are just two of numerous examples.



The Double Diamond model, created by the Design Thinking Council of the United Kingdom, focuses on two main phases: understanding the problem (discovering) and generating solutions (developing), with each phase being divided into two parts: 'understanding the context' and 'understanding the users', followed by 'generating ideas' and 'testing and implementing'.

The Double Diamond model is a way to understand and organise the design process. It divides specific activities into four parts: discovery, defining, development, and delivery. It serves as a map, helping navigate the stages of the project.



The design process also involves a dynamic movement between divergent (expanding) and convergent (narrowing) thinking. It is like travelling between different points on a map, where sometimes one looks for new ideas and other times one chooses the best solution from all the options. Said divergence and convergence form the beating heart of the design process.

On the other hand, **the Design Thinking model by Stanford School** consists of five main phases: empathy, definition, ideation, prototyping, and testing. The discussed model emphasises a deeper understanding of user needs (empathy phase), precise problem definition (definition phase), exploration of multiple creative solutions (ideation phase), iterative prototyping (prototyping phase), as well as testing and iterative refinement of these prototypes (testing phase).

Adequacy for project objectives: The Stanford School model may be more appropriate if the project objective is to gain a deep understanding of the problem and develop specific solutions through an iterative process of prototyping and testing.

T**eam experience and knowledge**: If the team working on the project is more familiar with the Stanford School model or has experience using it, it may be more effective in practice.

Compliance with industry standards: In some industries or organisations, the Stanford School Design Thinking model may be more recognisable or widely used, making it the preferred choice for projects.

It is also important to remember that there are other Design Thinking models that may be equally effective in different contexts. It is vital to choose the one that best fits the goals and needs of the project and the capabilities of the team.

Basing on the pieces of information presented above, it is possible to better justify choosing the Stanford School model as a reference point in our handbook, as we consider it to be the best fit for our target audience and project-specific objectives. It focuses on gaining a deeper understanding of user needs, defining problems precisely, and utilizing an iterative process of prototyping and testing, which is in line with our needs and the capabilities of our team. Moreover, the team's familiarity with this model ensures that we will be capable of implementing it effectively, leading to the best results.

1.7 Design Thinking discussed step by step

The Design Thinking process consists of various stages that guide designers in their work. Said stages serve as a guide, showing what needs to be done during the design process. They are not rigid and can be adapted to the specific needs of the project. There are different methods used when it comes to Design Thinking, but in general, the process can be divided into five main stages.

Empathize: At this stage, we try to understand the people we are designing the solution for. We analyse their needs, goals and problems in order to better understand which solutions might be most useful to them. It is like stepping into someone else's shoes and seeing the world from his or her perspective.
Define: Once we understand the people we want to help, we define a specific problem we want to solve. We determine what we want to achieve and what our goals are. It helps us focus on a specific task and set the direction of our actions.
Ideate (Idea): Now, it is the time to generate ideas. We utilize various creative techniques, such as brainstorming, to come up with as many different solutions to our problem as possible. There are no bad ideas. The goal is to be as creative and flexible as possible in our thinking.

Prototype: Once we have a few ideas, we move on to creating prototypes. These are preliminary versions of our solutions that allow us to see how they may work in practice. Prototyping helps us identify what works, what does not, and what can be improved.
Test: The final stage is to test our solutions with real users. We want to see how they react to our ideas and whether they find them useful. It allows us to find out what can be improved and what changes have to be made to make our solution even better.

Said stages create a design loop in which we can return and modify our ideas based on new information and experiences.

It is a flexible process that encourages experimentation and learning from our mistakes. This way, we can create better and more innovative solutions.

The Design Thinking method can be an effective tool for solving various problems in the field of education. Below, there are a few examples:

1. **Improving student engagement:** By using Design Thinking, teachers can better understand needs and interests of their students, leading to more engaging and personalised learning experiences.
2. **Developing innovative teaching methods:** Design Thinking can help develop innovative and creative teaching methods that respond to contemporary challenges and student needs better.
3. **Solving infrastructure problems:** Design Thinking can also be taken advantage of to solve infrastructure problems in schools, such as the lack of access to appropriate educational resources, classroom space issues, or time management.
4. **Designing educational tools:** Design Thinking may be utilized to design modern educational tools, such as mobile apps, e-learning platforms or interactive teaching materials, which can in turn facilitate the learning and teaching process.
5. **Improving experience:** Design Thinking can also be used to improve one's experience, for example by designing better training programmes, creating tools to support management in education, or providing resources for self-development.

In every case, the key element is empathetic understanding of the needs of users (students, teachers, school staff, etc.), as well as iterative testing and adaptation of solutions based on their opinions and reactions.

1.8 Certain principles of design thinking

Design Thinking is an approach that puts the user at the centre of the design process. There are five key principles that define the priorities of design thinking:

1. **Human-centredness:** Said principle emphasises understanding the needs and perspectives of the user. It means that in the design process, it is crucial to empathise with the user's perspective on the problem. Solutions designed should meet their needs. In practice, it means that designers strive to identify and understand the real needs and expectations of the people for whom the products or services are being created.
2. **Learning by doing:** Design Thinking is an approach that teaches through action rather than via theoretical reflection. It assumes that experience is more important than theory. In the course of design process, mistakes and failures are an integral part of the process and a source of learning. Designers experiment, test different ideas and learn from their own experiences, which leads to better solutions.
3. **Collaboration:** Collaboration is a key principle of Design Thinking, emphasising the importance of teamwork and the exchange of different perspectives. In the course of design process, it is crucial to combine the knowledge and experience of different people, as well as to foster a culture of collaboration. Working together allows for the use of diverse skills and ideas, which in turn promotes the creation of innovative solutions.
4. **Acceptance of mistakes:** Mistakes are inevitable when it comes to design processes. Design Thinking promotes the acceptance of mistakes as an integral part of learning and improving solutions. Designers understand that making mistakes is a natural part of the process and that they offer an opportunity to improve the design. It is important not to be afraid of making mistakes, but to treat them as valuable sources of learning.
5. **Asking questions:** Asking questions is a key part of the design process. Questions help understand the problem, challenges, and user needs. They are tools that translate into the search for innovative solutions. Designers ask questions to delve into the essence of the problem and find best solutions possible.

Principles of design thinking help designers create effective solutions focused on user needs. By understanding users, experimenting, collaborating, accepting mistakes, as well as asking questions, they can can develop innovative products and services that truly meet user needs.

1.9 Design Thinking and vocational education

Design thinking and skill development: Design Thinking is a creative problem-solving methodology that helps develop skills that are desirable in almost all areas of life. The ability to work in a team, solve complex problems, think in a creative manner, communicate effectively, and think analytically are key competencies acquired through Design Thinking. It is clear that they can be beneficial in education.

D**esign thinking and vocational education:** Due to its specific nature, Design Thinking may become not only a way to improve the educational process, but also a tool allowing to increase the effectiveness of educational activities.

Thanks to Design Thinking, educational processes can be planned better, interesting lesson scenarios can be designed, as well as engaging teaching tools can be created. Design Thinking is also suitable as a tool for improving communication between all participants of the educational process. By properly identifying students' needs and expectations, followed by actively involving them in the educational process, Design Thinking can also help increase their engagement. In addition, it can be used to improve the activities of educational institutions (improving the organisational culture of educational institutions, companies and organisations creating products for the VET sector).

Design Thinking may benefit everyone involved in the education system. Thanks to Design Thinking, teachers can guide their development better, increase their creativity and organise their work in a more efficient manner. Students receive a better educational offer and gain a sense of agency, the right to learn from mistakes, and become accustomed to diversity, which is the basis for development and innovation. What is more, they strengthen their key competences. Education administrators gain an effective tool for managing the education system and a source of inspiration for implementing changes that take into consideration needs of as many participants as possible.
Schools can create more equitable and inclusive environments for all students by supporting the skills and mindsets developed through Design Thinking. The approach in question allows for utilizing technology better, accelerating creative tasks and helping bridge the digital divide.

Design Thinking and skill development: Design Thinking not only helps with creative problem solving, but also supports the development of many vital skills. These skills are important in many areas of life, including education. Below, ways in which Design Thinking can help develop various skills are briefly discussed:

Creativity:
Design Thinking promotes creative thinking and innovative approaches to problem solving. Students are granted the opportunity to experiment with new ideas and solutions, which stimulates their creativity in the learning process.

Problem-solving skills:
The Design Thinking process focuses on identifying problems and developing effective solutions. It teaches students how to approach difficult situations and develop effective problem-solving skills.

Interdisciplinary thinking:
Design Thinking encourages combining different fields to find comprehensive solutions. It in turn promotes interdisciplinary thinking, helping students understand how different areas of knowledge can be related.

Engagement in the learning process:
Participating in the design and problem-solving process makes learning more engaging and meaningful. Students see that their efforts have an impact on real-world problems, which increases their motivation.

Empathy:
Design Thinking assumes that solutions should take into account needs and perspectives of users. Therefore, it promotes the development of empathy for others, which is valuable when it comes to establishing relationships and understanding diversity.

Flexibility in adapting to change:
In today's rapidly changing world, education must be flexible and adaptable. Design Thinking teaches rapid adaptation and iteration, which are essential in a dynamic educational environment.

Collaboration:
The Design Thinking process often relies on collaboration and interaction between students, teachers, as well as other stakeholders. It develops interpersonal and communication skills that are important in social and professional life.

Innovation:
Design Thinking can help educational institutions introduce innovative teaching methods and tools that better meet the needs of students and are adapted to contemporary requirements.

Practical skills:
In the course of the Design Thinking process, students work on projects that have a real impact on their environment. It develops their practical skills and prepares them for life outside school.

Development of different learning styles:
Design Thinking can be adapted to different learning styles, allowing for a more personalised approach to education and the development of different skills in students.

Design Thinking and education: Due to its specific nature, Design Thinking may become not only a way to improve the educational process, but also a tool for increasing the effectiveness of educational undertakings carried out. Design thinking can positively impact education in many areas, as it:

Encourages personalised learning:
By means of opting for Design Thinking, teachers amy create personalised learning environments tailored to the individual needs of students. For example, a teacher can design different learning paths that take into account differences in learning pace and styles.

Helps create better educational tools:
Design Thinking allows for the development of more efficient and engaging educational tools. Educators can design games, apps, educational materials, and classes that are more engaging and effective.

Promotes critical thinking skills:
The process of Design Thinking promotes critical and analytical thinking. Its participants can learn to analyse problems, create solutions and evaluate their effectiveness.

Develops soft skills:
Design Thinking develops soft skills, such as creativity, empathy, communication and collaboration. They are important in everyday life and at work.

Provides tools for solving social problems:
Design Thinking can be utilized to solve social problems. Its participants can design solutions for their community or the world, learning how to influence positive change.

Supports the creation of innovative curricula:
Design Thinking may help create innovative curricula that prepare students for the demands of today's job market better. Curricula can, for example, focus on developing digital skills, entrepreneurship or problem solving.

Increases engagement:
The Design Thinking process can boost engagement in learning, as it allows students to work on projects that are more meaningful and tailored to their specific needs or aspirations.

Improves the management of educational institutions:
Design Thinking can be used to solve problems related to the management of educational institutions. It may help optimise work schedules, improve communication or streamline administrative processes.

Develops entrepreneurship:
Design Thinking can help develop entrepreneurial skills in participants by encouraging them to develop their own projects and ideas.

Prepares for change:
Design Thinking teaches flexibility and adaptation. Its participants can learn how to navigate a changing world and adapt to new challenges.

All the aforementioned benefits make Design Thinking a useful tool when it comes to modern education systems. It can help participants develop skills and competences they need to succeed in the upcoming future. It can also support teachers in organising the educational process. As for education administrators, it can help create a supportive learning environment.

Design thinking is a tool allowing for creating a new culture of learning.
Designing an education system is a challenge requiring an innovative approach and the complex utilization of the potential of its participants. In a global and technologically advanced economy, learners are no longer passive recipients of information, but active, equal creators and creative users who should be involved in both acquiring knowledge and using it to develop new solutions. Democratised access to information granted by the Internet allows and requires the recognition of the equal rights of all participants to participate in shaping and being part of the system. It requires the introduction of cooperation instead of competition in education, equal appreciation of diversity instead of ranking and hierarchisation, as well as the recognition of the role of mistakes and failures as essential elements in the pursuit of innovative solutions. It can all be identified when it comes to Design Thinking.
The education system must adapt to new challenges and social needs. Its task is to prepare students to respond effectively to change and solve contemporary problems.

The role of design thinking in positive educational change:

Design Thinking can become a key tool when it comes to the positive transformation of the education system. Learning through action, creativity, collaboration, and focus on user needs are principles that can provide a new impetus for education development.
The application of Design Thinking while creating educational change can help create a new educational culture. Schools may transform into learning communities and teachers may become mentors and guides to knowledge.
Design Thinking has the potential to transform the VET system, making it more flexible and responsive to contemporary challenges. The use of creative thinking and innovative approaches may open up new development opportunities for participants of the education system and adapt it to the needs of the modern world.

SUMMARY

1.1. Why is designing an effective way to solve problems?

Have you ever wondered why design is such an effective way to deal with problems?

It is caused by the fact that at the heart of every design process lies a need. Needs often arise from difficulties we encounter. Problems are part of life – they can be annoying and frustrating, but they are also a source of progress. They force us to think, act and seek solutions.

Instead of treating them as obstacles, it is worth starting to see them as challenges – opportunities to learn and innovate. The discussed approach can help better understand the world and open oneself up to new possibilities.

Design Thinking (design thinking) is a way of working with problems that not only leads to specific solutions, but also allows to better understand other people's needs. It is a creative tool, but also a deeply human one.

Designing is thinking and acting at the same time. It is asking questions and looking for answers. It is **a process that produces real results:** new ideas, better products, greater user satisfaction.

What makes Design Thinking unique?

The discussed approach combines creativity with empathy and focuses on people, not just on technology. It teaches us to listen, observe and test before making a final decision. It allows to create things that are truly useful – not just in theory, but in practice.

It is worth remembering: Design Thinking is not just a problem-solving method. It is **a philosophy of action** that changes the way we approach everyday challenges: at work, at school, and in personal lives.

The example of Design Thinking in vocational education – hairdressing expert:

At a vocational school for future hairdressers, teachers decided to introduce Design Thinking into practical classes. Students were given the following challenge: 'How to improve both the comfort and satisfaction of customers at a hairdressing salon for older people?'

1. Empathize: The students visited a local retirement home, talked to its residents and observed their needs, predominantly: difficulties with sitting down, fear of changes in appearance, and feelings of loneliness during visits.
2. Define: The main problem was the fact that older female customers felt unnoticed and uncomfortable during hairdressing services.

3. Ideate: The students came up with a number of solutions, ranging from special cushions ensuring comfort and calm music, up to conversations before each service to establish relation and trust.
4. Prototype: A senior-friendly space was created in the school salon, with soft seating, neutral lighting and a 'memory corner' with photos of hairstyles from the customers' youth.
5. Test: Seniors from a nursing home were invited for free visits. Their positive reactions, predominantly having the form of greater satisfaction, more frequent returns, and emotional engagement, confirmed the effectiveness of the approach.
Outcome: The students not only learned a profession, but also gained the ability to design services with empathy. The quality of education improved (as the knowledge was practical), similarly to the quality of work (the students created real solutions), as well as the quality of life of the seniors (they felt noticed and cared for).

1.2 What is Design Thinking?

Design Thinking is an approach that puts people at the centre of the creative process.
It is a **method based on empathy, creativity and experimentation** that allows for complex problems to be solved in an innovative and practical manner.
What is Design Thinking actually?
It is a **problem-solving process** based on a deep understanding of users' needs. It is **not a rigid method**, but rather a **flexible framework** allowing for analytical thinking to be combined with intuition and creativity.
Why is DT useful in the case of vocational and special education?

- It teaches cooperation, listening and teamwork.
- It develops creativity, empathy and the ability to solve problems in an independent manner.
- It also engages students with special needs, as it is based on **various forms of communication and action. Most importantly, it addresses individual needs and abilities.**

Example from the field of SEN (Special Educational Needs) education
Students with visual impairments: At a vocational school, students designed solutions to support female students with visual impairments. Thanks to the empathising phase, a **multisensory daily schedule** with tactile and auditory elements was developed. The design process involved all students, which translated into the atmosphere of cooperation and understanding in the classroom.
Reflection question:
'Are there people or situations in your environment that could benefit from the application of Design Thinking? How would you start applying it?'

1.3 Design Thinking: A new approach to design

Design Thinking is more than a set of rules – it is a **new way of looking at the world and solving complex problems.** It requires the **courage to experiment**, break patterns, as well as to be open to innovation. It can be used both in technology development and while solving social problems.

As **Tom Kelley** writes, Design Thinking is a **'design mosaic'**. It is a mix of different methods, cultures and tools. It is a **combination of spontaneity, imagination and intuition with logic, analysis and pragmatism.** This allows to create solutions that are not only original, but above all – address real human needs.

Contemporary design does not end with products. It encompasses interpersonal relationships, social systems, educational spaces, mental health, and communication. The focus is put on the diverse needs, as well as identities and experiences of people, including those who were previously excluded from the design process.

Design Thinking is a change in approach: from designing 'for people' to designing 'with people' and 'by people'. In the process, anyone can become a designer – a vocational school student, a teacher, a coach, a parent, or a person with a disability.

Example from the field of SEN (educating students on the autism spectrum):

A team of students and teachers developed a 'quiet sensory corner' in the school library, designing it together with students with autism spectrum disorders. Thanks to their joint efforts, a place was created that met the real needs of the students, not just the adults' ideas about those needs.

1.4 Design thinking: Focus on people

The basis of Design Thinking is **human-centricity**, which can be understood as **focusing on people** – their emotions, needs and experiences. It is the belief that **most of challenges we face have a human dimension**, which is why people should be at the center of the design process.

Design Thinking assumes that it is not enough to simply ask **what people want**. One has to **immerse oneself in their world**, see through their eyes, understand their emotions and limitations. This is **empathy** – a key component of the discussed method.

The approach in question also means **creating solutions that are functional and provide a positive experience**. We design **not only products and services, but also emotions and relationships**: feeling of security, sense of influence, or the opportunity to be heard.

Yet another important concept is customer centricity – in the case of education, it means student centricity. We do not design 'for the system' but 'for the learner'.

Example from the field of vocational education (vocational school – vehicle mechanics):

Students noticed that people with limited hand strength had difficulty using lifts. They designed a lever characterized by reduced resistance, inspired by interviews with a person with physical disabilities. The solution also improved ergonomics for other users.

1.5. What is design thinking for?

Design Thinking can be utilized wherever there is a need to better understand a problem and find a creative, human solution to it. Even though it originates from the world of design and industrial design, it now permeates almost every area of life: education, health, public administration, social services, and management.

The aforementioned method works well for professional designers as well as **teachers, educators, entrepreneurs, public institution employees, and even parents or students.** Its greatest strength is its **flexibility and versatility.**

Design Thinking can be used, among other things, to:

- Design new educational services,
- Improve teaching processes,
- Create tools supporting individuals with difficulties,
- Strengthen student and teacher engagement,
- Establish better relationships within the team.

Why is it worth it?

- Better understanding of user needs (students, customers, citizens),
- Improved communication and cooperation,
- Greater innovation and engagement,
- More efficient problem solving.

Note:

Design Thinking **will not work in all situations.** In cases that **require precise procedures and predictable results** (such as emergency medicine or quality control), traditional methods may be more effective. Design Thinking **works great where there are many variables, many voices and when there is the need for a creative approach.**

Reflection question:

In what area of your work or education can you try out the Design Thinking approach right now?

1.6 Structure of the design thinking process

Design Thinking is an iterative and flexible process. It does not follow a linear path, but rather consists of repeatable steps that allow to explore the problem, develop solutions, test them and - if necessary - return to the beginning. Said process can be compared to a journey into the unknown: we know where we are starting from (the problem), but we do not always know exactly where we will end up (the solution).

Different models of the Design Process

There are many models of Design Thinking available. The best known are:

1. **Double Diamond Model** – developed by the Design Council UK,
2. **Stanford d.school Model** – developed at Stanford University.

Both models have a common feature: **cyclical transition from exploration to specific action**, namely - from **divergence (broadening perspectives) to convergence (narrowing options).**

Design Thinking Model – Stanford d.school

Within the scope of this handbook, we rely on the Stanford model because:

- it is **more understandable for beginners**,
- it particularly emphasises **empathy and iteration,**
- it allows working with people from different backgrounds – in VET and SEN,
- it is well known to our team and easy to implement in the field of education.

Stages of the Stanford model:

1.Empathize

Understand users: their feelings, needs and limitations.
Activities: interviews, observations, empathy maps.

2.Define

Transform collected data into a single, clearly formulated challenge.
Activities: defining the problem, personas, points of view.

3. Ideate

Generate many ideas without judgement or limitations.
Activities: brainstorming, SCAMPER.

4. Prototype

Transform ideas into something specific that can be touched, seen and tested.
Activities: mock-ups, models, skits, storyboards.

5. Test

Collect feedback, improve, try again.
Actions: observe reactions, collect suggestions, iterate.
When to use a particular model?

The Stanford model works best in an educational context, for example:

- in school projects,
- when working with SEN groups,
- during workshops with young people,
- in the case activities where reflection and testing of multiple solutions are important.

The Double Diamond model may be better suited to:

- project teams in companies,
- activities focused on process optimisation,
- when the group already has design experience.

VET-specific example (hotel management):

Students designed an app in order to assess the cleanliness of hotel rooms, basing on the needs of people with reduced mobility. Through empathy (interviews with guests and staff), they designed a prototype characterized by high contrast and voice control. The app was tested in a partner hotel as part of a work placement.

Reflection question:

'Which model fits your working style better? How can you use it in your specific environment?'

1.7. Design Thinking discussed step by step

The design thinking process is based on f**ive main stages** that help organise activities of the design team and lead from understanding the problem to creating and testing a solution.

Even though each phase has a specific function, the process is not rigid. it is possible to earlier stages, modify activities, or expand certain steps, depending on the specifics of the project, target audience, or the problem.

Stages of the process:

1. Empathize

At this stage, we learn to understand the people we are designing for. We observe, talk and ask questions in order to find out what they feel, need, as well as what difficulties they face. It is like 'stepping into someone else's shoes', which allows us to see the world from a completely different perspective.

2. Define

Once we have gathered knowledge, it is time to organise it. We formulate a design challenge that is specific and understandable in nature.

A well-formulated problem gives the team clarity and sense of direction.

3. Ideate
It is the key moment when it comes to creativity. The team generates as many possible solutions as possible without judgement or limitations. Diversity and freedom of thought are crucial.
Ideas can be realistic, bold, funny, or unfinished. The important thing is that they are generated.
4. Prototype
We turn best ideas into something specific: a model, sketch, scene, or a mock-up. A prototype does not have to be perfect. It is meant to help us understand how the idea works and whether it is worth developing.
This is a stage of action and testing carried out in safe conditions.
5. Test
We present prototypes to users, collect their reactions and ask for their opinions. We find out what works, what does not and what can be improved.
If necessary, we return to earlier phases. We can improve and test again. This is the stage of **iteration** – repeating steps to achieve best possible results.
The principle of loops and learning from previous mistakes
An important feature of Design Thinking is iterativity, so the ability to return to earlier stages basing on experience gained. It teaches us to:

- accept mistakes as part of the process,
- learn from feedback,
- be flexible and mentally resilient,
- make decisions basing on factual needs of users.

Said approach is particularly important when working with young people, who are often afraid of making mistakes. Design Thinking teaches that **every mistake is an opportunity to achieve something better.**
An example from the field of vocational education (SEN – teaching a student with ADHD):
In a logistics class, a student with ADHD had difficulties concentrating. The project team (students and teacher) created a 'concentration box', which was a set of tools (noise-cancelling headphones, a visual timer, and task board) that also proved useful for other students. The project was developed entirely using the Design Thinking method, starting from empathy, through testing, up to implementation.

1.8. Certain principles of design thinking

1. Focus on people
The user, predominantly his or her needs, motivations and limitations, is always at the centre of the process.
Designers learn to listen, observe and empathise with the recipient.
Empathy gives rise to solutions that really make sense.

2. Learning by doing
Design Thinking is a practical approach. Action first, reflection second.
By creating prototypes and testing them in practice, participants learn faster and more effectively than through analysis or theory alone.
Mistakes are treated as a part of the process, not as failures.
3. Collaboration
Diversity in a team is considered to be its strength. Designers work together, sharing their experience, skills and ideas.
Teamwork makes it possible to generate solutions that a single person would not be able to design.
4. Acceptance of mistakes
In the case of Design Thinking, failures are not only acceptable, they are essential.
A mistake is a starting point for improving a solution.
A safe testing environment allows for bold experimentation.
5. Asking questions
Good questions are the foundation of the process. Designers are not afraid to ask 'why?', 'for whom?', 'what if...'.
Said questions lead to deeper understanding and more accurate solutions.
Example (VET – hairdressing school):
Students tested a new workstation layout for people with limited mobility. Thanks to empathy, cooperation and solution testing, a mobile hairdressing console model was developed and permanently implemented in the workshop.

1.9 Design Thinking and vocational education

Design thinking as an educational approach
Design Thinking is not just a way to create innovative products. It is a **holistic approach to problem solving,** which works well in education as:

- a method for planning and implementing innovation,
- a tool for strengthening competences of students and teachers,
- a way to build engaging and diverse educational environments.

At the centre of design thinking is **a human being** – his or her needs, potential, limitations and aspirations. This is why this method works so well while juxtaposed with the challenges of modern schools.

What skills does Design Thinking develop?

Design Thinking supports the development of the so-called 21st century skills, which are essential for living and working in a rapidly changing world. They include:

- **Creativity and innovation** – experimenting, creating original solutions.
- **Solving complex problems** – analysing, testing and iterating solutions.
- **Empathy** – taking different perspectives into account, especially during teamwork-oriented and social projects.
- **Critical and analytical thinking** –ability to ask questions and evaluate solutions.
- **Communication and collaboration** – working effectively in a group, sharing knowledge and creating shared value.
- **Flexibility and resilience** – adapting to change, accepting mistakes as a part of the learning process.
- **Entrepreneurship** – readiness to act, take initiative, and implement one's own ideas.

The aforementioned skills are useful not only for students, but also for teachers, educators, leaders, and school principals.

Design thinking in educational practice

1. Designing engaging lessons

Design Thinking helps teachers create personalised, attractive and understandable lesson plans that respond to factual needs of students better.

Example (VET – hotel management school):

A team of students created a prototype of a 'mobile guest room' for learning customer service in various conditions. Thanks to such a project, practical training could also take place outside the vocational workshop.

2. Strengthening student engagement

Students who participate in the design of educational experiences become more engaged, motivated and responsible.

Example (SEN – integrated school):

Students with learning difficulties co-created English learning materials using QR codes and pictograms, which increased their autonomy and self-esteem.

3. Creating educational tools

Through empathy and iteration, students and teachers can create apps, worksheets, games, podcasts that are better suited to the nature of real-world challenges.

4. Problem solving at school

Design Thinking allows students and teachers to solve the following types of problems together:

- organisational (excessive noise in the classroom),
- spatial (non-functional computer room),
- social (classroom conflicts, peer exclusion),
- environmental (reducing plastic consumption at school).

Application in the education system

Design Thinking can transform **not only individual lessons, but entire educational institutions and systems as well.** It works as a tool for change management and organisational development.

In the case of schools and institutions:

- improving communication and work organisation,
- designing friendly educational spaces,
- developing school development strategies,
- taking into account the perspectives of students, parents, teachers and local partners.

In the case of the VET system:

- developing career paths based on labour market needs,
- creating practice-oriented learning environments,
- testing and implementing educational tools developed in cooperation with the representatives of the industry.

A new culture of learning

Design Thinking can become the foundation of **a new school model** based on:

- cooperation instead of competition,
- diversity instead of uniformity,
- learning from mistakes instead of judging failures,
- creating knowledge together with students, not just transferring it.

In a world where all kinds of information are at our fingertips, schools should help students **create, not just reproduce.**

Example of reskilling courses:

A group of people learning a new profession created their own system of visual notes and quizzes basing on real-life professional tasks. As a result, the final exam pass rate increased and the participants' sense of competence improved.

The role of Design Thinking in educational change

Design thinking can be a driver of positive, systemic change in education, especially if it is implemented not as a one-off tool, but as a way of working and thinking about learning.

- Students → become active participants in the process.
- Teachers → become mentors and experience designers.
- Schools → become learning communities.
- Education → becomes a space for creative action, not just the implementation of the core curriculum.

This is not a trend. It is a way to make education m**ore human, open and effective.**

Reflection question:

'What small changes can you make in your daily work to start acting in the spirit of Design Thinking?'

Chapter 2

2. DESIGN THINKING PROCESS PHASES

2.1 Preparation for the Design Thinking process

What should be kept in mind when preparing for the Design Thinking process? The Design Thinking process is multi-stage in character. The variety of activities required may make its results difficult to predict. Therefore, a proper preparation is key to achieving the desired end result.
When preparing for the Design Process, it is vital to think not only about tasks to be performed at each stage, but also about materials and tools required for the work, such as: sticky notes, markers, paper, as well as prototyping materials. Nevertheless, the success of the Design Thinking process depends on providing adequate support to its participants. It i**nvolves ensuring conditions for cooperation and communication, as well as guaranteeing freedom to express opinions and share ideas.** It can be achieved primarily by:

- Defining project objectives,
- Selecting the right team,
- Preparing a suitable workplace,
- Establishing a schedule for the process.

2.2 Why is it important to set project-specific goals?

The project goal is the main point of reference that defines what we want to achieve through a given project work. It acts as a map showing the way to the final destination.

The goal of a project could be, for example, to create an easy-to-use app helping people find best restaurants in their area. Defining such a goal will help understand exactly what is to be achieved.
The goal is crucial due to the fact that:

It sets the direction

It shows which way to go.

It helps with decision-making

When we have a clear goal, decision-making becomes easier. We know whether a decision brings us closer to a specific goal or not.

It monitors progress

It allows us to track our progress. A question can be asked: Are we getting closer to achieving our goal, or do we need to change our approach?

It increases accountability

When everyone included in the team knows the goal, it is easier for its participants to feel responsible for their actions. Everyone knows why the work is being done and what is there to be achieved.

It organises the process

The project goal acts as a plan that helps us organise our activities. It tells us what needs to be done and how to do it in order to be successful.

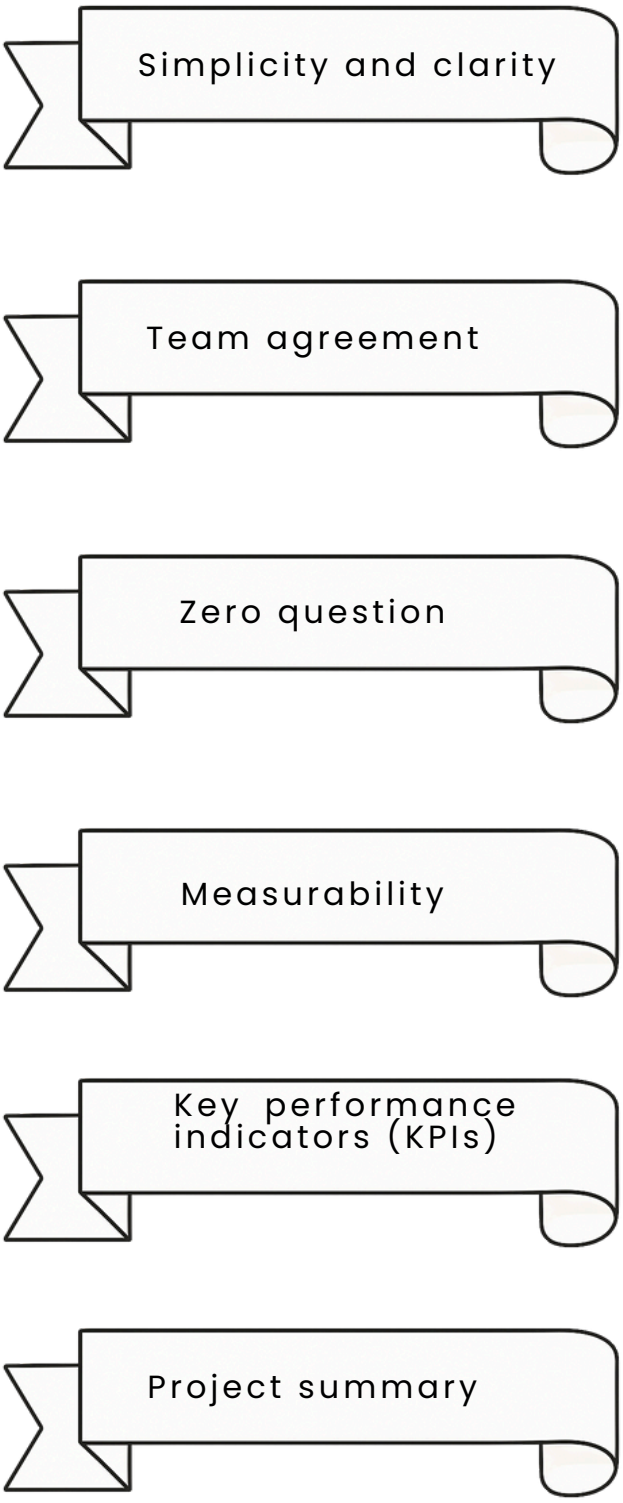
Defining a project goal is more than just a simple task. It is a crucial step that makes it possible to carry out project work effectively and achieve desired results.

How to define project objectives? Defining the project objective is the starting point when it comes to the Design Thinking process. Every design process begins with identifying a specific problem that becomes a challenge for all team members. The objective is therefore a kind of signpost, guiding the actions of the project team (the project objective should be referred to at every stage of the Design Thinking process).

To help formulate project goals, answers to two basic questions presented below should be considered:

- **What are expected results of the project, i.e. what benefits should it bring?**
- **What will be considered a success and what will be considered a failure when it comes to the project?**

The goal is the starting point. Defining the goal is the first very important step when it comes to each and every project. It is like a map showing us where we are going and what we want to achieve. How exactly to formulate a goal? Few key tips can be found below:



The project goal should be clear and easy to understand for all team members. It should not be too complicated or too vague.

It is cital that all team members agree on the project goal. Consensus makes work smoother, for everyone knows the expected final outcome.

Before we start formulating a goal, we should think about how we can solve the problem at hand. This zero question is the starting point for finding a solution and helps us look at the problem from different perspectives.

The project goal should be measurable. It means that we need to be able to determine whether we have achieved the goal or not. For example, if the goal is to increase the number of users of a specific app by 20%, we can easily measure this metric.

KPIs help us assess whether we have achieved our goal. It may have the form of the number of app downloads, time users spend on our website, or the number of products sold.

Said tool helps us formulate the project goal and contains important pieces of information and guidelines pertaining to the design process. It allows us to better understand what we want to achieve and how to do it.

Measuring project goals and taking advantage of key performance indicators is an important part of effective project management. It allows to monitor progress and evaluate results achieved.

Project objectives should be known to team members and presented before the commencement of the design process. It is a sensible idea to include them in the project agenda, which will list all relevant project indicators and specify how to achieve them.

The project brief is a key when it comes to defining the project objective [01_Preparation_01_Project_brief]. It is a description of the project challenge, containing the essence of the problem and most important assumptions or guidelines helpful when it comes to solving it. The project brief is a tool helping to understand and formulate project objectives.

The project brief should include the following:

Project description - including the main problem to be solved.

User characteristics - should provide pieces of information on the project users, such as individuals affected by the problem being solved.

Expected results - should indicate what results we want to achieve as a result of the project, along with key performance indicators.

Project constraints - should provide pieces of information about main constraints of the project, namely - obstacles that may arise during its implementation.

Milestones – pieces of information on most important progress points within the scope of the project.

2.3 Importance of teamwork in the Design Thinking process

The effectiveness of Design Thinking largely depends on how well we utilise the potential of all individuals involved in the project.
A project team should be understood as a group of people who work together to achieve a specific goal. They are united by their joint work, mutual cooperation, as well as the sense of responsibility for activities undertaken.
In a good team, everyone speaks honestly and openly, listens to each other and draws on the knowledge and experience of others. Working together fosters creativity and innovation. Then, it is easier to come up with new ideas, as we know that we are not alone and can count on the support of the team.
Teamwork is about working together towards a common goal, supporting each other and achieving results that often cannot be achieved individually. Said approach is one of the most basic principles of Design Thinking.

Benefits of working in a team:

1. **Utilising potential:** Teamwork allows to fully utilise all the skills and ideas of team members. It makes us more effective and efficient. Moreover, actions we take are more likely to be successful.
2. **Developing cooperation and communication:** Cooperation is the key to success in teamwork. The ability to talk, listen and reach compromises helps us manage conflicts better and establish stronger, trust-based relationships.
3. **Fostering creativity:** In a team, we have access to different perspectives and ideas. Said diversity fosters the creation of fresh, creative solutions. Ideas of others can inspire us and lead to new, innovative concepts.
4. **Establishing culture of responsibility:** Teamwork teaches us responsibility for others. We feel connected to each other and want to help each other. It makes our actions more careful and committed in character.

Teamwork may also be connected certain challenges:

Extended time: Sometimes, it takes longer to make decisions or complete tasks, as we need to consult certain ideas with others. This process can be frustrating and generate additional costs.

Conflicts: Different personalities and working styles amy lead to misunderstandings and conflicts within the team. As a result, work may be delayed and motivation may decline.

Groupthink: Sometimes, everyone in a team wants to agree with others so as not to upset others. This seemingly safe approach can, however, result in poor decisions if good relations become a priority over thorough-oriented analysis.

Risk: In a team, we may take risky decisions, as we are confident that others will support us. The sense of community sometimes weakens individual caution.

Social loafing: Some people may avoid getting involved, relying on others to 'make up' for their lack of activity. The aforementioned phenomenon can reduce the effectiveness of the entire group.

Conformity: It is difficult to oppose the opinion of the majority, even if you have a different idea. As a result, we give up presenting our own ideas, even though they may turn out be valuable.

In order to efficiently address issues specified above in the education system, the following strategies can be opted for:

Extended time:

- Strategy: Implement clear timelines and priorities for each project, along with regular check-in meetings. Promote effective decision-making techniques, such as voting or utilizing the consensus method.
- Example: Establish regular weekly meetings for teams of teachers with clearly defined goals and tasks to be completed between meetings.

Conflicts:

- Strategy: Provide training for participants in the process on conflict resolution and interpersonal communication. Create a proper environment, in which everyone can express their opinion.
- Example: Organise workshops on mediation and conflict resolution and hold regular feedback sessions within teacher teams.

Group thinking:

- Strategy: Encourage critical thinking and open discussion. Introduce the role of a “devil's advocate” who deliberately presents opposing arguments in order to stimulate debate.
- Example: Appoint one person at each teacher meeting to ask difficult questions and present alternative solutions.

Risk:

- Strategy: Conduct thorough analysis and pilot testing of new technologies or methods before proceeding to full implementation. Collect feedback from teachers, students, parents, and other participants.
- Example: Implement a new educational technology in one class for a semester and gather detailed feedback before rolling it out to the entire school.

Social loafing:

- Strategy: Clearly divide duties and responsibilities. Introduce a system allowing to monitor and evaluate each team member's contribution.
- Example: Use project management tools such as Trello or Asana, where it is clear who is responsible for what and what deadlines are.

Compliance:

- Strategy: Promote individuality and diverse thinking. Create a safe environment, in the case of which everyone can express opinions without fear of repercussions.
- Example: Use anonymous surveys after meetings, during which participants can express their true opinions about decisions and proposed solutions.

Implementing said strategies will help create more effective and harmonious teams within the scope of the education system, leading to better learning outcomes and satisfaction for both teachers and students.

Teamwork has many advantages and makes sense in numerous situations. For instance, when we need to solve a difficult problem together, share tasks or use a variety of knowledge and skills, it may turn out to be invaluable. In such cases, teamwork is effective and rewarding. It is crucial to maximise the potential of each team member and focus on common goals.

Creating project teams. Below are a few things to consider when creating a team:

1. **Diversity:** The team should be diverse. It means that everyone should have different skills, experiences and perspectives. It is crucial to include people who can benefit from the project.
2. **Team roles:** Each team member should have a specific role to play. We can help define roles using personality tests such as MBTI (Myers-Briggs Type Indicator), Belbin Team Roles, StrengthsFinder, DiSC Personality Assessment, or intuition.
3. **Team size:** The team should be neither too small nor too large. The optimal size is between 6 and 15 people. A small team can lose the initial energy, whereas a large one may face organisational challenges.
4. **Working atmosphere:** It is important to create a safe space, in the case of which everyone feels comfortable and can share ideas.

Creating project teams is a process that requires attention and care. If done well, the results achieved can be exceptional in character.

Teamwork-related principles

When creating project teams, it is important to follow a few principles that will help achieve success. They are as follows:

Team leader: The leader is responsible for leading the team, resolving conflicts and keeping everyone informed about the progress being made.

Clear goals: Everyone must be fully aware of what we are striving for. Project goals should be precise and measurable so that we can clearly determine when success has been achieved.

Adapting actions: Everyone has a different pace and work preferences. It is worth adapting the pace and style of work to each team member. It is also vital to manage various distractions.

Job satisfaction: Working in a team should be enjoyable. It is important to feel comfortable in the group and be proud of your achievements.

Space for individual work: Even though we work together, we sometimes need some time for ourselves. Therefore, it is important to have some time for individual work in order to make the most of our personal skills.

To coordinate team work, you can take advantage of the Team Orientation Map [01_Preparation_02_Team_alignment_map], which is sometimes called a team synchronisation map. Said tool helps to plan team work and strengthen focus on project activities by agreeing on common goals, commitments, resources and risks. It is a sensible idea to prepare a map with all team members before starting the project process.

2.4 Where will we work? Why is location of major importance?

Choosing the right workspace for your project team is a key step in the Design Thinking process. The project workspace should be carefully selected and appropriately equipped in order to facilitate effective teamwork. Below are some key elements that a properly prepared workspace should have:

- **Creative workspace:** The workspace should allow for experimentation and encourage creative work. It is important to provide an area facilitating collaboration, open communication and the exchange of ideas.
- **Comfort of all team members:** The workspace should be comfortable for all team members. It should be large enough to accommodate everyone and provide space allowing team members to move around freely.
- **Access to natural light:** Access to natural light increases productivity and improves the overall well-being. It is therefore important that there is plenty of natural light in the workplace.
- **Workshop space:** Providing space for workshop activities is crucial, especially during the prototyping phase. It allows team members to create physical prototypes and experiment.
- **Equipment:** The workplace should be equipped with appropriate tools, such as large tables, mobile chairs, whiteboards or flipcharts. What is more, the access to audiovisual equipment and the Internet is also crucial.
- **Rest area:** It is vital to provide a rest area where team members can relax and recharge their inner batteries.
- **Technological support:** Adequate technological support, such as Internet access and computer equipment, is essential.

To sum up, choosing the right space to work on a project is crucial to the efficiency and success of the project. It is important to consider all the factors discussed above while selecting the best location.

Remember that getting out of the building is also crucial, as there is no other way to integrate or work with real people or users. Therefore, such spaces – workplaces, public spaces, or homes – should also be defined as places where some of the work is done, at least during early stages of the project.

2.5 Time management in the course of the Design Thinking process

Time management in the design process is a key element that influences team effectiveness and the achievement of project goals. Below, reasons why time management is important in the Design Thinking process are provided and briefly discussed:

1. **Focus on goals:** Limited time forces to focus on project goals and eliminates unnecessary distractions. It allows team members to be more focused and work more effectively on the solution.
2. **Work intensity:** Setting a time frame promotes work intensity, which in turn increases team commitment and motivates its members to make better use of available resources. It allows to achieve more in less time.
3. **Creativity and unconventional solutions:** Time constraints stimulate creativity and encourage the search for unconventional solutions. Often, time pressure prompts quick thinking and risk-taking, which in turn leads to innovative ideas.
4. **Project efficiency:** Dealing with time constraints promotes project efficiency. Teams that can manage time effectively plan their activities better, avoid delays and deliver results on schedule.

In order to manage time effectively in the Design Thinking process, it is worth following a few key principles:

Prepare an action plan: Planning is a vital step that helps understand the stages of the project and actions required. The plan should include all the steps necessary to achieve goals intended.

Realistic time estimation: When planning, it is crucial to realistically estimate the time needed for each activity. It is important to allow for some flexibility, as not everything may go according to the plan.

Identify potential constraints: When planning, consider possible constraints such as the lack of resources, delivery delays or technical issues. Being aware of sail factors helps respond to potential difficulties quickly.

Monitor progress: Continuous monitoring of project progress is essential. It allows to respond to changing circumstances quickly and adapt action plan to the challenges encountered.

Be flexible: Design thinking processes often require flexibility. Not everything can be predicted and planned, so it is vital to be open to change and experimentation.

Furthermore, it may be a sensible idea to prepare an agenda for each meeting or project workshop [01_Preparation_03_Project_process_agenda]. The agenda should include the purpose of the meeting, a list of actions to be taken, time allocated for each action, necessary materials and tools, as well as people responsible for each task. Careful planning of each meeting helps make better use of time and resources, contributing to increased project efficiency.

SUMMARY

2. DESIGN THINKING PROCESS PHASES

2.1. Preparation for the Design Thinking process

Before we begin the Design Thinking process proper, it is paramount to prepare in a proper manner. The process is complex and dynamic. Moreover, its course often depends on the team and conditions in which the work is performed. A proper preparation involves not only planning individual stages, but also creating space for cooperation, openness and commitment.

Four pillars of effective preparation are as follows:

1. **Defining the project goal** – the starting point to which we will then refer at every stage of the process.
2. **Selecting the team** – diverse, open and ready to work together.
3. **Organising the workspace** – fostering creativity and collaboration.
4. **Planning the time frame** – setting stages, meetings, milestones and ensuring time for reflection.

Furthermore, it is vital to prepare materials and tools: markers, sticky notes, paper, boards, templates, prototyping materials, as well as digital tools.

Just as important as technical equipment is creating a mood of psychological safety, in the case of which participants can share ideas freely, ask questions and propose non-standard solutions. Such kind of environment fosters creativity and ensures real innovation.

2.2. Why is it important to set project-specific goals?

Defining the project goal is the first and most important step when it comes to the Design Thinking process. A clearly defined goal serves as a map and compass – it shows the way, organises activities, facilitates decision-making, as well as allows the team's work to be evaluated.

A good goal should be:

- **clear and understandable** – formulated in simple terms, without professional jargon being used,
- **jointly developed** – accepted by the entire team,
- **measurable** – allowing to assess whether it has been achieved,
- **realistic, but also ambitious** – inspiring action,
- **user-oriented** – reflecting the needs of the end users.

Helpful questions when formulating a goal are as follows:

- What benefits do we want to achieve with the project?
- Who will benefit from our actions?
- What will constitute a success or a failure?
- How will we know that we have achieved our goal?

A project brief [01_Preparation_01_Project_brief] is a document that contains all the key pieces of information required to understand and start a project.

What should be included in a project brief?

Project description: Within its scope, we describe the main problem we want to solve. It is a short introduction, explaining what our project is about.

User characteristics: Information on people to whom we are addressing the project. Who are the people whose problem we want to solve?

Expected results: Guidelines on benefits we want to achieve thanks to our project. It may have the form of increasing the number of users or improving the quality of the product. It is also useful to include key performance indicators, namely – factors specifying how we will measure the success of our project.

Project constraints: Issues that may hinder the implementation of the project. These can be time, but also - financial or technological constraints.

Milestones: Points marking important stages of the project. These are checkpoints that help track progress and specify if everything is going according to plan.

2.3. Importance of teamwork in the Design Thinking process

Design Thinking is a deeply collaborative process. Each and every person brings unique experiences, skills and ways of thinking to the table. The quality of final solutions depends on the quality of teamwork. That is why it is so important to consciously create a design team and manage its potential.

Teamwork motivates, enhances creativity and develops the sense of belonging. Said phenomenon is known as social facilitation. The presence of others may increase the level of commitment and quality of work.

Why is it worth working as a team?

1. **Utilising potential** – a team brings different skills and points of view, allowing for complex problems to be solved more quickly and effectively.
2. **Communication and cooperation** – daily work on a project develops listening, reasoning, trust-building, as well as compromise skills.
3. **Increased creativity** – the clash of different points of view is an excellent way to generate fresh, out-of-the-box ideas.
4. **Culture of responsibility** – mutual dependence within a team teaches responsibility not only for one's own tasks, but also for the results of joint work.

A project team is also an important tool when it comes to personal development. It builds soft skills, teaches independence and shows how to work in changing conditions.
Tool: Team orientation map [01_Preparation_02_Team_alignment_map].
This tool helps synchronise activities of team members around common goals, resources, commitments, as well as potential risks. Completed jointly at the beginning of the project, it serves as a reference point at later stages of the process. It can also be updated during the course of the project in order to facilitate response to changes and coordinate work better.

2.5 Where will we work? Why is location of major importance?

Choosing the right workspace for the project team is a **key step** that can make or break the entire process. The place where the team will work should support **creativity, flexibility and comfort** while also meeting the needs of specific stages of the design process.

A workspace is **not just an office or a workshop.** It is also the users' environment. Remember that **field activities are an important part of the process:** observations, conversations with users, and testing prototypes in a real context are indispensible. Spaces such as **schools, students' homes, public spaces** may also serve as natural environments for the design process.

2.5 Time management in the course of the Design Thinking process

Efficient time planning influences team commitment, meeting efficiency, the quality of results, as well as the degree of innovation.

Why is time management so important?

1. **Focus on goals** – limited time forces clear priorities to be set, which eliminates chaos and supports focus on results.
2. **Increased work intensity** – clearly defined time frames motivate action and help maintain the team's work rhythm.
3. **Increased creativity** – paradoxically, time pressure stimulates innovation, as it forces to act quickly and generate unconventional solutions.
4. **Efficiency and control over progress** – a good schedule facilitates planning, progress assessment and early detection of delays.

In order to manage time effectively in the Design Thinking process, it is worth:

1. **Creating a detailed action plan** – specifying stages of the process, objectives, tasks, and resources. It facilitates orientation and coordination.
2. **Making a realistic time estimate** – it allows for a safety margin and avoiding excessive optimism in estimates made.
3. **Identifying potential constraints** – such as availability of people, technical or organisational limitations.
4. **Monitoring progress on an ongoing basis** – may have the form of using schedules, checklists, or online tools (Trello, Asana).
5. **Remaining flexible** – the design process rarely runs smoothly. It is sensivle if the plan allows for changes.

An additional tool to support time management is a **workshop agenda or project team meeting.**

Chapter 3

3 DESIGN THINKING PROCESS PHASES

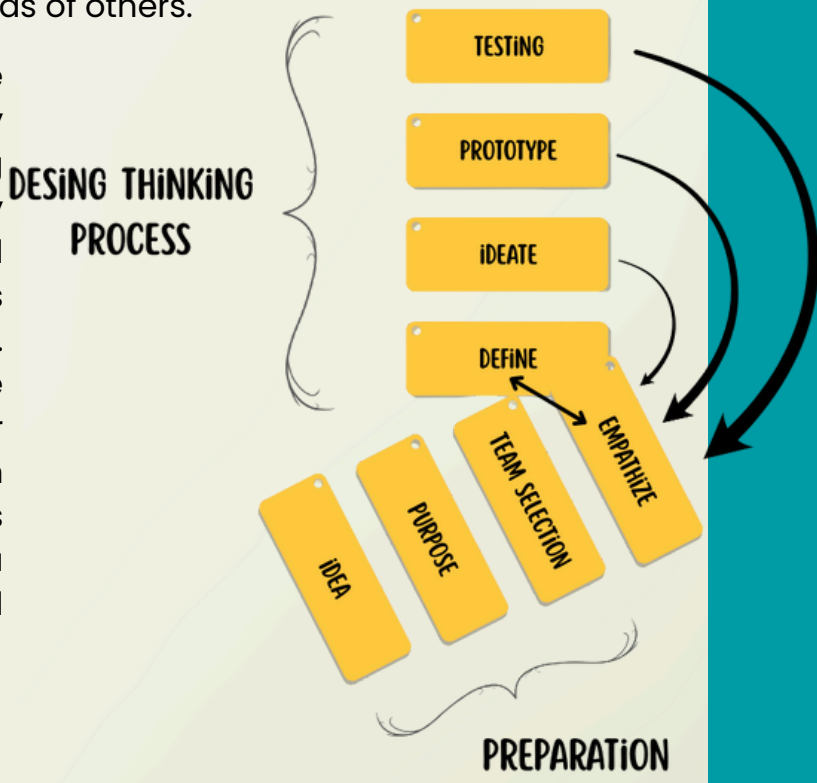
3.1 Empathize

This phase constitutes the initial step of the Design Thinking process itself, even though many necessary steps have been undertaken before, such as the aforementioned objective formulation , the selection of the team that will work on the process, or setting the time and place. It is worth remembering that the process is iterative and that various steps can be repeated numerous times. The empathize phase begins project exploration and shaping . It can be revisited at later stages of the Design Thinking process in order to deepen the understanding of the audience and its needs.

On the visual process map (see: figure below), the empathizing phase has been placed between the preparation and definition phases. Such location reflects its function - through empathy, it is possible to understand the user's perspective and define the target audience. As the team moves into the definition phase, it reaches for additional tools and activities that deepen said understanding and allow to more precisely identify the needs of both the individual and the group perceived as a whole.

Design Thinking is a problem-solving methodology that focuses on creating solutions tailored to people's needs. While commencing the Design Thinking process, having a fully formed product or service from the outset can be a warning sign. It could mean that the Design Thinking methodology has not been properly applied, wrong tools have been used, or there has been a lack of openness to the thoughts and needs of others.

DT thrives in situations where solutions are not immediately obvious. It involves actively listening to different parties, deeply understanding their needs and collaboratively creating solutions that resonate with their experiences. If a solution seems obvious from the very start, it is worth asking whether Design Thinking is the right approach for the case. Ultimately, DT goes beyond creating solutions. It is a journey of exploration, empathy and meaningful innovation.



DT plays a key role when it comes to generating innovation. Nevertheless, th aforementioned innovation must be tailored to a specific group of people. When using DT to innovate a product, service or internal organisational structure, understanding the relationship with the audience becomes crucial. Only then can a solution be identified that is both innovative and meaningful to this group. During the empathy phase, all perspectives should be included and listened to. Skipping said stage often results in real user needs being left unmet. In some scenarios, the exclusion of certain voices is deliberate, but the key point is that the broader the spectrum of opinions gathered, the greater the potential to generate innovative ideas and valuable solutions. Lessons learned from different experiences enrich the overall design process and influence the quality of the final outcome. The broad involvement of participants directly translates into a better tailored product or service, making it more efficient and attractive to the target audience. The most important inventions and creations do not come from a previous idea put into practice, but from curiosity in its purest form. If research is based on asking questions without the intention of having a clear answer, more possibilities will emerge. Design Thinking examines many different perspectives, but always coming from a specific, selected group. The key is to avoid judgement and continually seek understanding. **What do we look for in the course of the empathy phase?**

In the empathize phase of Design Thinking, the predominant goal is to deeply understand users, as well as to empathise with their needs and experiences. The phase in question is crucial when it comes to gaining insights that will influence the design process.

Many traditional approaches discuss 'user-centeredness' as a way of considering the service user. However, it often translates into general assumptions or standard solutions based on statistical averages. The aforementioned approach, while valid in some contexts, **tends to overlook voices and experiences of those outside the norm or majority.**

In contrast, authentic empathy in design thinking is a deep commitment to understanding people as they are, especially those whose realities have historically been ignored, silenced or misunderstood. The expression 'put yourself in my shoes' or 'step into my shoes' is no longer a superficial slogan in such a scenario, but rather - a transformative attitude that demands:

- Listening without prejudice.
- Abandoning own assumptions.
- Recognising and valuing diverse experiences.

Empathy as a basis for an inclusive educational environment

While talking about students belonging to ethnic, cultural, socio-economic minorities or having specific educational needs, the empathy phase becomes extremely important. Why is that? It is caused by the fact that such students have often not been included "within" the educational systems, but have been included after the fact, predominantly through makeshift solutions or compensatory measures.

Authentic empathy forces us to **start the design process by listening to such groups,** asking them how they perceive classes and the educational process as a whole, what barriers they face, how they feel about learning, and what makes them feel a part (or not) of the educational community.

For example:

- How does a newly arrived student who has not yet mastered the language feel?
- How does a student with the autism spectrum perceive an excess of sensory stimuli in the classroom?
- What does it mean for a young Gypsy to be systematically underestimated?

What frustrations do a dyslexic student feel when the curriculum is mainly based on reading quickly and accurately? The aforementioned questions cannot be answered from behind a desk. Answers can only be found through direct listening, uncritical observation, honest conversation, as well as humility in action.

From "for them" to "with them".

Authentic empathy makes us stop designing for others and start designing with others. It no longer treats vulnerable groups as passive recipients of 'help' or 'support', but recognises them as valuable participants, whose experiences can make a difference to the entire education ecosystem.

When education teams are engaged in this approach, they not only design solutions that are more effective, but also more equitable, humane and sustainable. In the discussed case, innovation becomes a tool for true equality.

Empathy cannot be standardised

Within the scope of the Design Thinking methodology, the empathy phase is not a technical stage, but an open attitude of discovery and deep listening. The tools proposed, such as interviews, observation, shadowing, or focus groups, are not ready-made prescriptions, but rather - flexible structures to be adapted to the people, contexts and specific challenges we face.

The most common mistake made when applying the discussed methodology in educational settings is the utilization of tools such as checklists, for example, according to pre-designed instructions, without considering whether they really help understand the user. It can lead to superficial or meaningless results, where the 'format' is met, but the goal is not achieved. The factual understanding of those experiencing the problem is then the issue.

The true value of Design Thinking is revealed when the team is able to modify, combine and even invent tools that capture the emotions, fears, desires, and unspoken needs of users better.

Therefore, maintaining a flexible, curious and non-judgmental approach that allows to adapt each action to the group of people we are dealing with is more important than mastering the techniques .

3.1.1 Main objectives of the empathize phase

At the beginning of the discovery phase, in order to get an initial and flexible picture of the topic the team will be working on, it is useful to reach for the Buzz Report tool [02_Empathize_04_Buzz_reports]. It allows to identify key issues and interconnections between different elements of the challenge. It can also be helpful to take advantage of the SWOT tool [02_Empathize_08_SWOT] to analyse both internal organisational factors and external conditions affecting the project situation. **Said phase pursues several important objectives, the common premise of which is an in-depth understanding of users and their needs. It serves as the foundation for designing solutions that genuinely respond to the real expectations of the audience.**

Title	Description
Understanding	Understanding users' perspectives, experiences and challenges. It involves trying to understand the users' situation, looking at reality from their perspective, developing empathy, and searching for insights to help design meaningful solutions. During the empathy phase, it is crucial for the team to withhold judgement and avoid making hasty decisions (which is very common and natural when looking for a solution). The focus should be put on understanding the user's perspective without trying to solve the problem prematurely. If our goal is to understand the user as thoroughly as possible, understand his or her motivations and desires, as well as his or her deeper thoughts, we can use the questionnaire [02_Empathize_05_ Individual_interview_questionnaire]. To get a broader picture and include key parties, it is possible to opt for the Stakeholder Map tool [02_Empathize_ 06_Stakeholder_map].

Identifying user needs	The idea is to discover true needs and desires of users - including those that they themselves cannot express clearly. Rather than just focusing on what they say explicitly, designers try to understand what really matters to them. Such a deep understanding allows them to create solutions that not only satisfy current needs, but also anticipate and fulfil deeper user-specific requirements. Designers often engage in direct observation or immersion in the user's environment in order to gain first-hand experience. Said approach may include spending time in the place where the audience of the designed solutions live or work, observing their behaviour, as well as identifying hotspots or areas for improvement. It can be done using structured tools, such as 'Shadowing', explained in the tools section [02_Empathize_14_ Shadowing _learning]. Furthermore, role-playing is an engaging way to immerse participants in a problem or scenario, enabling them to empathise with different perspectives and come up with ideas [02_Empathize_11_Role_ play].
Developing empathy	The cultivation of empathy among members of the design team through an emotional bond with users. The established emotional connection helps designers understand users' challenges and aspirations, supporting a human-centred approach to problem solving. Recognising user diversity is crucial.

	Team members seek to empathise with people from different backgrounds, cultures and abilities in order to ensure that the solutions designed are inclusive and meet the needs of a wide range of audiences, regardless of whether they are near or far from the design team [02_Empathize_12_Human_Bingo_Icebreaker].
Discovering pain points	Identifying problems and areas of frustration. Understanding where users are struggling or encountering problems, which in turn allows to spot opportunities for improvement and innovation. Identifying key challenges allows designers to create solutions that meet real user needs, resulting in less frustration and a better experience of taking advantage of the product or service.
Generating practical insights	Generating practical insights from observations, interviews and other empathy-based activities. Such insights constitute the basis for generating ideas and developing solutions at subsequent stages of the design process.
Defining design challenges	Clearly defining design challenges or problems to be solved. The empathy phase helps designers formulate problems in a way that reflects real needs of users, guiding the design process towards meaningful solutions, as well as towards ensuring that the resulting designs are not only functional, but also - deeply resonate with experiences and aspirations of the target group.

Avoiding stereotypes	Challenging and overcoming prejudices and stereotypes. The empathy phase encourages designers to approach the problem openly, while at the same time avoiding hasty judgements and solutions.
Facilitating user-oriented solutions	Laying foundations for designing solutions that are truly user-centred. Understanding users' motivations and behavioural patterns ensures that the resulting solutions align with their preferences and positively impact their lives.
Stimulating creativity	Stimulating creativity and ingenuity immerses designers in the world of users. By experiencing the environment and context in which such audiences function, the designers may be inspired to create innovative solutions that reach their target audience.
Improving collaboration	Fostering collaboration within the design team and with parties involved. Experiencing empathy with users creates understanding and commitment to solving problems in a user-centred way.

Achieving the aforementioned goals during the empathy phase will allow the team responsible for the Design Thinking process to be better equipped to create solutions that are not only functional and effective, but also - truly meaningful and valuable to the people they are targeting. It has to be kept in mind that all the objectives in the empathy phase are equally important and must be considered and approached as a whole. It is vital to keep an open mind, but at the same time focus on clearly defined goals, so as not to succumb to a scattering of ideas and actions. Therefore, it is crucial to define goals, which is what the tools in this publication [02_Empathize_07_Goal_definition] can help with.

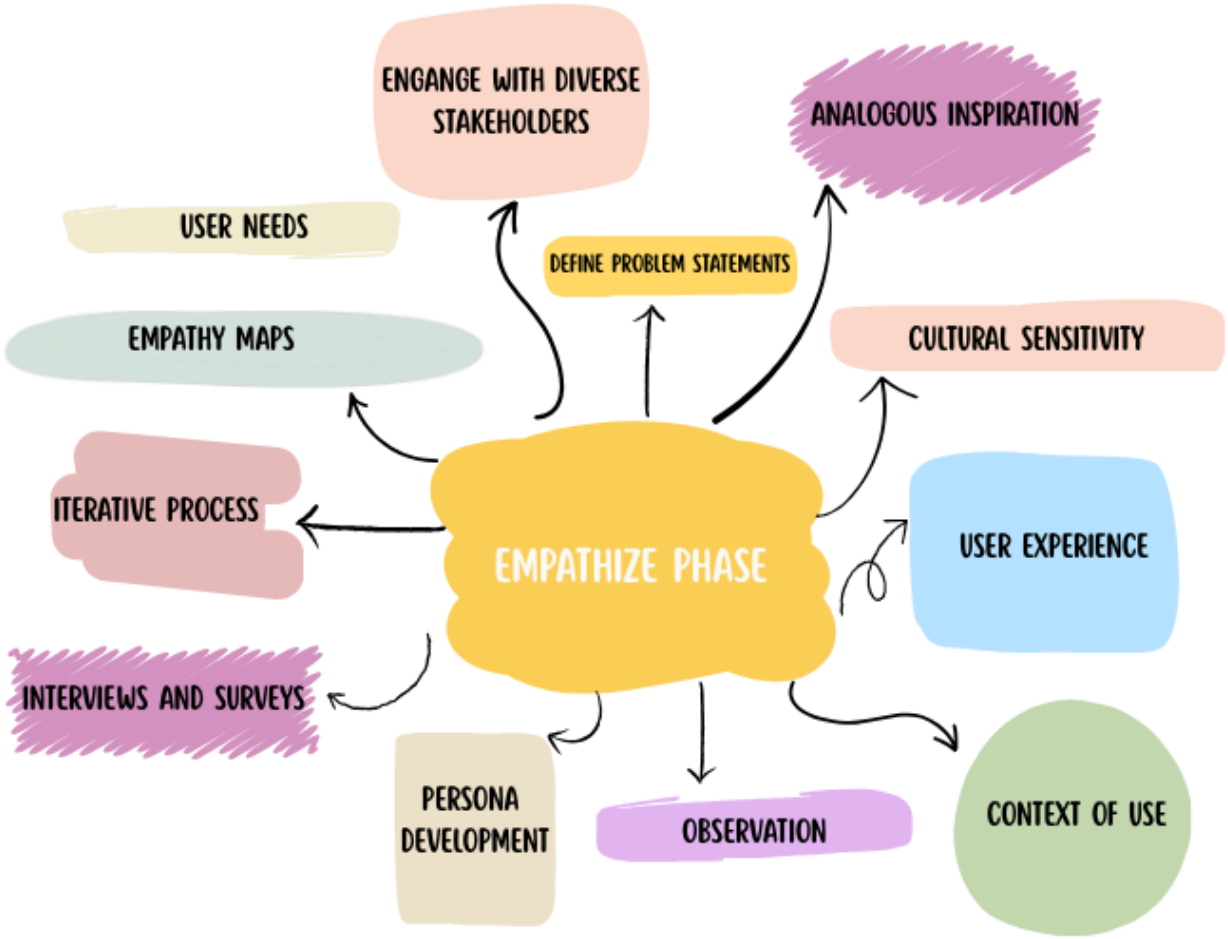
3.1.2. Empathize phase stages

Within the scope of the Design Thinking process, everything starts with an initial idea. It is an insight that someone has come across, without necessarily actively looking for it. This idea may emerge from conversations with other people. Design Thinking then evolves into a systematic research process. Qualitative research tools are utilized to gain a deeper understanding of the challenge and provide effective solutions.

Key aspects to focus on within this phase are as follows:

- user needs,
- context of use,
- observations,
- interviews and surveys,
- empathy maps,
- creation of personas.

Below, we discuss the action plan to be applied during the empathize phase.



The following action plan for the empathy phase is a guideline rather than a precise protocol. It is designed to provide the education team with a structured starting point to deepen their understanding of users - students, families, teachers or other parties being a part of the education community. It can be done through observation, active listening and emotional connection to their experiences.

Nevertheless, in line with the philosophy of Design Thinking, the action plan should be seen as one of many possibilities. It is up to the team, depending on its objectives, the profile of the group it is working with, its own organisational culture or available resources, to decide whether to implement it in its current form, modify it, or adapt it to certain specific needs.

It is paramount not to apply all the steps exactly as formulated, but to maintain empathy, openness and flexibility that are characteristic for this stage. The methodology will be useful to the extent that it is used in the service of the people and real contexts in which it is applied.

Our action plan for this phase will be divided into three key blocks:
I. Understanding.
III. Identifying hidden needs.
III. Generating ideas and design challenges.

I. UNDERSTANDING.

An in-depth understanding of the users, such as students, their families, or other participants of the education-oriented environment From their own perspective. It allows for designing solutions that truly respond to their needs.

1.Preparation

Assemble the educational team involved in the project.

Keep the goal in mind: we are not going to solve problems, we are going to understand them.

Establish a key principle: 'Don't judge. Don't interpret. Just observe and listen".

2. Select key users

Identify groups or profiles most relevant to the challenge (such as students with special educational needs, minority students, low-participation families, etc.).

Develop a stakeholder map, taking into account all key parties involved in the project:

- Who is most affected by this challenge?
- Who can provide a different perspective?

3. Gather information

Technique 1: Buzz report

Short meetings in small groups of teachers who have had contact with students.

Each teacher answers the following questions:

What does the student say?

What does he/she do?

What does he/she seem to be feeling?

What are our opinions about his/her needs?

Actual observations are collected, without being interpreted.

Technique 2: Individual questionnaires for participants

Open-ended questions such as:

What do you like or dislike about the class?

When do you feel that someone is listening to you?

What would you change in school if you could?

What makes it difficult for you to learn?

Ensure confidentiality and age-appropriate language.

4 Collective analysis

· Group pieces of information obtained into an empathy map by user or profile:

o What do you see?

o What do you hear?

o What does the person say and do?

o What do you think and feel?

· Detect patterns, common emotions and friction points.

5. Synthesis and 'alarm signals'

Write down one or more conclusions (sentences summarising deep truths identified):

o "Many students believe that if they do not ask questions, they do not exist in the classroom".

o "Immigrant families do not get involved because they think they have nothing of value to offer".

6. Final team reflection

What have we learned that we did not know before?

What prejudices have we had to overcome?

What questions should we answer in the definition phase?

Continuous reminding

The phase in question is not about problem solving, but rather - about understanding.

It is the most human, slowest and strongest stage of the innovation creation process.

I. IDENTIFYING HIDDEN NEEDS

Identify real and unspoken needs of users (students, families, teachers, or other parties involved in the educational process) by observing their behaviour, routines and by experiencing the situation from their perspective.

1. Preparing the educational team

o Define a clear objective: " Discover needs that users do not always express in words".

o Choose a specific user profile to analyse, for example - a student with motivational difficulties, a parent with limited participation in school life, or a teacher struggling with an excess of responsibilities.

o Divide roles and responsibilities: observer, facilitator, enroller.

2. Application of the technique: Shadowing (direct observation)

Objective: Observe the user in his or her everyday, natural environment in order to identify barriers, frustrations, as well as unspoken needs.

Steps:

1. Ask for the user's consent (or their legal guardian's consent if they are a minor).
2. Discreetly accompany the user for a selected part of the day – for example: change of activities, break, class work, etc.
3. Observe and record behavioral patterns and reactions without interfering with the situation:

- Which moments seem unclear or frustrating?
- In what situations does the user ask for help and who do they turn to?
- What activities does the user repeat even though he or she still finds them difficult?
- When does the user seem relaxed and confident, and when does tension, anxiety or withdrawal appear?

4. Finally, write down your observations by answering the following questions:

- What have you noticed through observation that would have been difficult or impossible to pick up in conversation (for example: during an interview)?
- What needs could you ‘sense’, even though they have not been explicitly stated by the user?

3. Application of the technique: 'Role-playing'

Objective: Step into the user's shoes in order to personally experience the situation he or she is facing and better understand his or her emotions and point of view.

Steps:

1) **Create a short scenario** depicting a typical situation of the user (such as taking an oral exam without mastering the language, asking for help in class without support).

2) **Divide the roles** between the teachers:

o One plays the role of the user (for example: a newly arrived student who does not know the language).

o Another one takes the role of the teacher or the environment.

3) **Describe the situation** and - if possible - record it:

o How did the teacher who took on the role of the user feel?

o What obstacles did he/she encounter?

o What support was missing?

4) **Joint reflection**: What new needs have we identified and which part of the education system may be causing previously unseen difficulties?

4 Synthesis of needs

o Make a joint list of **explicit** and **implicit needs.**

o Examples of hidden needs:

- "I need a non-verbal way to participate".
- "I need some time before I speak up".
- "I need a sense that my experience is important".

Practical application

o Make a note of the identified user needs. They will will serve as a starting point in the next phase of Design Thinking, namely - when formulating the design problem.

o Use the knowledge gained to plan specific actions, adjustments or changes to the course of the activity (for example: teaching methods, pace of work or mode of communication).

Reminder for the team

We are not here to assume or solve problems.

We are here to observe, feel and understand what the user cannot or does not know how to express.

III. GENERATING IDEAS AND DESIGN CHALLENGES.

The predominant aim of this stage is to generate practical, well-founded ideas based on a deep understanding of the user experience and to define design challenges that meet his or her real needs.

Preparing the learning team

- Explain the purpose of the team's work: "We want to understand our users better (such as students, parents, teachers) in order to identify key problems and be able to develop creative solutions."
- Choose the user group that the team will focus on - it can be, for example:

- students with low motivation,
- families rarely involved in school life,
- emotionally overloaded teachers.

Divide the team into smaller working groups, matching their composition to the chosen working methods (for example: one group uses brainstorming, another empathy mapping, while yet another works with interviews).

1.Applying empathetic information gathering techniques

Technique 1: Structured observation

Choose a place (classroom, corridor, square in front of the building).

Observe for 15-20 minutes without interfering.

Focus on behaviours, expressions, and interactions.

Write down in columns:

- **What do I see?**
- **What does he/she seem to feel?**
- **What might he or she need?**

Technique 2: Learning by means of observation

Teacher observes the pupil throughout the day as a silent observer.

Key aim is to 'feel' how the pupil learns, when he/she gets lost, as well as how he/she relates to space, time and people.

Finally, write a short story from the student's perspective (for example: "Today, I felt invisible when...").

Technique 3: Focus group

Gather 6-8 users (students, families or teachers).

Moderate the conversation by asking open-ended questions such as:

What makes you feel listened to?

When do you feel blocked?

What would you change if you could?

Write down key phrases and dominant emotions.

3 Synthesise knowledge

- Share insights as a team.
- Identify patterns, strong phrases, and contradictions.
- Use cards to group similar ideas by themes: motivation, fear, support, lack of connection, etc.

4. Identify design challenges

Basing on the pieces of information you have collected, write **sentences describing challenges** using the following formula: **How could we ... + action + user + need?**

Examples:

§ How could we help shy students participate in class without feeling like they are in front of everyone?

§ How could we make immigrant families feel as a part of the school community?

§ How can we reduce the anxiety that some teachers feel when faced with difficult classes?

5. Final check on the challenge

o Have the challenges been formulated basing on real needs rather than assumptions?

o Do they focus on the user rather than on our limitations?

o Are they open-ended enough to allow for multiple solutions to emerge?

Reminder for the team

An effective solution starts with a sensible problem definition.

We do not design basing on what we believe, but on what we understand.

The empathize phase is iterative in character. Continuously deepen your understanding by gathering more information and insights.

By the end of this phase, the team assigned to work on the solution should have a broader understanding of the challenge and goals to be achieved basing on data-driven decisions. All discoveries made are aimed at expanding knowledge and insights, as well as at reaching consensus on what to focus on what the desired outcomes for users should be.

In some cases, the empathy phase may lead to the discovery that there is no need for further development, as the question has been sufficiently clarified and there is no demand for a product or service related to the research conducted. Such a realisation is valuable, because it saves time and resources that would have been spent on unnecessary development-oriented work.

Some ideas generated at this stage may be ready to be tested straight away. Due to their clarity and consistency, they can be quickly developed into prototypes or experiments that may then be evaluated in real-world settings. By testing said ideas at an early stage, designers can gather valuable feedback from users and other parties involved, allowing them to refine and iterate initial concepts basing on real-world insights.

Nevertheless, it has to be remembered that not all ideas will be ready for immediate testing. Some may require additional development and validation before being suitable for effective evaluation in real-world settings. These ideas need to go through the stages of the Design Thinking process, which include definition, concept generation, prototyping, and testing.

3.1.3 Key aspects of the empathize phase

Understanding key elements of empathy phase preparation and assimilating ideas associated with stages such as the discovery phase is essential.

3.1.3.1 Mental preparation, taking a stand and redefining our identity.

The empathy phase is oriented towards deeply understanding the problem and defining its boundaries by means of analysing the context and perspectives of individuals involved. Even though it may seem simple, an empathic approach requires certain conditions to be met. It is often hindered by emotions such as pity, fear or moral indignation. They are not conducive to a true understanding of the other person. What is even more, they may block empathy.

Before moving on to consecutive steps, it is vital to initially understand one's own point of view. It is worth asking ourselves: "What is my position on this issue?". Such self-reflection will help better recognise moments when we judge others' opinions, react emotionally or analyse others' arguments. Being aware of our own beliefs makes it easier to gather information in a more open and objective manner. Whether we are open to new ideas, perhaps conflicting with our existing beliefs, will determine how much authentic information we receive. It is not a matter of writing down only what we agree with, but rather - carefully recording everything our interlocutor says, regardless of our opinions.

At the same time, it is worth considering whether our organisation is adequately prepared to deal with the challenge faced. It requires defining our own identity, along with its characteristics and operating mechanisms, which can be contrasted with other examples. In order to achieve that, we will use the Analogies and Antilogs tool [02_Empathize_10_Analogs_and_antilogs], which allows to compare ourselves with paradigms we would like to emulate and those we want to clearly distinguish ourselves from.

Sometimes, because of the confusion in our minds, we find it difficult to put ourselves in the shoes of the people we are 'listening' to. How many times have you walked into a meeting without even having a moment to digest the content of the previous one? How often do you find yourself drifting off during a conversation, instead of really listening to the other person? These are normal aspects of our current lifestyles. Even though many people experience them on a daily basis, it is important to be aware of such habits and control ourselves in order to try to enter every conversation with a clear mind and the ability to listen in an active fashion.

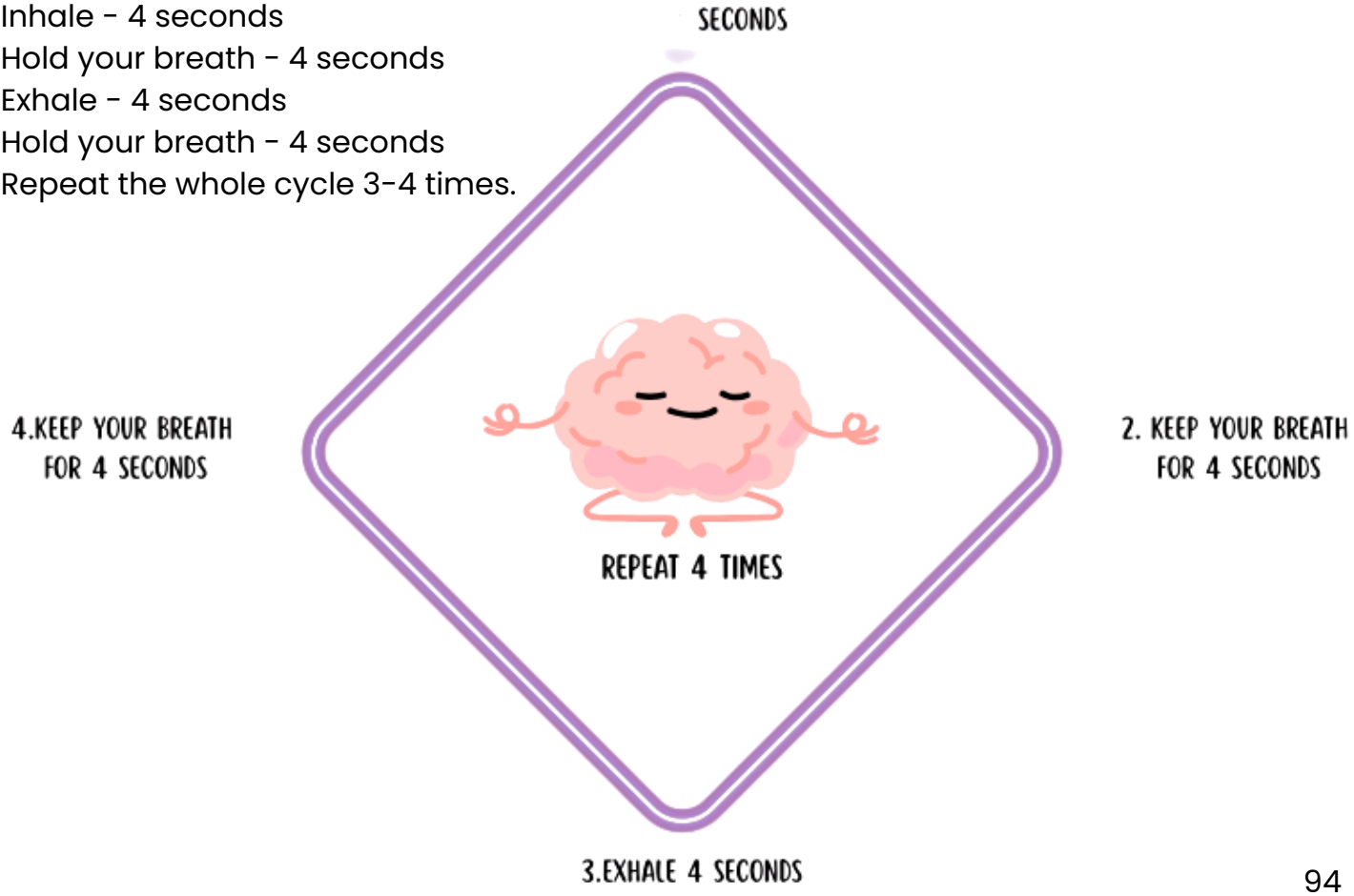
3.1.3.2 Active listening

Active listening is a communication-related competence that involves a conscious and committed focus on the other person's speech, taking into account both verbal and non-verbal messages being conveyed. The aim of such an approach is not only to hear the words, but also to understand the emotions contained, the intention and the context of the utterance.

In order to calm the mind, improve concentration and balance the two hemispheres of the brain, a simple breathing technique can be taken advantage of. Breathing has a direct impact on our mental state. While used appropriately, it can help you calm down, activate you or prepare you for an important meeting in a matter of minutes.

One such technique is the 'Square' exercise, which takes just one minute and requires no special conditions or materials. It can be performed in almost any situation - standing in a queue, sitting in a car or waiting for a job interview. There is no need to adopt a yoga position or close your eyes. Just take a moment to focus on your breath.

The exercise can be done as follows:
Find a comfortable position. You can sit or remain standing.
Take a few deep breaths in and out to prepare yourself.
When you are ready, release all the air out of your lungs and start breathing in a 'square' rhythm:
Inhale - 4 seconds
Hold your breath - 4 seconds
Exhale - 4 seconds
Hold your breath - 4 seconds
Repeat the whole cycle 3-4 times.



This short exercise will help you regain your composure, increase your mindfulness and prepare you for action.

If you have the opportunity to do so, you can lengthen the duration of the individual breathing phases. Conversely, if it is too difficult for you, shorten them. Remember that one pause (for example: after an inhale or after an exhale) may be more challenging than another. That is completely normal. The key is to adapt your breathing rhythm to your current ability and mood. Nevertheless, try to keep all four stages of breathing equal in length in order to maintain the consistency of the exercise.

After the breathing exercises, our mind is ready to focus on the speaker and actively listen while at the same time paying full attention.

Another exercise helping develop active listening skills is the 'Tell my story' one. The interview team can repeat this exercise several times to improve deep listening skills.

- **Divide into groups of 4 people.**
- **Each group should then divide into 2 pairs.**
- **In pairs:**

One person tells a story related to his or her current life situation - preferably about a relationship with a loved one.
The other person listens carefully, paying attention not only to the content, but also to the **body language, tone of voice and emotions** of the story.
After the story is finished, roles are swapped.
After pair discussions, everyone returns to the group of 4.
Each participant now has the task of **telling the story of his or her pairing partner** as if it were his or her own story, **using first person ('I') for narrative purposes**.
It requires not only careful listening, but also the ability to reproduce the speaker's style of speech and emotions.
This exercise teaches empathic listening, attentiveness and understanding of another's perspective. It also helps develop the ability to convey content while at the same time maintaining the other person's authenticity.

3.1.3.3 Role of research in the empathy process

This section discusses good research practices and is directly linked to the empathy phase, which is the exploration and discovery-oriented phase. It is here, because at this stage research involving people is most often conducted and data of a particularly sensitive nature (including personal, psychological, sociological, or cultural pieces of information) are collected.

Unlike laboratory research, which aims at objectively understanding natural phenomena, working with people in their real environment requires much greater sensitivity and ethical responsibility. Any action performed in this context should be based on a solid ethical foundation that takes into account the dignity, well-being, as well as perspective of those involved in the research.
To better understand what research is, it is worth starting with the etymology of the word itself. The 'research' term derives from the Old French 'recherche', meaning 'to seek'. This meaning remains valid. Researching is a process of seeking information that makes various avenues and possibilities available.

Nowadays, the 'research' term is usually added to the 'systematic' one. It means planning in advance, which increases transparency and reliability. However, it does not mean discarding unexpected information or observations. On the contrary, any new piece of information can prove to be valuable, as long as we remain aware of the process and the objectives we have set for ourselves. Research planning process is as important as its implementation. Each step takes time. The thoughtful structure of activities helps build a professional image of the research team. Individuals involved in the research should be clear that the activities are planned, follow a specific order and take place at the right time. It in turn increases their confidence and sense of security. The lack of proper planning in the research process may lead to serious irregularities. An example of this is when organisations declare that they will inform participants of the research results, but they never do so, because there has been no prior planning as to what to do with the data obtained.

The situation is similar with surveys. Organisations often ask users to complete them, but without informing them for what purposes the information collected will be used. Often, there is a vague phrase 'to improve our services', which does not specify what specific areas are to be improved. Even though this can sometimes be guessed from the questions asked, the lack of clear communication raises doubts and undermines respondents' confidence. In a user-centred design process, especially in the empathy phase, the presence of a research team is crucial. By involving several people, it is possible to collect a variety of information from multiple perspectives: cognitive, emotional, social or cultural one. The diversity of team members (in terms of competences, experiences or roles in the organisation) increases the chance of identifying nuances and hard-to-spot user needs.

At the same time, the more data and viewpoints are gathered, the more important it is to be capable of filtering information. The team has to learn how to narrow down the scope of data being analysed so as not to get lost in an overabundance of signals, while at the same time not missing out on any key threads. It is particularly important not to fall victim to what is known as 'confirmation bias', namely - unconsciously focusing on information that confirms an already preconceived idea for a solution.

Research ethics play a huge role in this context. It ensures consistency of action, fairness to subjects and clarity within the team. Ethical principles help avoid mistakes and abuses, both in relations with research participants and between members of the project team.

The lack of an ethical framework can lead to situations where:
- research participants do not know what will happen to their data,
- team members unknowingly manipulate results to match expected outcomes,
- information is used in inappropriate ways, for example: outside the original purpose of the study.

It is also worth remembering that even in teams having g ood relationships, informal shortcuts or assumptions such as 'after all, everyone knows that' can emerge over time. That is why formalisation of ethical rules is needed even in the environment where members know and trust each other.

Said rules must be discussed and agreed upon by the team before work begins:

Explain why obtaining informed consent from participants is ethically important. Follow up with describing steps researchers take to ensure that participants understand the purpose, procedures, possible risks, and benefits of participating in a study. Review examples of successful informed consent processes and potential challenges in different research contexts.

Explain why obtaining informed consent from participants is ethically important. Follow up with describing steps researchers take to ensure that participants understand the purpose, procedures, possible risks, and benefits of participating in a study. Review examples of successful informed consent processes and potential challenges in different research contexts.

Learn about ethical responsibilities of data management, including data collection, analysis and storage. Discuss best practices regarding maintaining research data integrity and the importance of transparent reporting. Discuss issues related to data manipulation, data fabrication, as well as the role of peer review in adhering to research ethics.

Explore ethical challenges of conducting research in a global context, especially during cross-cultural collaboration. Discuss the importance of cultural sensitivity, respect for local norms and values, as well as the need for equitable partnerships between researchers from different regions. Review examples of successful cross-cultural research collaborations and learn from potential pitfalls.

Depending on project implication and its scope, sensible scientific practices should also be considered when conducting research. Within the scope of this handbook, they are understood as a set of principles and guidelines that researchers follow in order to maintain the integrity, credibility and ethical standards of their work.

3.1.3.4 Discovery

The empathize phase is broader and incorporates different types of approaches to both users and people involved, as well as to the surrounding context as a whole. The last part of this phase is 'discovery', which can be understood as the final outcome of the empathy phase.

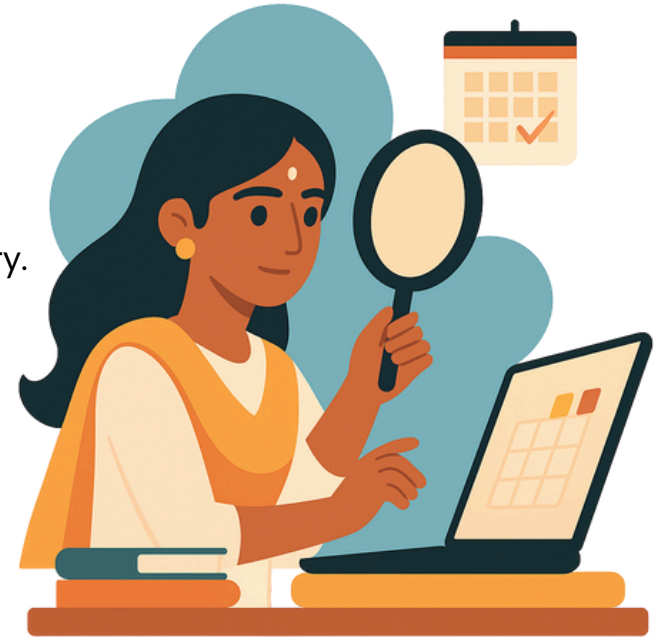
The last part of the empathize phase, **discovery**, consists of an in-depth analysis aimed at understanding users and their context. It provides a perspective on the challenge that truly addresses their needs and improves their experience. Thanks to such exploration, significant discovery can emerge. What exactly are we discovering? Needs of users, factors that shape their daily lives, issues that affect their routines, and their expectations for the future.

Two key points are worth emphasising:

1. At this stage, we are not talking about products, services or solutions; our focus is solely on the users.
2. Needs identified are neither trivial nor immediate. In other words, if a student needs to look after their health and fitness for various reasons, it is not enough to simply put a gym next to their house. Projects are always more complex, having numerous variables and nuances.

Why do we call it 'discovery'?

If something is obvious, immediate and trivial, it will not be considered a discovery. For example, you may need a library to improve your reading performance at school. Does that qualify as a discovery? Not really. We need to avoid projects that do not delve into needs and are defined in such a basic way. Instead, our challenge may be quite different: 90 per cent of students regularly read daily, share reading with their families or use reading as a way to integrate with other cultures. In such cases, it is clear that simply having a library is not enough. In some scenarios, a library may not even be necessary.



We discuss 'discovery', because it is after the empathy stage that most important aspects of the user's reality, namely - their needs, motivations and challenges - are revealed. We discover them through research and observation, not because the user explicitly talks about them.

In more technical terms, discovery allows to define insights. The team identifies key discoveries or 'insights' that will guide consecutive steps of the process. These insights are deep discoveries pertaining to users and their experiences that can lead to innovation opportunities.

What is important during the discovery phase? After an intensive empathy and exploration-oriented work, we take advantage of visual thinking techniques in order to synthesise information that allows people to understand, assimilate and adapt the information gathered. Essentially, **the discovery phase is the cornerstone of the Design Thinking process, laying foundations for a successful and user-centred design process**. It helps designers formulate problems, gather insights, as well as create a solid foundation on which to **build the next stages of concept development, prototyping and testing.**

Being open to all new information is crucial to outline a plan of action with the right problem, being the one we want to focus on (as many others will emerge during the process), thus creating the right solution.

As it has been mentioned earlier, this phase is about discovery, meaning that there is no existing service or designed product yet. The difference is that in the case of a designed product, this phase would have the explicit purpose of gathering information to justify why the product or service should be created, thus excluding all pieces of information that do not support the solution as the answer to the main challenge. The discovery phase ends when the questions to be answered are: "What are the users' needs for (product/service)?" or "What needs to change about this service/product to make users want it?".

The discussed phase works well when it allows for different solutions and therefore different products and/or services to emerge. Discovery is the first step in the double diamond diagram presented at the beginning of this Manual. Once this phase has been completed and a complete picture of the context has been identified, the project team has to jointly identify what the challenge is exactly. Only then is it possible to move on to consecutive stages: idea generation and idea testing, being parts of the development phase.

To fully immerse ourselves in the everyday experiences of the users we are designing for, a 'Shadow Learning' session may turn out to helpful: tool 02_ Empathize_14_Shadowing_learning.

Discovery phase techniques and tools

A part of the work of Design Thinking is to formulate right questions to find answers to meet the challenge. At this point, it is also cital to understand that we do not know all the answers. Sometimes, it is worth consciously letting go of assumptions about the answers. We may already know them, but we need to look at them from a new perspective. It is user information that is the answer we are looking for. Such data focuses on new things or points of view that we have not thought of.

It is very common that we are invited to join a team, because we have the tools to find ways to meet a challenge. Changing the way we think and asking questions is most likely the first step of the research phase. The most important question when it comes to discovery in Design Thinking is "What problem are we trying to solve?". It will help everyone involved in this phase focus on the research, conversations and future actions that will be taken.

To gain insight, it is crucial to go beyond the obvious and identify valuable or sometimes unexpected pieces of information or perspectives. Below, there are some techniques that may help you approach this phase properly:

Active listening: pay close attention to what others are saying. Do not interrupt and carefully observe not only their words, but also their tone of voice and body language. It will allow you to understand their thoughts, emotions and points of view better. Furthermore, try to avoid planning your response. If you notice yourself doing this, consciously abandon the thought and refocus on the interviewee. To effectively prepare for active listening, take a moment to calm and focus your attention. It can be done a few moments before the conversation starts. Take a moment to do this by means of opting for the technique that suits you best. If you do not use your own technique, the previous section explains the 'square technique', which is effortless to do.

Empathy: It may seem redundant as it is the name of the phase we are currently going through, but it does not hurt to understand and reiterate that it is about putting yourself in the shoes of others to understand their experiences and feelings. Empathy allows to make a deeper connection with people and discover insights that may not be immediately apparent.

Observing behavioural patterns: Observe people in their natural environment. Pay attention to their actions, habits and interactions. Observing behavioural patterns can reveal matters and insights that cannot be conveyed through verbal communication alone. Pay attention to non-verbal signals, such as body language and facial expressions, as they often provide valuable clues when it comes to users' emotions and preferences. Additionally, consider the context in which the behaviour occurs, as environmental factors can have a significant impact on the actions and decisions of individuals being observed. [02_Empathize_13_Observation_techniques].

Divergent thinking: Encourage creative thinking and brainstorming in order to generate a wide range of ideas. Allow for divergent thinking, in the case of which participants explore different possibilities without immediate evaluation. It can lead to unexpected insights and innovative solutions. Do not be afraid to ask 'crazy' or unexpected questions. They are the ones that often lead to breakthroughs and open up new perspectives. To stimulate creative thinking and open up to different possible solutions, use inspirational phrases such as: "How could we...?", "What would happen if...?", or "Imagine you have a million euros - what would you create to solve a problem related to...?".

Interdisciplinary collaboration: collaborate with individuals from different disciplines or backgrounds. Diverse viewpoints may provide valuable insights and alternative approaches, leading to a deeper understanding of the problem being analysed. Talking to experts, such as scientists, sociologists or politicians, can help see the broader context of the problem and new possibilities not previously considered by users.

Questioning assumptions: Pay attention to assumptions, both your own and those of others. It is underneath these that important insights are often hidden. Consciously subjecting them to reflection makes it possible to you to open up to new perspectives and discoveries.

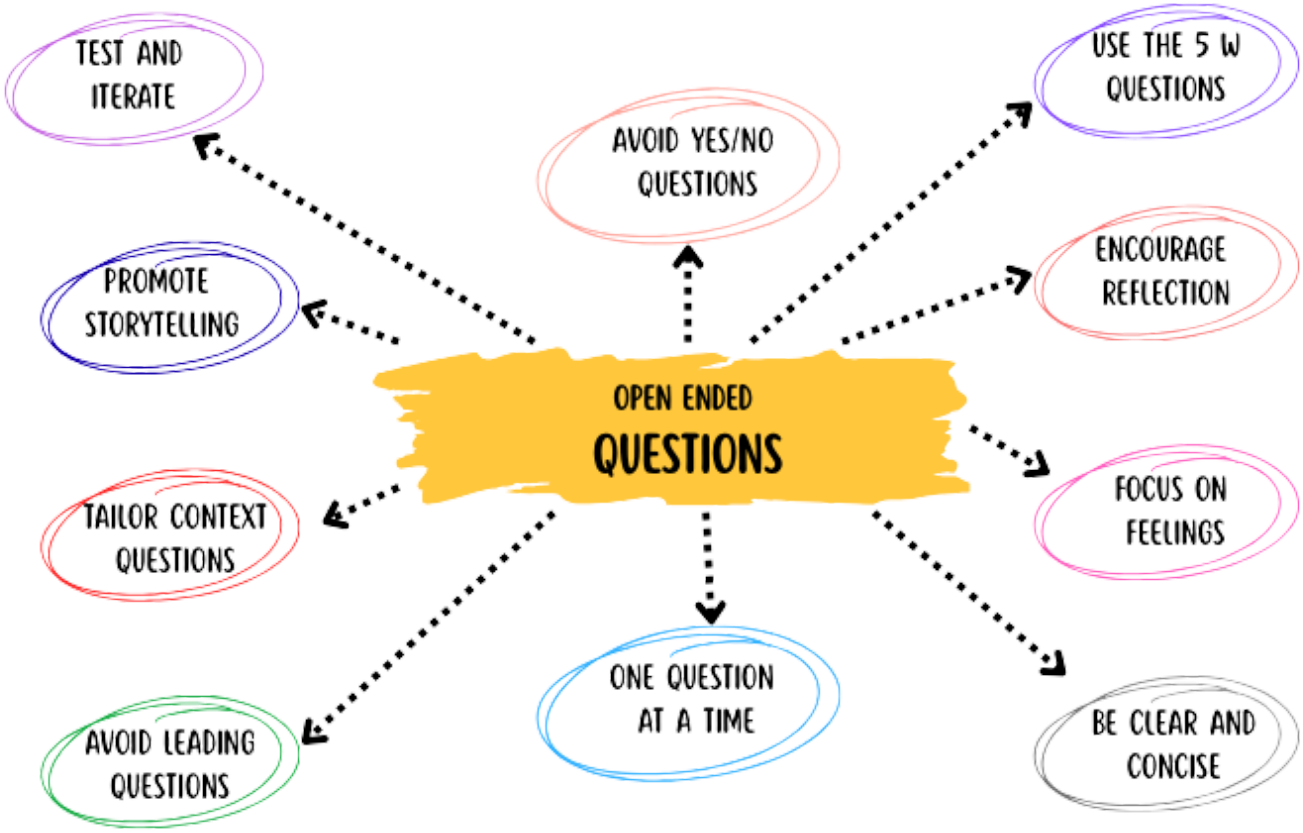
Thought mapping: Create mind maps in order to visually organise information and connections. Mapping relationships between ideas or data points may help uncover patterns and potential insights. Mapping can also be done with interviewees to understand how they organise information and prioritise different concepts better.

Synthesise information: Gather pieces of information from different sources and synthesise them in order to find general themes or trends. Synthesis involves combining different information to create a more comprehensive, coherent and integrated understanding.

Feedback loops: Create a feedback loop to continuously collect feedback from stakeholders, users or team members. Regular feedback may help find areas for improvement, validate assumptions, as well as uncover insights throughout the development process. External perspectives can also help refine the synthesis and discover blind spots or alternative interpretations.

Experiment and introduce changes: Take advantage of an iterative approach to problem solving. Experiment with different solutions, gather feedback and adapt your approach basing on lessons learned, opening yourself up to the possibility of re-examining and adapting information. The iterative character of the process often leads to deeper insights over time. Remember that the process of discovery is an on-going search for meaning. It requires curiosity, an open mind and the willingness to explore different points of view. Keep a flexible approach, allow yourself to be surprised and experiment with different techniques to understand user needs in different situations better. [you can do that by using the 02_Empathize_15_Focus_group tool. In order to conduct research effectively, it is essential to have a plan of action. It then serves as a kind of map to help you stay on track. It can be helpful to prepare a set of key questions that not only develop the main idea, but also point to alternative paths, allowing you to focus on most relevant possibilities without having to analyse each one.

Ask open-ended questions: Encourage open conversation by asking questions that require more than a simple 'yes' or 'no' answer. Use questions such as "Can you tell me more about...?" or "What do you think about...?" in order to encourage deeper reflection and discussion. Play around with modifying the design and scope of the questions, see how it changes the direction of the investigation, look for overt and covert assumptions, and see whether they support or hinder exploration.



Open-ended question formulation is the skill of crafting questions in a way that encourages detailed and thoughtful responses, providing a deeper understanding of the respondent's thoughts, feelings and experiences. Below, there are some tips on for formulating open-ended questions for users, stakeholders or other individuals related to the challenge being addressed.

When starting an open-ended question exercise, there are a few matters that we should keep in mind, as users have their own preferences:

- *Avoid questions that can be answered with a 'yes' or 'no':*

Instead of asking questions that can be answered with a simple 'yes' or 'no', phrase the questions in such a manner to elicit more elaborate answers. For example, replace the question "Did you enjoy the event?" - with the following one: "What aspects of the event did you like?". The answers may be quite different from what you expect.

- *Use '5 W' questions or open-ended questions:*

They are usually opted for by journalists to report on events and are easy to remember: "What?", "Where?", "When?", "Who?", and "Why?". Starting questions with words such as "you mentioned", "how", "describe" or "tell me about" encourages respondents to provide more detailed and narrative-oriented answers. [02_Empathize_09_The_5_whys].

- *Encourage reflection*:

Formulate questions in such a manner to encourage respondents to reflect on their thoughts or experiences. For example, instead of asking: "Did you learn anything new?", ask: "What new insights or knowledge did you gain from this experience?".

- *Focus on feelings and experiences*:

When seeking a deeper understanding of emotions and experiences, formulate questions that directly relate to respondents' feelings. For example: "How did you feel when...?" or "Can you describe a moment when you felt...?".

- *Be clear and concise*:

Questions should be clear and concise in order to avoid possible misunderstandings. Clearly communicate what information or insights you are looking for without complicating the question. Additionally, inform the respondent that you can rephrase the questions or give an example. However, it is worth avoiding this so as not to influence the content of the answers.

- *Ask one question at a time*:

Ask one question at a time to avoid overwhelming the respondent. If a question has several parts to it, consider breaking it down into smaller, easier to digest questions. Questions that are too long or have multiple parts often result in only the last part of the question being answered. Earlier parts tend to be skipped or forgotten

- *Avoid suggestive questions*:

Avoid questions that impose a particular answer or indicate what answer would be the most desirable one. Remain neutral to encourage honest and unbiased opinions. Be mindful of the tone of voice and body language. People have a natural tendency to avoid confrontation. If they sense the attitude of the interviewer, they will most often tailor their answers to what they think the interviewer wants to hear.

- *Adjust questions to the context*:

Consider the context of the interview or survey. Tailor questions to the specific situation, ensuring that they are relevant and meaningful to the respondent. Even though it is useful to stick to a pre-determined plan, new themes relevant to the study may emerge during the interview. If it is the case, it may be useful to flexibly adapt subsequent questions to deepen them. Respondents often bring up topics that seem irrelevant at first glance . There is a fine line between consciously diverting the conversation (when it does not add cognitive value) and listening carefully. The latter allows you to see whether the statement contains relevant information the respondent wishes to convey.

- *Promote storytelling*:

Ask questions that encourage respondents to share stories or examples. For example, ask: "Can you tell about a situation where...?". Such an approach often leads to richer and more illustrative answers.

- *Testing and repetition*:

If possible, test questions on a small group before using them more widely. It will allow you to refine and clarify any ambiguities based on feedback.

Examples of open-ended questions:

"What do you think about [a specific topic]?	'How would you describe [a relevant area]?
'Can you share your perspective on [a specific topic]?	'Can you tell me about your experience with [a relevant area]?
'What factors do you consider when choosing [a relevant area]?	Can you describe your experience with [a specific topic] in your own words?
How would you define success in terms of [a relevant area]?	What factors influenced your perspective on [a specific topic]?
Can you share a specific example or story that illustrates your experience with [a topic]?	What do you think are the most important challenges related to [a relevant issue]?
What emotions or feelings come to mind when you think about [a specific experience]?	How would you describe your approach to [a related action or process]?
How do you think [a specific event or situation] has affected your life [personally or professionally]?	What do you think are the key elements that contribute to [the desired outcome]?
Can you describe any particular moments that stand out in your [personal or professional] journey?	What would happen if you had no constraints in finding a solution [to the right issue]?

Keep in mind that the aim is to **create an atmosphere conducive to openness** and encourage participants to **share their thoughts and give honest and detailed answers.**

Adapt questions to the specific context and objectives of the qualitative interview. Conducting an effective interview is crucial when it comes to obtaining reliable, in-depth information that truly reflects the participant's perspective.

Open-ended questions are an integral part of qualitative interviews.
Below, there are some useful tips **that can help you** conduct them effectively and empathetically:

- **Warm welcome:**

Start with a warm welcome and a brief introduction to make the participant feel at ease.
Your friendly approach and genuine interest in the interviewee's perspective will help build trust and facilitate rapport.

- **Purpose of the interview:**

Explain the purpose of the conversation. Assure the participant that the information collected will be kept confidential.
Clearly stating the purpose of the interview and the way the collected data will be handled reinforces the sense of security and encourages honesty.

- **Start with simple questions:**

Begin with straightforward, neutral questions that do not raise concerns.
It allows the participant to 'get comfortable' with the situation and get into the rhythm of the conversation.
As the interview progresses, gradually introduce more detailed and in-depth questions.
Make sure that they are open-ended in nature and allow for reflection and free expression.

- **Balance between guiding the conversation and following the participant:**

During the interview, try to maintain a proper balance between the planned course of the conversation and responding flexibly to what the participant says.
Follow what comes naturally from their answers. Said approach will make the conversation more authentic.
Do not be afraid to modify questions or their order if you see that a different direction of the conversation leads to valuable insights.

- **Final stage of the interview:**

End the conversation by thanking the participant for his or her time and reiterating the confidentiality of the information provided.
Expressing gratitude and confirming both your understanding and respect for the participant's participation will help end the conversation on a positive note.

By following the guidelines presented abpve, you can effectively conduct a qualitative interview and gather valuable pieces of information that will not only enrich your research but also help you in your decision-making process.
At the same time, you then establish relations based on trust and create an atmosphere of openness and respect.

3.1.4 Inspiring examples of true empathy

After familiarizing yourself with the first part of the process on empathy, you probably did not learn much new. We all know that in order to understand the needs of a user or customer and offer him or her appropriate solutions, we need to be close to him or her. It seems obvious. Nevertheless, knowing it and applying it are two completely different things. We should go one step further by clearly emphasising the importance of empathy in our team. It is crucial that we really treat it as a value and consistently develop this skill through daily practice.

It is not about designing FOR the user, but rather - designing WITH the user. It might be the best motto for the empathy phase and the whole Design Thinking process. Said distinction is very important.

Think of a toy factory: one can imagine that a good working method would be to assemble a team of 'experts' from different disciplines (ergonomics, education, psychology, production, etc.) to detect, analyse and study children of a certain age and, basing on this analysis, decide which toys are best to include in the final catalogue. The toy factory will then select toys that always meet consistent quality standards and are in line with its own philosophy.

During the second case, the toy shop does not have an experienced team. Instead of carrying out research and producing reports on its users, it contacts them directly. The children become part of the design team, helping to filter, test or verify ideas. It is a close, honest and trust-inducing environment. Other members of the team do not feel pressure to promote a certain type of toy, but rather - adapt completely to what the children and their families want.

The first approach has proved successful so far, but is losing effectiveness as the market becomes saturated and creativity stagnates. In such scenarios, the second approach, which is more empathetic and open in nature, provides more out-of-the-box ideas and user-centred concepts.

The first approach is to design toys FOR children and the second approach is to design toys WITH children. The provided example does not mean that including children in the team means that they decide on the final design of the products or the whole process. Rather, the idea is to give them a voice at certain stages of design, both to describe problems or undesirable situations and to come up with innovative ideas.

Below, there are some inspiring examples:

1.Walt Disney's strange behaviour

One of the first inspiring examples of empathy towards users is the attitude of Walt Disney. During a visit to the construction site of his first theme park, Disney's technical and design team noticed something unusual: Walt Disney would kneel at the entrance to each attraction. Why was he doing this? Walt Disney wanted to see the park as children see it - from their level and at their scale. It is an example of 'putting yourself in another person's shoes' or, in this case, 'getting down to their level'. It is an exercise in real empathy, not just theoretical one.

What does it mean to put oneself in the shoes of someone else?

It means consciously and empathetically looking at the world from the other person's perspective, understanding his or her emotions, needs, limitations and everyday experiences. In the context of design, it means stepping into the role of the end user and trying to feel what he or she is experiencing. Only then can you create solutions that truly match his or her reality, even if it is completely different from yours.

2. Fair Trade yoghurt

As mentioned at the beginning, we all realise that we need to be close to the people involved in our projects, especially those to whom we want to provide the product or service we are interested in. Said idea has popularised interviews and even online surveys which, although simple and easy to use, often do not reflect the reality.

An example of this is 'Fair Trade yoghurt'. The case relates to an NGO managing various solidarity projects in northern Senegal, which was looking for ways to raise funds for its initiatives. As the organisation worked with local pastoral communities, it came up with the idea of linking a popular dairy product, yoghurt, with development projects in pastoral communities in Senegal.

Before negotiating with potential partners, the idea was tested among consumers of a particular brand of yoghurt on the market. They were asked whether they would still buy the yoghurt if its price was increased by just 5 euro cents in order to support solidarity projects. The results were promising: more than 85% of respondents asked said they would undoubtedly continue to buy yoghurt and even switch brands if they supported fair trade. With this data in hand, a marketing campaign was launched, a promotional design was developed and tests were carried out in one supermarket to confirm the data. As part of the experiment, half of the yoghurt stock was labelled with the NGO's label. What was achieved? Yoghurts without the label disappeared from the shelves, while those with the label remained almost untouched. Only 3% of customers opted for the fair trade product.

Several conclusions that can be drawn from the presented case:

- **People are not always honest.** Whether it is due to politeness towards the interviewer, social conventions, moral dilemmas or personal complexes, people do not always say what they really think. It is vital to bear this in mind. A survey or interview alone is not enough to confirm a hypothesis.
- **Actions speak louder than words**. All of a person's statements should be filtered through his or her actions. In our research, we often focus too much on surveys or interviews and too little on observing behavioural patterns.
- **Be aware of stereotypes and hasty generalisations.** When something goes wrong, we often blame others and avoid taking responsibility. In the case of the yoghurt project, the immediate conclusion was that the customers were not socially aware. This is an oversimplification. A given person may not support an NGO for many reasons, for example because he or she already supports other organisations, he or she does not understand the projects or he or she is unsure about the proposal. Our job is to uncover these uncertainties and address them through a more compelling and attractive offer.

3.Ideal software that no one has installed

This case was particularly striking, because the technical team could not for a long time figure out why their perfect product was not achieving the expected results. The product was specialised software for managing entertainment programmes on television. It had a wide range of functions and, when tested by various users, the results confirmed its effectiveness. The software was supplied on a CD to boot, the instructions were simple and the installation process did not cause any problems. Nevertheless, once the campaign was launched, it became apparent that the number of installations was extremely low. The installation process and instructions were re-checked and everything seemed fine.

One of the employees, tired of all the assumptions without any conclusion, decided to visit his friend and, on this occasion, offered him the software to see if there were any problems with the installation. When he arrived at his friend's house, after a short conversation, he handed him a CD with the new software and explained how to carry out the installation. As the installation was going to take some time, they were able to continue the conversation while it was going on in the background. Then, the children and the friend's wife arrived. Even though the software was being installed, it was taking too long. The children wanted to start watching their favourite TV programme. The father cancelled the installation and instead turned on the programme the children wanted to watch.
It proved to be the key to solving the problem. To terminate the installation, the father would have had to find another date and restart it. It would require working without any interruptions, which was difficult to achieve in the family home. Once the problem was identified, the solution was simple. Instead of providing one CD with a long installation time, the installation kit was modified to include two CDs characterized by a shorter installation time, allowing the software to be installed in two stages rather than at once.

Conclusions drawn from this case:
We learned from this case that during any interaction, many unexpected situations may arise that we least expect. We learned that sometimes problems arise from completely unexpected factors or from trivial issues rather than from complex technical issues. Said overlooked factors can only be discovered when we are close to the user environment, naturally connected to it, without being influenced or conditioned by the observation process.

4.Kindergarten with parents being late
A kindergarten had a problem with parents who were late to pick up their children, which caused organisational and logistical isses. The administration and staff met and agreed that the best way to avoid lateness would be to impose small penalties. The first week was to be informative and penalties were to be imposed from the second week going onwards. This measure was justified as the only way to prevent lateness, not as a tactic to generate income, but rather as a way to ensure better organisation for the benefit of all, including students, teachers and families.

During the first week the results improved slightly, but then something unexpected happened. From week to week, lateness increased instead of decreasing. What happened? It turned out that families were still facing same problems of getting to school on time. Before the introduction of fines, they tried to avoid being late, as they did not want to give the wrong impression. Nevertheless, after the fines were introduced, paying them seemed to absolve them of guilt, so many families chose to pay the fine instead of rushing to get to school on time.

After said event, the administration realised that the problem was not as simple as it seemed and decided to tackle it in more detail, involving the families directly. After a number of meetings, the administration staff realised difficulties of balancing family and work life, mobility problems and the limited number of parking spaces near the school were key issues to be faced. Over the course of the year, meetings were held to discuss various proposals - but each of them presented different challenges, such as high costs, difficulties in implementation or the risk of generating new problems instead of solving the existing ones.

In the end, after listening to all the families and months of trials and experiments, it was possible to come up with a design that was much more effective and satisfactory for everyone. The focus was not just on 'avoiding lateness', but the scope of the challenge was broadened to create a more holistic approach. The question was asked: How can we improve logistics and access to the centre, while improving the quality of life for families? Ultimately, a system was devised, in the case of which parents organised themselves into groups to pick up pupils from different points in the city and drive them to school together, without having to use multiple cars, thus relieving the burden on other families. Each week, a group of parent volunteers was on duty and coordinated their activities through a simple mobile app. The developed system achieved multiple goals: it improved punctuality, reduced traffic congestion, promoted healthy habits, as well as strengthened the community.

Conclusions drawn from this case:

- **Focus on causes, not just on effects:** If we only address the undesirable effects of a situation, we risk applying temporary solutions only. It is essential to discover root causes of problems, which are often not apparent. The only way to discover them is through empathy, close contact with the people involved and participation.
- **Do not oversimplify the problem;** consider the full complexity: We often oversimplify problems by isolating them and solving them with standard or purely technical measures. It gives us a false sense of security. By looking at the problem holistically, we increase the number of possible solutions.
- **Be patient; nothing happens immediately:** We often want to solve problems quickly, but empathy and haste do not go hand in hand. Understanding people, their motivations, difficulties they face, as well as their personal situation requires proximity, which in turn necessitates patience.
- **There are no experts for everything and not all cases are the same:** we tend to look for experts to provide the perfect solution. Nevertheless, in the vast majority of projects, best solutions do not come from the experts, but from the people directly involved.

5. Crisis solutions

The prestigious School of Industrial Design organised a hackathon on designing materials for use in crisis situations. After several lectures on problems caused by various disasters, the participants, divided into teams, proceeded to design prototypes. One of such prototypes was highly appreciated by the jury, eventually winning the competition. It was even used by major United Nations suppliers, making it a complete success.

In the discussed case, the solution proposed was to design a bed structure out of cardboard. The solution was very satisfying for several reasons: cardboard is a cheap and readily available material, the structure was easy to assemble and disassemble, greatly simplifying logistics, it was lightweight, making it easy to transport, and it was easily recyclable. As mentioned earlier, it was a success and the design was used in many emergency situations.

Nevertheless, we would like to zoom in on a few situations where the solution was not entirely optimal, because needs of the end users for whom the structures were intended were not fully considered. One such case occurred at high altitudes in Tanzania, in a makeshift camp for about 300 displaced people. Many users found that cardboard was an excellent material for lighting fires to warm themselves, so they decided to use cardboard bed structures to light small fires at night.

In another case, during Hurricane Katrina in New Orleans, the situation was slightly different. In shelters where large groups of people were staying, many of them complained about the cardboard beds. They did not complain that the beds were uncomfortable or could not bear their weight. Functionally, they were perfect. Rather, they were offended by the material itself. Using cardboard beds was an insult to them.

The two cases provided are anecdotal and it cannot be said that the cardboard structures were not a success. They were, as they served their purpose. However, the failure to consider potential future problems led to unexpected complications that could have been avoided by means of small changes when it comes to communication with users.

Conclusions drawn from this case:

- Always consider end users. Even if your product is perfect, it will always require some specific features or aspects to be taken into consideration in order to adapt it to the needs of the target audience. Sometimes, when our product fails, we blame the user for not understanding or knowing how to use it, but we fail to consider that perhaps the problem lies with us and that we have not explained the specificity of the product well enough or have not adapted it to the users' needs or culture.
- Most effective way to develop empathy is through direct contact and shared experiences with users. Even best reports, documentaries or data are no substitute for real-life immersion in their daily lives. To truly understand needs and challenges of a group, it is helpful to experience its situation from as close a perspective as possible.
- For example, if we are designing a solution to support students who commute daily from rural areas, the greatest insight will be gained by accompanying them on such a journey - early in the morning, often with transfers, in varying weather conditions. Without this, it will be difficult to fully grasp how fatigue, transport constraints or commuting times affect their functioning and motivation to learn.

Conclusions

By investing time and effort in the empathize phase, designers can lay a solid foundation for creating solutions that are not only functional, but also resonate with users on a deep and meaningful level.

Said phase is similar to laying foundations for a building. The stronger the foundations, the more solid the structure. Similarly, empathy with users allows designers to go beyond superficial requirements and truly understand motivations, aspirations and pains of people they are designing for. Furthermore, insights gained during the empathy phase may serve as a guide throughout the design process, ensuring that every subsequent decision is rooted in empathy and based on authentic needs and experiences of end users. Essentially, the empathy phase is not just the first step, but rather - a continuous thread that runs throughout the design process in its entirety.

At this stage, it is also vital to recognise what has been done so far to address the identified problem - what has already been implemented, what is feasible to do and what remains out of reach due to cultural considerations, situational context, or the nature of the relationship. Looking at a situation from the outside, it is easy to form judgements without fully understanding the local context. Meanwhile, social relationships, while they may seem insignificant, often play a key role in explaining why certain actions are taken and others are abandoned. Participants may not respond openly if, because of their role in the community, they do not feel empowered to do so. Understanding why a situation has not been resolved is fundamental to further developing new solutions.

In addition to understanding the social dynamics and complexity of the context during the empathy phase, designers should additionally develop the attitude of cultural humility. It is the awareness that they do not know all the realities of users' lives and that they should express willingness to learn from them with respect and openness. It includes recognising and respecting the different perspectives, values and norms in the community or user group being studied. By embracing cultural humility, designers can avoid transferring biases and stereotypes to the solutions they design. This nuanced approach not only enhances the authenticity of empathy, but also promotes a more inclusive design process.

SUMMARY

3.1 Empathize

The empathy phase is the foundation of the Design Thinking process. In its course, the design team gets to know the reality of the users - their emotions, needs, barriers and experiences. The aim is not to find solutions, but rather - to deeply understand the people we are designing for.

Empathy in practice is not about guesswork or analysing statistical data, but about **listening without judgement, observing behavioural patterns, asking open-ended questions, and building relationships.** It is the stage where we get to know not only what users are saying, but also what they are unable or unwilling to express. Tools such as the Stakeholder Map [02_Empathize_06_Stakeholder_map], Shadowing learning [02_Empathize_14_Shadowing_learning], Role-Play [02_Empathize_11_Role_play] or Buzz Report [02_Empathize_04_Buzz_reports] support the collection of such observations and findings.

In the context of **Vocational Education and Training (VET),** empathy helps uncover students' hidden challenges, such as the fear of practice in the real work environment or the lack of confidence in their own skills. For students with special educational needs (SEN), an empathic approach can reveal sensory, communication or emotional barriers that are traditionally ignored by the education system.

The discussed phase requires **mental preparation, active listening techniques and awareness of one's own assumptions.** It is also a space for ethical reflection - how we conduct research, how we care for confidentiality and how we respond to diversity.

Practical effects of empathy are: well-defined project challenges, greater stakeholder engagement, stronger bonds within the project team, as well as the willingness to create **inclusive and useful solutions.**

Working in the spirit of empathy means designing **with users,** not just for them. It is a move 'from imagining to experiencing' - from planning actions to **listening deeply** to the other person.

That is why empathy does not and should not end after one session. It is **a continuous thread throughout the Design Thinking process,** to which the team returns when it needs to deepen understanding, revise assumptions or reconnect with the real needs of the audience.

3.1.1 Main objectives of the empathize phase

The empathy phase is the first and also the key step in the Design Thinking process. Its aim is to **gain a deep understanding of the user** - his or her needs, emotions, behaviour and the environment in which he or she operates. During said phase, designers abandon assumptions and s**tereotypes in favour of genuine listening and observation.**

Objectives of the empathize phase include:

- Understanding users and their perspectives [02_Empathize_05_Individual_interview_questionnaire],
- Identifying hidden needs, including those not explicitly expressed,
- Building an emotional connection and empathic approach,
- **Gathering insights** deep insights resulting from the analysis of user behaviour, needs and motivations. Insight is not an obvious fact, but a hidden truth that helps to understand why a given user acts in a certain way. Insights enable designers to create more relevant, tailored solutions that meet the real needs of the audience,
- Defining design challenges based on real-world observations [02_Empathize_07_Goal_definition],
- Avoiding assumptions and preconceptions,
- Stimulating creative thinking through an in-depth understanding of everyday user experiences and challenges,
- Enhancing team collaboration by learning about the audience together.
- In a VET context, empathy helps better understand young people at the threshold of their careers, together with their anxieties, ambitions and skills gaps. In SEN - it helps identify invisible barriers (sensory, language, and social ones) that affect the educational process of students with special needs.

VET example:
In a vocational school, students in the hotel management course complain that they find hotel placements stressful. Discussions in an intimate group based on the utilization of [02_Empathize_04_Buzz_reports] reveal that the problem is not the hotel itself, but the lack of cultural preparation. Students do not know how to relate to foreigners, which creates tensions.

SEN example:
A student with the autism spectrum disorder in a mechanics class avoids teamwork, which teachers initially interpret as the lack of commitment. It is only through empathetic observation and conversation that it is revealed that the cause is the excess of sensory stimuli, such as noise, intense sounds and movement, that causes the pupil to become overloaded. Instead of expecting a change in the student's behaviour, the team recognises the need to adapt the working environment to make it more neuroatypical and accessible. One simple but effective solution may be to allow the student to use noise-cancelling headphones during practical activities

3.1.2 Empathize phase stages

The empathy process can be divided into three main blocks of activities:

1. Understanding the user
It is the starting point: defining who the users are (for example: students with low motivation, migrant families, overburdened teachers), identifying their needs and perspectives. We use Buzz Report [02_Empathize_04_Buzz_reports], **questionnaires and empathy maps, among others to achieve that.** The aim is to collect as many authentic observations as possible and go beyond stereotypes.
VET example:
In an agricultural school, students are reluctant to participate in field activities, despite expressing interest in this form of learning. The analysis carried out using the Stakeholder Map [02_Empathize_06_Stakeholder_map] reveals that the real barrier is the lack of suitable work shoes. Many students from less affluent families cannot afford them. The problem is therefore not caused by the lack of motivation, but material constraints that require systemic support.

2. Identifying hidden needs
At this stage, we use Shadowing [02_Empathize_14_Shadowing_learning] and Role-Play [02_Empathize_11_Role-play] techniques to experience the world through the eyes of the user. It is the deepening of understanding when users are unable to name their needs themselves.
SEN example:
A dyslexic student systematically avoids hairdressing theory classes. Shadowing shows that instructions given orally are too fast for her and the teacher does not offer alternative forms of support. The student requires more visual aids and repetition. Non-verbal teaching tools are needed.

3 Generating design challenges
Basing on data from observations and interviews, the team designs questions like **"How could we...?"**, which become the starting point for further stages of the process (ideation, prototyping). Examples from the VET and SEN area can be as follows:

- How to help dyslexic students participate better in work placements?
- How to reduce sensory stress for students on the autism spectrum in the catering lab?

VET+SEN example:
The project team formulated the question "How can we provide accessible and understandable health and safety instructions to all students during work placements - including those with cognitive or communication difficulties?".

In response, video instructions were developed, taking into consideration universal design principles. They included with sign language translation, subtitles and simplified language. The prototype was tested together with students at the practical training centre, so that the final solution took into account their real needs and opinions.

3.1.3 Key aspects of the empathize phase

The empathy phase requires not only tools, but also attitude and mental preparation. Its most relevant aspects are as follows:

- Preparation and redefinition of identity

Before listening to others, it is sensible to ask ourselves: 'What is my approach to this topic?' It is supported by the Analogies and Antilogs tool [02_Empathize_10_Analogs_and_antilogs], which allows to identify your own beliefs, experiences and point of view, thus becoming aware of how these may influence your interpretation of the user's needs.

VET example:

A vocational teacher notices that his belief "toughness and resilience are all that matters in the job market" causes him to downplay emotional needs of his students. Through the use of the Analogies and Antilogs tool [02_Empathize_10_Analogs_and_antilogs], he begins to see that this approach can limit students' potential. By comparing his own experiences with examples of openness and empathy in other educational settings, he reformulates his approach and begins to better support students with their individual challenges.

- Active listening

Empathy requires total presence. We listen, observe body language, emotions, as well as pauses. Techniques such as 'Square Breathing' (focus regulation) and the 'Tell my story' exercise, which develops deep listening, help achieve the goal set.

Example SEN: In the 'Tell my story' workshop, the school caregiver steps into the role of a student with selective mutism and tries to participate in a practical lesson. Only then does she understand how silence in class is perceived as the lack of knowledge, even though the student understands and knows the material.

- Empathic research and ethics

Empathising can also be treated as research. It needs to be conducted with informed consent, confidentiality and cultural respect. It is particularly vital when working with students with special educational needs or minority groups.

Example VET+SEN:

When planning an empathetic research study, a technical school chooses to interview students with mobility disabilities in order to understand their experience of accessing technical labs better. The research team takes care of the ethics: it provides participants with full, understandable information about the purpose of the study (informed consent) and allows the participation of a communication assistant if needed. It allows students to feel safe and speak frankly about barriers they face. Their voices become a key source of insights that will be used later on to create inclusive solutions.

- Discovery - a key outcome

The aim of this phase is discovery - not of the obvious, but of the overlooked. It is the moment when we discover deep, hidden needs that cannot be read from the user statements, but which influence their everyday life. For example: The problem with low reading levels is not necessarily only caused by the lack of a library, but also by students not identifying with the reading culture due to linguistic or social exclusion.

VET example:

A catering school has built state-of-the-art laboratories, but students do not want to use them. Only an in-depth analysis shows that the space is too 'sterile' in design, resembling a hospital rather than a home kitchen. It negatively affects working comfort.

Empathy in the vocational education sector and working with students with diverse needs is not a luxury. It is rather the prerequisite for effective design. Only when teachers, educators and design teams learn to listen without assumptions can they identify real challenges:

- students who do not understand instruction but are ashamed of the fact,
- parents who want to help but feel excluded,
- teachers who feel burned out but do not speak out about it.

Incorporating empathy into all project activities is a way to create education that works, as it is created with people, not just for people.

3.2.1 What is the define phase and why is it so important?

What is the define stage? If a problem is not defined, it is difficult to determine the direction to take while searching for solutions. Systematising information gathered in the first phase of the Design Thinking process helps draw proper conclusions and plan consecutive stages of the design process better.

Defining is a key step in the Design Thinking process, which allows for precise identification of the design problem and sets the direction for further action. Said stage allows to understand the user's needs and formulate the design challenge.

During the defining phase, the following are important:

- **Identifying users:** It means defining the target group for the project and understanding its needs, motivations and aspirations. Field visits are an excellent way to immerse participants in the context of the problem or challenge to be dealt with [03_Define_24_Field_research].
- **Diagnosing the problem:** Precisely defining the project problem by analysing data collected during previous phases of the process.
- **Identifying benefits:** Recognising potential benefits of solving the problem, which helps justify its importance.
- **Looking for patterns and trends:** Analysing pieces of information gathered for recurring themes and patterns that may be crucial when it comes to finding a solution.

Defining requires the ability to interpret data, analyse its meaning and synthesise it - combining information into a coherent whole. It is a process that gives meaning to information gathered and lays the foundation for consecutive stages of the design process.

The defining phase aims to create a common understanding of the design problem within the team and establish clear goals for action. Through definition, the design process becomes focused and purposeful, providing the team with a clear perspective for action. It is also important to know which aspects we want to work on and which should be avoided, so to identify both positive ('Ins') and negative ('Outs') aspects of a given situation, problem or idea. It encourages balanced thinking and can lead to a more complete perspectives [03_Define_26_IN_and_OUT].

It is vital to devote sufficient attention and care to this stage, as properly defining the problem leads to better results in subsequent phases of the design process. Defining is therefore a key element allowing for effective and efficient project management by opting for the Design Thinking method.

Defining: Analysis and synthesis. After collecting research data, the project team should carefully analyse it and identify most critical problem areas. The discussed process requires analytical skills that make it possible for the collected material to be examined for relevant information. It should be followed by a synthesis phase, during which gathered pieces of information are used to search for patterns and trends that will help find solutions.

Analysis is the process of thoroughly examining the available data, information and insights gathered during the empathize phase. It helps to understand the problem being studied better by breaking down research material into smaller, more digestible chunks.

Synthesis is the process of combining and organising collected data to give it meaning.

It should be noted at this point that both analysis and synthesis are iterative processes, which means that they can overlap and repeat at different stages of the design process. Said processes allow for verifying the collected data, gaining a deeper understanding of the problem, and adjusting the approach to further actions. In the defining process, openness and flexibility are keys to better understanding the problem and formulating appropriate proper design challenge.

Defining plays an important role when it comes to the Design Thinking process, serving as a bridge between the research phase and the idea generation one. Its purpose is to precisely define the design problem and identify potential benefits of solving it. The result of the defining phase should be a clear design challenge that will guide consecutive steps of the design process.

Defining allows to verify information have gathered, narrow down the design area and focus on the user. It makes it possible to understand his or her needs and expectations better, which is a key element of effective design. Therefore, properly defining the problem is essential to achieving success when it comes to the Design Thinking process.

3.2.2 Key elements of the define phase

The design challenge is a key element of the Design Thinking process that defines the design problem and serves as motivation for action. To create it, several steps must be undertaken:

1.Identifying the target user: The first step is to identify the group of people who will utilized the solution. It is necessary to determine exactly who is affected by the problem and what the needs and expectations are.

2.Describing the problem: Next, it is vital to clearly define the problem the user is facing. Identify difficulties you are determined to solve during the project.

3.Defining benefits for the user: It is paramount to consider what benefits the user will gain once the problem is solved. It helps understand what value the solution can deliver and how it will impact the user's life.

4.Scope of the project team's influence: It is important to consider the realistic influence of the project team on reality. It helps understand team's capabilities and determine which actions will have the greatest impact. Our point of view is not necessarily the only or the best one. There is the need to consider all perspectives and then decide through which lens to view and perceive users and their contexts in order to approach the research [03_Define_23_360_perspective].
Moreover, it is useful to anticipate or think about possible future scenarios that may arise as the project progresses. [03_Define_27_Design_of_scenarios].

5.Considering potential constraints: It is worth considering potential constraints that may arise during the problem-solving process. It helps avoid unforeseen difficulties and prepare for different scenarios [03_Define_28_Problem_reframing_techniques].

The aim of the design challenge is to identify the gap between the current problematic situation and the desired state, namely - specify what can be achieved by solving the problem. It is crucial to formulate the challenge in a clear and understandable manner so that it motivates the team and provides a clear goal to achieve.

Creating an effective project challenge is a key step in the Design Thinking process, as it focuses on user's needs and the main problem to be solved. Below, there are a few steps to help you formulate an effective project challenge:

1.Consider the user's perspective: Focus on how the user perceives the problem and what the needs and expectations are. Understanding the user's perspective is key to creating a solution that will be useful and satisfying.

2.Avoid suggesting specific solutions: A design challenge should not contain ready-made solutions, but rather - open up multiple potential paths to solving the problem. Focus should be put on the user's needs rather than on specific solutions, allowing for flexibility and openness to new ideas.

3.Focus on the user's major problem: Try to identify and articulate the main problem the user is facing. Avoid trying to solve all needs at once, as it can hinder the effective development of a solution. Set priorities and focus on most important difficulties encountered by the user. [03_Define _29_Problem_statement_creation_through_point_of_view].

4.Step-by-step definition process: The definition process involves analysing data collected during the empathize phase, identifying user's goals and formulating the design challenge. Said process includes:

- Analysing research material: Organising and analysing collected data in order to identify key problems and user needs.

- **Defining user goals:** Determining what goals the user wants to achieve by solving the problem. It will help tailor the solution to his or her needs.
- **Formulating the design challenge:** Basing on data collected, formulate a clear and understandable design challenge that will focus the team's efforts on solving the user's main problem.

In short, the defining process serves as the foundation of the entire design process. At this stage, we determine who we are designing for and what we require to solve the problem. It makes the design process organised and meaningful.
The defining stage ends with the formulation of a design challenge that not only describes the design problem but also provides the reason why it has to be addressed.

3.2.3 From analysis to synthesis – how to work with data?

Definition can be broken down into three basic steps: analysing research material and identifying problems, defining user goals, as well as formulating the design challenge.

Analysis of research material and identification of problems. The essence of this step is to organise and analyse data collected during the empathize phase and identify key information about the problem, user needs, as well as possible solutions.

The first step is to organise and analyse all the pieces of information gathered in the previous stage. Collected data should be analysed for patterns, recurring themes, contradictions, and issues that will allow for a better understanding of the problem and its potential solutions. At this stage, collected pieces of information are given meaning.

The best method to organise data is by **mapping.** Mapping is taken advantage of to organise data and identify themes or patterns. It involves grouping data and linking it into categories. Collected data (having the form of notes, comments, observations, reflections, etc.) should be placed in one place, where it can be viewed simultaneously and afterwards - organised according to the selected categories. **The research wall method can be opted for when it comes to mapping.** A research wall is simply a large enough surface on which the collected information is displayed (in the form of quotes from interviews, photos, screenshots, information written on sticky notes, etc.).

Pieces of information placed on the research wall are gradually given a meaningful structure by organising them in line to established criteria (the criteria can be general and correspond to the categories that make up the project challenge). Identified themes and patterns are then given names, and then a map is created containing all key themes found in the research material.

When we place collected pieces of information on the research wall, our goal is to give them structure and meaning. It means that we organise them in line with established criteria, which may correspond to categories contained in the design challenge. For example, if we are researching user needs in the context of a new product development project, we may divide our information into categories such as functionality, appearance, price, etc.

Then, once the data has been organised, we identify main themes and patterns that emerge. For example, if many users express the need for an easy access to information, we may identify this theme as ‘ease of use’.
The next step is to name the identified themes and patterns. It will allow us to easily refer to them in further discussions and analyses.

Finally, we create a map that contains all major themes and patterns found in our research material. Said map will be a tool that will help us understand what is important to users and what has to be taken into account during consecutive stages of the project.

By organising, identifying and assigning meaning to information we have gathered, we can understand users' needs better and work more effectively to solve their problems.

Mapping is the process of organising collected data in a clear and understandable manner. It helps clearly present **research material**, as well as identify relationships and patterns between pieces of information. Thanks to mapping, we can see the bigger picture more easily and find important points that will serve as a basis for further project-related activities.

Yet another important element of the defining phase is determining user's goals and values. We want to understand who we are designing for and what user's main goals and values are. To achieve such a goal, we use pieces of information we have gathered to gain insight into his or her needs, expectations, aspirations and potential limitations. User research allows us to gather a lot of relevant information about behavioural patterns, attitudes, habits and problems the user faces.

To better define user goals and values, we can opt for various design tools to help us organise information we have gathered and create a comprehensive picture of the user. One such tool is Persona.

A persona is a type of user model that describes an archetypal person utilizing our product or service. Creating personas makes it possible for us to better identify users by describing their characteristics, behaviours, motivations, as well as problems. Personas allow for the design team to better understand the users' perspective and see the problem from their point of view. In such a way, we can work more effectively on a solution that meets factual needs and expectations of users.

A persona is an archetypal character, rather than a stereotypical representation of factual people. Therefore, when creating a persona, it is vital to base it on real data and pieces of information gathered during research, while at the same time avoiding biases or common assumptions about a particular group of users.

When describing a persona, it is crucial to give it a first and last name, as well as provide basic demographic information such as gender, age, marital status, and place of residence. It is also vital to include the user's interests, skills, life goals, needs, expectations, and potential frustrations. Such information should be relevant to the design challenge and the problem to be solved. An exemplary photo or an image incorporating a quote that characterises the user's attitude best can also help to understand the persona better.

It is worth noting at this point that in the course of design process, several different personas are usually created in order to represent different segments of the target group. The preparation of personas should be preceded by qualitative interviews with representative individuals belonging to each segment.
Such an approach will make the personas more credible and tailored to actual needs and behavioural patterns of users.
Exemplary persona:
Persona: IT teacher - Krzysztof Nowak (male)
Basic demographic information:
● Full name: Krzysztof Nowak
● Gender: Male
● Age: 42
● Marital status: Married, two children (aged 8 and 12)
● Place of residence: Warsaw, Poland
Photo/image: (Insert photo or image here)
Interests and skills:
● Interests: New technologies, programming, electronics, computer games, mountain tourism, photography
● Skills: Programming in Python, JavaScript, SQL; computer network basics, Windows and Linux system administration, IT project management
Life goals:
● **Professional:**
o To stay up to date with the latest solutions and trends in IT.
o To improve teaching skills to prepare students for the demands of the job market better.
o To be promoted to the position of IT teacher team leader at my school.
● **Personal:**
o To spend more time with my family, especially doing outdoor activities.
o To improve in such fields as photography and mountain hiking.
Needs and expectations:
● **Needs:**
o To update knowledge pertaining to latest IT technologies and tools.
o A flexible course format that allows to balance studies with professional and family-oriented responsibilities.
o Practical training that provides skills that can be immediately applied while working with students.
● **Expectations:**
o Online courses with access to video materials, practical exercises, as well as Q&A sessions with experts.
o Possibility of consulting issues with trainers and other course participants.
o Certificate upon completion of the course, which will be recognised by employers and educational institutions.

Frustrations:

- Lack of time to participate in traditional, face-to-face courses due to professional and family-related commitments.
- Difficulties in keeping up with the rapid pace of technological changes and implementing them in the curriculum.
- Insufficient practical materials and exercises in available professional development courses.

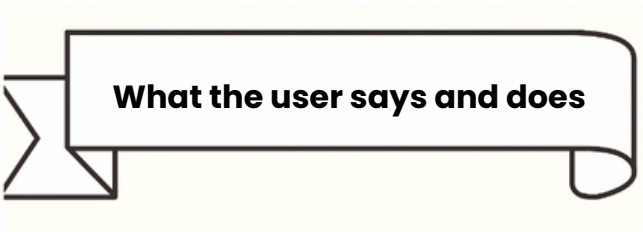
Quote characterising the user's attitude: 'I would like to keep up to date with technology and pass this knowledge on to my students, but I need a flexible course that does not interfere with my professional and family-oriented responsibilities.'

Summary: Krzysztof Nowak is an experienced IT teacher willing to improve his skills and update his knowledge in order to teach his students in an efficient manner. His biggest challenge is balancing learning with his professional and family-oriented responsibilities. A flexible professional development course tailored to his needs is crucial for him to achieve his professional and personal goals.
Another tool facilitating the understanding of the potential user is 'A day in the Life' [03_Define_21_A_day_in_the_life], which allows to better understand the perspectives and experiences of users. 'A Day in the Life' serves as a simulation of the daily life of a customer or a user. Taking advantage of said tool involves simulating a typical day or a specific moment in the user's life to understand his or her experiences and needs better. Basing on the persona, scenarios of a typical day or event in which the person participates are created. Such scenarios include various stages and interactions that may occur throughout the day.

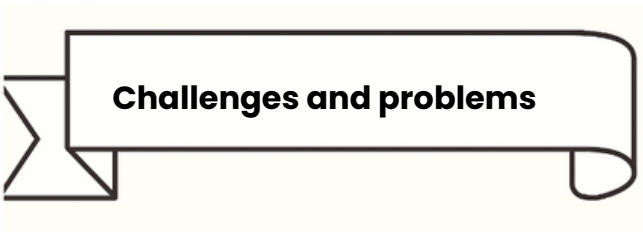
We can also opt for an empathy map [03_Define_17_Empathy_map]. This is a design tool helping the design team understand the user better predominantly by focusing on his or her emotions, needs, experiences and perspectives. Unlike a persona, which presents a general picture of the user, an empathy map allows for a deeper understanding of his or her behavioural patterns and attitudes.

An empathy map is typically presented in the form of a diagram divided into several areas, such as:

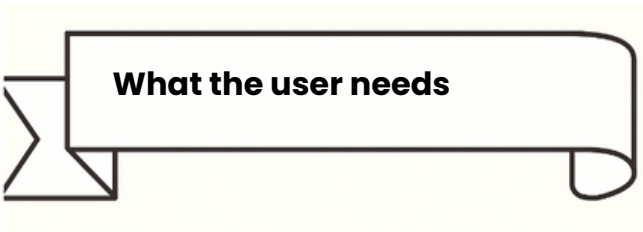
This area helps understand user's thoughts and emotions related to a specific problem or situation.



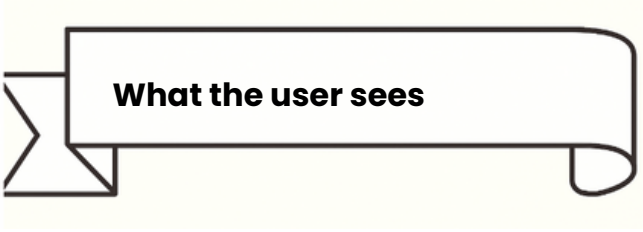
In this case, the design team seeks to identify what the user says about the problem and observe his or her actual actions and behavioural patterns.



This area allows to understand main difficulties the user faces in relation to a given problem.



It includes identifying user's needs related to solving the problem, as well as his or her expectations pertaining to the solution.



It refers to identifying user's environment, including external factors that may influence his or her thinking and behavioural patterns.

This area concerns difficulties that the user may encounter when using the proposed solution.

An empathy map is created basing on data collected during research, observations and qualitative interviews with users. It allows the design team to understand the user's situation better and tailor the solution to his or her needs and expectations more effectively.

Creating an empathy map is a way to gain a deeper understanding of the user and see the problem from his or her perspective. Similarly to a persona, an empathy map helps synthesise research observations about the user. However, it focuses on motivations behind his or her behaviour and needs to a greater extent. It can be considered to serve as a complement to a persona.

In order to create an empathy map, all research data related to the user should be gathered and placed it in the appropriate template. An empathy map focuses on two aspects of user's functioning:

1.Retrospective aspect: Describes the user's interactions with the outside world - what he or she sees, hears, does and says.

2.Introspective aspect: Describes the user's thoughts and feelings related to his or her interactions with their environment - what is important to him or her, what makes him or her feel good or bad, what worries him or her, as well as what inspires him or her.

The first step when it comes to creating an empathy map is to describe the user's actions in the outside world - what he or she sees, hears, does and says. It is vital to capture their observations, words, behaviours and reactions to different situations.

The second step is to examine thoughts and feelings of the user related to his or her interactions with their environment. It includes everything that is meaningful to him or her, what motivates him or her, what challenges he or she faces, and what makes him or her feel good or bad.

An empathy map makes it possible to discover the user's true needs and desires, as well as gives meaning to his or her actions. It provides a better understanding of what is important to the user, what frustrates him or her, as well as what gives him or her pleasure. The discussed tool adds depth to personas and allows for a more precise match between solutions and user needs [03_Define_18_Customer_journey_map].

While personas and empathy maps present a static picture of the user, a user journey map allows to analyse his or her actions.

A journey map is a presentation of the user's experience expressed on a timeline. It visualises all the actions taken by the user in a specific time and context. A user journey map is a diagram illustrating key actions, steps, moments, stages and interactions of the user. It provides a detailed description of behavioural patterns and related experiences. It makes it possible to look at user problems in context, placing them in the real world of challenges and problems faced.

By mapping user actions, we gain insight into his or her real problems and the points at which these problems arise. We can easily identify them and start searching for effective solutions. When preparing a journey map, information gathered during research, such as surveys, interviews or direct observations should be utilized.

The structure of a user journey map may include pieces of information about actions taken at each stage, tools used during these actions, difficulties encountered, and ways of solving problems.
One should remember that there is no universal template for a user journey map. It can be prepared in any way and form, tailored to the needs of a given project. What matters is that the map clearly illustrates user's actions and related problems.

A user journey map serves as a graphical representation of user's experiences and actions in a specific context and time. It is a type of diagram illustrating key steps, stages, interactions, and moments that a particular user goes through when performing a specific task or having a given experience.

It is taken advantage to understand user behaviour and how he or she satisfies his or her needs in a specific context. A journey map makes it possible to look at the user experience from the perspective of the path followed, revealing factual problems and challenges.

The map in question can be tailored to a specific project and its needs. It is vital to ensure that it is clear and easy to understand so that user actions and related problems are easy to grasp. A user journey map is a tool helping designers understand user needs and experiences better, leading to more optimal product and service design. Below, there is an example of a user journey map:

User journey map: Krzysztof Nowak (male)

Goal: Participation in a professional development course for IT teachers
Journey stages:

1. Awareness of the need
2. Searching for a course
3. Registration and preparation
4. Participation in the course
5. Applying knowledge in practice

1**. Awareness of the need**

● **Actions taken:**
o Reading industry-specific articles and attending educational conferences.
o Discussing technological innovations with colleagues.
o Obtaining feedback from students on the need to provide up-to-date content in the curriculum.

● **Tools used:**
o Websites, industry magazines, social media.
o Educational platforms and forums designed for IT teachers.

● **Problems faced:**
o Rapid changes in technology make knowledge obsolete.
o Difficulty finding time to update knowledge independently.

● **Solutions applied:**
o Consideration of participating in a professional development course.

2. Searching for a course

● **Actions taken:**
o Browsing online and in-person course offerings.
o Reading reviews and opinions on different courses.
o Engaging in consultations with other teachers and mentors.

● **Tools used:**
o Search engines, course review websites.
o Recommendations from friends, forums and discussion groups.

● **Problems faced:**
o Remarkable number of courses available makes it difficult to choose the suitable one.
o Lack of time to thoroughly analyse each offer.

● **Solutions applied:**
o Setting priorities and selection criteria (such as flexibility, scope of the curriculum).

3. Registration and preparation

● **Actions taken:**
o Registering for the selected course.
o Organising work schedule and family responsibilities to find time for the course.
o Preparing necessary equipment and materials.

● **Tools used:**
o Registration platform, calendar.
o Computer, stable Internet connection, educational materials.

● **Problems faced:**
o Difficulties in synchronising course schedule with daily responsibilities.
o Technical problems with accessing the course platform.

● **Solutions applied:**
o Choosing a course characterized by a flexible schedule.
o Testing equipment before the course.

4. Participation in the course

● **Actions taken:**
o Participating in online lectures and doing practical exercises.
o Taking part in Q&A sessions and discussions with other course participants.
o Regularly reviewing and updating notes.

● **Tools used:**
o E-learning platform, video conferencing tools, discussion forum.
o Notebook, programming software.

● **Problems faced:**
o Difficulties with concentration and maintaining motivation.
o Lack of immediate technical support.

● **Solutions applied:**
o Setting regular study hours, creating a study plan.
o Using the discussion forum and Q&A sessions.

5. Applying knowledge in practice

● **Actions taken:**
o Implementing newly acquired knowledge in everyday teaching.
o Creating new teaching materials and designing lessons by opting for new technologies.
o Sharing knowledge with colleagues and students.

● Tools used:
o Computer, teaching software, educational platforms.
o Presentations, multimedia materials.

● Problems faced:
o Lack of support in implementing new tools at school.
o Resistance to change from students or colleagues.

● Solutions applied:
o Organising workshops for colleagues.
o Gradually introducing changes and monitoring their effects.

Understanding the value that users attribute to products, services or experiences is the foundation for creating solutions truly meeting their needs. In the defining phase of Design Thinking, it is crucial not only to identify user's goals, but also - to capture what really matters to him or her. It is mainly about his or her value system, which may be non-obvious, diverse and deeply rooted in personal, social or cultural context.

In the context of vocational education and training (VET) or when it comes to people with special educational needs (SEN), user value may include aspects such as a sense of agency, independence in learning, access to resources, employment opportunities, or the ability to develop strengths in a supportive environment. What is more, users may define value differently depending on their level of digital competence, sensory barriers, educational experiences or life situation. Therefore, value research is not just about asking 'what is important?', but about undertaking an in-depth analysis of what the user perceives as useful, trustworthy, supportive, and motivating.

In order to organise such information, design teams can opt for the Value Canvas [03_Define_19_Value_canvas] tool, which allows for a detailed analysis of the so-called value proposition. It allows to identify what user problems are being solved, what needs are being met, as well as what exactly the user gains from a given service or product. It can include both functional benefits (ease of use) and emotional ones (a sense of belonging, being treated with respect).

The Value Curve [03_Define_20_Value_curve] tool, on the other hand, allows to compare the value proposition of the designed solution with others available on the market. A visual curve shows where the offered value exceeds the competition and where it may be insufficient. In the case of teams working in the education sector, it directly translates into the opportunity to consciously stand out, for example by providing more accessible materials, better teaching support or more realistic career prospects.

Thanks to such tools, the project team can not only avoid creating solutions 'for everyone' (so really - for no one), but also specify the value it wants to deliver to the user, being in line with individual priorities and life goals.

3.2.4 Creating a design challenge

Formulating a design challenge is a key stage in the design process, mainly because it helps determine the direction of further activities and the goal we want to achieve. In order to prepare a design challenge, three key questions must be answered:

1. Who experiences the problem?
2. What is the nature of the problem?
3. What benefits can be gained from solving this problem?

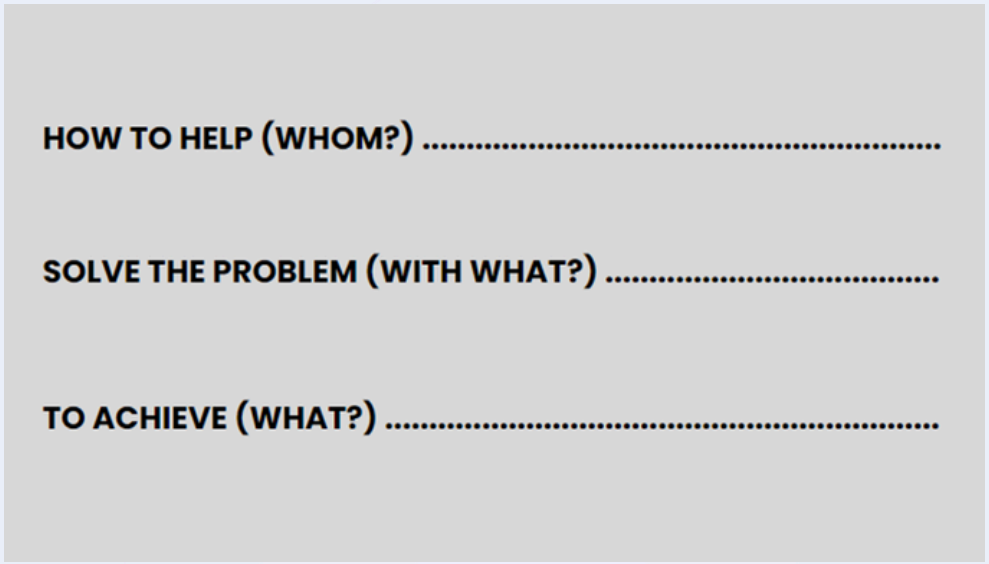
The first question pertains to the identification of users for whom the solution is being designed. Basing on information gathered about users, it is possible to determine who will be the ultimate beneficiary of the project.

The second question requires a proper description of the problem. By utilising information gathered about the users, it is vital to identify what bothers them and what constitutes the main difficulty. The problem should be formulated in a manner that is clear and understandable to all parties involved.

To formulate the problem, it is possible to opt for a tool called '5 whys' [02_Empathize_09_The_5_whys], which involves repeatedly asking 'why?' to ultimately identify the root cause of the problem.

The third pertains to benefits that the user can derive from solving the problem. Pieces of information relating to the matter can be found in the collected data, such as the user's goals, values and expectations.

Answers to said questions can be documented and transformed into a generative question that will serve the role of the design challenge. The most commonly used formula is HMW ('How Might We...?'), which indicates the direction of further work for the design team.
The design challenge can be presented in a simple table helping to clearly define the problem and the goal of the project.



In cases, where resources or time are limited and it is necessary to choose what is essential to achieve project objectives, the MoSCoW matrix [03_Define_22_MoSCoW_prioritization_matrix] can turn out to be of use. The acronym MoSCoW refers to four priority categories:

- **Must-Have**: elements of the project that are absolutely essential for its success.
- **Should-Have**: elements that are important but not critical.
- **Could-Have**: elements that are desirable but not necessary.
- **Won't-Have**: elements that are considered unnecessary for the current project.

DESIGN CHALLENGE

EDUCATIONAL ARCHITECTS

HOW TO HELP (WHO?)	SOLVE THE PROBLEM (WITH WHAT?)	TO ACHIEVE (WHAT?)

SUMMARY

3.2. Define – step by step

3.2.1 What is the define phase and why is it so important?

The defining stage is a key stage of the Design Thinking process – it serves as the bridge between empathy and idea generation. It is the moment when we collect, organise and analyse data in order to formulate a clear design challenge.

If we do not take the time to thoroughly understand the problem, we will not be able to design a good solution.

That is why the definition stage is a time to pause and organise knowledge – to look at all the information gathered about users and extract the essence.

At this point, the team should ask a few key questions:

- What is the real problem we want to solve?
- Who are we designing for?
- What do we want to achieve and why is it important from the user's perspective?

Said process can be divided into three main stages:

- Analysis of data collected and identification of key problems
- Definition of user goals
- Formulation of the design challenge

1. Analysis of research material and identifying problems
During said step, we analyse data collected during the empathy phase – interviews, observations, notes or recordings, predominantly to identify relevant patterns, needs and problems of users. The predominant aim is to **organise** information and identify **key design challenges.**

Tools used:

- Research wall
- Data mapping
- Categorising topics

VET example – hotel manegement industry:

During interviews with students at a hotel management school, the following problem was identified: 'I do not feel confident when interacting with foreign guests.' Such data was assigned to 'language skills' and 'low self-confidence' Categories. Mapping identified a common pattern: the lack of realistic practice situations in the curriculum.

SEN example:

In a facility for students with ASD (autism spectrum disorder), research showed that students were stressed by sudden changes in their environment. The problem was mapped in terms of 'need for predictability' and 'lack of visual instructions'. Based on such findings, a set of educational challenges was developed for further analysis.

2. Definition of user goals

During this phase, we determine what is important to the user – focusing predominantly on goals, values and expectations. We use tools such as:
Persona [03_Define_16_Persona]
Empathy map [03_Define_17_Empathy_map]
A day in the life of the user [03_Define_21_A_day_in_the_life]
VET example – Hotel management school student
Persona: Natalia (female), 18, hotel management vocational school student.

User goals:

- To find a stable job after school.
- To acquire practical customer service skills.
- To learn foreign languages in a professional context.

Frustrations:

- Lack of modern tools during classes.
- Insufficient practical experience with real customers.

Needs:

- Classes with hotel desk work simulation.
- Internship at an international hotel in a large city.

Each of the presented tools helps in perceiving the user differently – as a person with experiences, emotions and values.

VET example – vocational education (electrician):

Persona: Tomasz, 18, Electronics School Complex student, willing to gain practical skills in installing smart home systems. His goal: to be competitive in the job market. Frustration: 'At school, we focus on solutions from the last decade.' Based on the empathy map, it was discovered that Tomasz wants more workshop projects that resemble real-life assignments.

SEN example – inclusive school:

Persona: Anna (female), 15, a student with dyslexia. Her goal is to 'feel confident when reading in front of the class.' Emotion analysis based on the empathy map reveals frustration and anxiety related to reading aloud. Supporting tool: an app that converts text to speech and individual lessons before presentations.

3. Formulation of the project challenge

At this stage, the team creates a **clearly defined project questio**n that will serve as a starting point for generating solutions. We most often use the **HMW – How Might We... formula**
The following tools are useful while preparing a project challenge:
5 x Why [02_Empathize_09_The_5_whys]
MoSCoW Matrix [03_Define_22_MoSCoW_prioritization_matrix]

HMW question structure:

- How could we... (solve the problem)
- For whom... (user context)
- For what purpose... (value/benefit for the user)

VET example – social care:

Problem identified: 'Technical college students do not know how to establish relationships with older people.'
HMW challenge: How could we help technical college students understand emotional needs of seniors so that they feel confident in their care work?

SEN example – students with ADHD:

Problem identified: 'Students with ADHD have difficulty concentrating in traditional classroom settings.'
HMW challenge: How could we create an educational environment that supports the focus and activity of students with ADHD without excluding them from the group?

3.2.2 Key elements of the define phase

After analysing data and identifying key patterns, the next step is to understand what users really want – what his or her needs, aspirations, goals and values are. Understanding the user's goal serves as the foundation of effective design.
Note: What users want is often different from what they say they want. That is why it is so important to analyse their behaviour, motivations and life context.
Afterwards, define the design problem. To achieve that, we go through the following steps:

1.Identify the user
Determine who the recipient of the solution is. What are his or her needs, limitations, and dreams? Visiting their environment, such as his or her workplace, place of study or home, is crucial.
Tool: [03_Define_024_Field_research]
Note: for people with special needs (PwSN), consider their mode of functioning, accessibility of space, and communication.
2. Problem diagnosis
Analyse data from previous stages (interviews, observations). Identify most important problems, not the obvious ones, but those being 'beneath the surface'
3. Identify benefits
Consider what changes solving the problem will bring. Will the user gain time? Confidence? Accessibility? It will help justify the importance of the problem.
4. Look for patterns and trends
Look for recurring themes, emotions, and difficulties. They may indicate deep-rooted needs.
5. In-Out – what is in, what is out?
Determine what we do and what we do not do – what is within our influence.
Tool: [03_Define_26_IN_and_OUT.

Example: Professional development course for professional IT teachers:

1.Identification of the target user:
Target user: Professional IT teachers.
Needs and expectations:
- Updating knowledge in the rapidly changing field of IT.
- Acquiring practical skills that can be directly taught to training participants.
- Flexible training format that can be reconciled with professional duties.

2. Describe the problem:
Vocational teachers often lack up-to-date knowledge and skills in the rapidly developing field of IT. There is a need to adapt their competences to current trends and market requirements so that they can teach their students in an efficient manner.

3. Identify user benefits:
- Knowledge update: Teachers will be up to date with latest technologies and teaching methods pertaining to the field of IT.
- Increased teaching effectiveness: Teachers will acquire practical skills that they can immediately use in their work with students, resulting in the improvement of the quality of education.
- Flexibility: The flexible course format will allow teachers to balance training with their professional responsibilities, minimising the impact on their daily work.

4. Scope of the project team's impact:
- Course programme design: The project team has the opportunity of creating a professional development course programme tailored to current needs of teachers and the labour market as a whole.
- Training session organisation: The team can organise training sessions in various formats (online, face-to-face, or in the hybrid model), as well as to provide access to modern educational materials.
- Cooperation with experts: Opportunity to cooperate with IT experts in order to ensure high-quality training content. We can use 'ERAF' diagrams, a system of diagrams for analysing entities, relationships, attributes and flows present in the system. The major goal is to reflect from an external perspective or to approximate all the elements that make up the system, including interactions between them [03_Define_25_ERAF_system_diagrams].

5. Consider potential constraints:

- Time and resources: Time and resource-related constraints faced by teachers may hinder participation in professional development courses.
- Budget: Budget constraints may affect the scope and quality of training offered.
- Access to technology: Teachers may sometimes have limited access to modern technology and equipment, which may in turn hinder acquiring practical skills.

3.2.3 From analysis to synthesis – how to work with data?

Defining is not only about analysing data, but also - about **organising and synthesising** it.

- Analysis – we divide data into smaller chunks, recognise meanings and classify observations.
- Synthesis – we combine pieces of information into a whole: we look for patterns, models, and relationships. They form the diagnosis and serve as the starting point for the design challenge.

These two processes are iterative. It is possible to return to them at different stages.
An empathy map [03_Define_17_Empathy_map] helps the team understand the inner and outer world of the user better. The focus should be on what users may:

- **hear,**
- **see,**
- **feel and think,**
- **do and say,**
- **fear,**
- **need.**

Said tool combines data from observations and interviews into a coherent narrative about the user.
SEN Example– Teacher working with a student with the autism spectrum disorder

- Empathy map: Mr Jan (male), a teacher at a vocational school
- He hears: From his colleagues that 'this student will not be able to do it'.
- He sees: That the student is doing well in practical tasks, but reacts badly to changes in the plan.
- He thinks and feels: Frustration, but also a desire to help.
- He says: 'I want every student to feel part of the class.'
- Concerns: That the student will drop out of the system.
- Needs: Tools allowing for individualising tasks.\

SEN example – teacher at a vocational school, student with ASD:
Vocational school teacher:

- Hears: that 'This student is not suited to practical classes.'
- Sees: that his student is doing well with repetitive tasks.
- Thinks: 'I need to find a way not to overwhelm him with changes.'
- Says: 'It is important that he feels needed.'
- Concerns: That the student will be excluded.
- Needs: Tools for individualising practical tasks and clear instructions.

3.2.4 Creating a design challenge

A design challenge is a **clear, motivating statement** that becomes the direction for the team. It should:

- focus on the **user and his or her needs,**
- **not suggest a ready-made solution,**
- be formulated in an **open** but specific way,
- indicate **what, for whom and why** it is worth changing.

Once the user and his or her needs are understood, it is time to define the project challenge – **questions that will guide the team's further work.**

The most common format is as follows:

- How Might We...'
- How could we help [the user]
- with [a specific need],
- to [achieve value]?

VET example – professional development course:
'How could we create a professional development course for IT teachers that is flexible, practical and tailored to their current educational needs and professional responsibilities?'

SEN example – student with ADHD:
"How could we create an educational environment that supports the focus and activity of students with ADHD without excluding them from the group?"
Tools supporting challenge creation:
• [03_Define_19_Value_canvas] – Value map
• [03_Define_20_Value_curve] – Value curve

How to create an effective design challenge? Step-by-step instructions

1.Understand users
Who are they? What are their needs, frustrations, and aspirations?
Exemplary tool: [03_Define_23_360_perspective]

2. Do not impose a solution
Ask 'how can we...?' instead of suggesting ready-made ideas.

3. Focus on the most important problem
Do not try to solve everything – narrow down the scope and set priorities.

4. Define the team's impact
What are the options? What can we realistically influence?

5. Consider limitations and the future
What barriers may arise? What may change?
Tools: [03_Define_27_Design_of_scenarios], [03_Define_28_Problem_reframing_techniques]

6. Create a system map if the problem is complex
Tool: [03_Define_25_ERAF_system_diagrams]

7. Formulate the challenge
In the form of a sentence beginning with:
'**How could we...'**

Example of a design challenge formulated basing on the diagram presented above:

How could we support vocational school students in discovering and developing their individual professional talents so that they feel motivated to learn and be prepared for the reality of the labour market better, despite limited access to work experience and diverse educational needs?

3.3.1 What is ideate and why is it important?

Design Thinking is a problem-solving method based on creative thinking and design techniques. Nevertheless, it is not just a set of tools. It is primarily an approach that promotes a specific way of thinking and acting. It creates a culture that fosters innovation and continuous development. Such an environment is based on openness, stimulates creative attitudes, as well as encourages experimentation and the search for non-standard solutions.

Building a culture of innovation requires three key conditions to be met:

1. **Inspiring leadership**: An innovative culture requires leaders who can motivate and inspire others to take action. Such leaders promote open dialogue, collaboration and ability to take risks.
2. **Work environment based on trust and autonomy:** It is essential to create an environment, in the case of which people feel comfortable sharing their ideas and experimenting. It is also an environment that gives employees the freedom to make decisions and take action.
3. **Positive attitude towards failure:** An innovative culture accepts that failure is an integral part of the learning and development process. It is important to view failure as an opportunity to learn and improve.

An innovative culture recognises failure as an integral part of the learning and development process. Organisations have to treat it as an opportunity to learn and improve, rather than as a reason to blame or punish employees/participants in the process. Key elements of a positive attitude towards failure include the following:

1. **Education and awareness:** Organisations should educate employees/students about the value of failure and the role it plays in the innovation process. Employees/students must understand that mistakes are a natural step towards success.
2. **Openness and transparency:** Encourage open sharing of stories about failures, both big and small ones. It is important that employees/students feel that they can talk about their mistakes without the fear of negative consequences.
3. **Analysis and reflection:** After each failure, it is worth conducting a thorough analysis to understand what went wrong and what lessons can be learned for the future. This is a reflective process allowing teams to learn and avoid making identical mistakes in the future.
4. **Support and empathy:** Leaders should show support and empathy to employees who have experienced failure. It is cital that employees feel that their efforts are appreciated, even if they did not produce the expected results.

Positive failure, also referred to as 'brilliant failure,' is a situation in which failure leads to valuable insights and innovative solutions that can benefit the future. It is not just about accepting mistakes, but also - about being able to use them as a starting point for new opportunities.

Design thinking and innovation culture complement each other, creating a space conducive to creative approaches and the implementation of innovative solutions. While design thinking is an approach to problem solving, innovation culture is a broader environment that fosters openness, supports creativity, as well as encourages experimentation.

In the third stage of the Design Thinking process, known as ideation, the synergy between innovative culture and design thinking is evident. **Ideation is a time of creative idea generation, during which project team members focus on finding possible solutions to a problem.** At this stage, various creative techniques are taken advantage of to help develop ideas.

Ideation is a creative process that requires an open mind and the courage to seek unconventional solutions [04_Define_40_Divergent_thinking]. During said time, team members try to look at the problem from different perspectives, testing different approaches and experimenting with ideas. At this stage, it is also important to allow for free expression and avoid judging ideas.

When preparing for **ideation**, it is crucial to create an inspiring work environment, ensure diversity among participants, and focus on goals set out in the project challenge. It is also vital to give participants time for breaks to avoid burnout during the creative session.

Ideation, or the process of generating and selecting ideas, is a key stage when it comes to Design Thinking. It **aids in the search for potential solutions to problems.** It is a phase in which new ideas are created or existing ones are improved. Afterwards, those with implementation potential are selected.

During said stage, various creative techniques are taken advantage of, such as brainstorming sessions, mind mapping and other collaboration tools that help unleash the creativity of project team members and encourage them to develop ideas together. The effectiveness of this phase depends on the openness, imagination and cooperation of all participants involved in the process.

The functions of the idea generation process are numerous. First of all, it encourages looking at a problem from different perspectives, which may lead to the generation of diverse ideas. Secondly, it supports creativity among all participants by encouraging them to express their thoughts freely. Thirdly, ideation strengthens teamwork by means of boosting understanding and trust among team members. Finally, ideation helps increase the potential for innovative solutions by discovering unconventional and unexpected ideas.

3.3.2 Key principles and stages of ideate

Ideation is a spontaneous stage of the Design Thinking process, within the scope of which, the quantity of ideas is more important than their quality. The predominant goal is to generate as wide a range of proposals as possible, which will only be evaluated, selected and developed at a later stage. Said freedom of creation and lack of restrictions foster the emergence of innovative solutions.

In this spirit, the 'Ideas for interactive teaching strategies' [04_Ideate_39_Ideating_interactive_teaching_strategies] session, which aims at generating a variety of creative concepts for engaging teaching methods, can be taken advantage of. Participants will be invited to freely explore ideas for interactive forms of learning that increase student engagement and support active learning.

To sum up, ideation is the process of generating and selecting ideas that bring the project team closer to creating the best solution to a specific problem. It is a phase that fosters an open mind to creativity and innovation, encouraging experimentation and the search for unconventional solutions.

Principles of idea generation are crucial in this process, because they help create conditions conducive to creativity and innovation. Below, there are some principles to follow when generating ideas:

1. **Quantity over quality:** At the ideate stage, the goal is to generate as many ideas as possible. The more suggestions, the greater the chance of finding the right solution. Therefore, it is vital not to worry about the quality of ideas at this stage; diversity is key.
2. **Refrain from judging:** While generating ideas, do not judge or reject them. Even those that seem inappropriate can serve as a basis for further creative exploration. It is paramount to give every idea a chance to be considered.
3. **Creative courage:** The ideation process strengthens courage while formulating ideas. There are no stupid or impossible suggestions. Creative courage may lead to the discovery of new and surprising solutions.
4. **Building on others' ideas:** It is worth developing the ideas of other team members by supplementing and expanding them. Collaboration makes it possible for the team to look at the problem from different perspectives and create more comprehensive solutions.

5.Sticking to the project challenge: Ideas generated during the ideate phase should be consistent with the project challenge. The challenge sets the direction for creative activities, so it is vital to stay within its boundaries.

6.Documentation: During a creative session, it is a sensible idea to write down all ideas. Even those that initially seem irrelevant may provide valuable inspiration at later stages of the project.

Following the rules above helps create an environment that is conducive to the idea generation process, encouraging exploration, thinking outside the box and collaboration. It is the foundation for further project development.

How does the idea generation phase work? Even though there is no single universal method for conducting a creative session, it is possible to identify a general framework making the idea generation process more effective. The idea generation stage consists of three phases:

1. **Planning:** At this stage, we focus on planning the ideation process, making it more transparent and effective. It is worth reviewing the project challenge once again, outlining goals we want to achieve during the creative session and placing them in a place that is visible for all participants.
2. **Idea generation:** At this stage, we focus on creating new ideas. It is important that participants are able to freely express their thoughts during the creative session. It is also worth considering selecting participants for the creative phase and choosing appropriate creative methods and tools.
3. **Selecting ideas:** After the creative session is over, we move on to selecting most promising ideas. During this stage, we evaluate ideas and select those with implementation potential that can contribute to solving the problem.

Planning the ideation phase. When planning the ideation phase in the Design Thinking process, it is vital to remember that all creative activities should focus on the problem defined during the design challenge. The design challenge sets the framework for the activities and identifies main topics to be addressed in this phase of the design process. Before initiating the idea generation process, it is advisable to re-examine the design challenge (defining goals to be achieved during the creative session) and place them in a visible place for all team members.

During the planning phase, it is additionally worth considering the selection of participants in the creative process. Both the size of the group (it should not be too small or too large) and its composition are of utmost importance. Before starting the session, ensure diversity in the team and take into consideration the needs of key stakeholders (people involved in the problem). It may be beneficial to invite experts and 'outsiders' who can guarantee better results from the session.

Once the creative team (or teams) has been selected, the next step is to select proper methods and tools to support the idea generation process. Their selection should take into account such factors as the objectives, available resources, as well as both capabilities and preferences of the team members. When planning a creative session, it is worth using a variety of techniques suiting different thinking styles and support the diverse competencies of the participants. It is also extremely important to prepare necessary materials and tools in advance in order to enable the creative work to be carried out efficiently and comfortably. The next step is to plan the time for the creative session. Idea generation processes can be exhausting for participants, so it is a sensible idea to determine its duration or the criteria for ending the session before it begins. Flexibility is essential when setting the time, as the length of a given session will depend on participant availability. An integral part of planning this stage is also to indicate breaks that will ensure the comfort of the team members.

3.3.3 Tools supporting ideate

Generating ideas. Once the creative process planning is complete, it is possible to move on to the idea generation phase. A creative session may begin with a discussion and selection of the rules that will apply during the session. Their presentation can be summarised in a joint declaration of compliance by all participants of the creative session.

Idea generation is a key step in the creative process. It can be very exciting and inspiring. The idea generation phase can be divided into the following stages:

1. **Selecting rules:** Before starting a creative session, it is crucial to discuss and select rules that will apply during the session. Their presentation can be summarised in a joint declaration of compliance made by all participants. Examples of rules may include mutual respect, lack of criticism or judgement of other participants' ideas during idea generation, right of each participant to express his or her ideas, equal opportunities for participation, as well as the principle that the agreed duration of the session should be respected and participants should be punctual.
2. **Warm-up:** Before the actual idea generation session, it is a advisable to conduct a warm-up. It is the time when participants can get to know each other better, increase engagement, as well as improve communication within the team. You can use various ‘icebreakers’, which are activities or exercises that help relieve tension and create a friendly atmosphere.
3. **Creative session:** After the warm-up, you can move on to the actual idea generation session. There are many methods, tools and techniques for generating ideas that can be taken advantage of. One of the most popular techniques is brainstorming.

Brainstorming: It is a creative thinking technique involving an intensive and free exchange of ideas within a team in order to come up with new ideas or solutions. During brainstorming, participants share their ideas without judging their value. The essence of this technique is spontaneous discussion stimulating creativity and inspiring participants.

The ideation phase, which is the process of generating ideas, can be unpredictable and may not go as expected. Rules such as prioritising quantity over quality or refraining from judgement are designed to help bring out the potential of all team members. Nevertheless, such rules should be approached flexibly and adapted to the specifics of the creative process. Creative processes are often based on strict regulations. Unconventional approach can lead to most innovative solutions.

Generating ideas is a fascinating process that allows for discovering new perspectives and creative solutions. It is vital that everyone feels comfortable and can share their ideas without fear.

The most popular technique for generating ideas is brainstorming, considered to be the basis of all other creative thinking methods. Its essence is usually a spontaneous discussion aimed at mutual inspiration and stimulating creativity.

Brainstorming is an excellent method when it comes to generating ideas that can be utilized in a variety of situations, both at school and in everyday life.

Below, there are steps that often accompany a classic brainstorming session:

1. **Familiarisation the team with the problem:** At the beginning, participants learn about the nature of the problem and its context. They also consider any obstacles and limitations that may arise when trying to solve the problem.
2. **Transforming the problem into a 'How?' question:** During this phase, participants try to transform the problem into a question beginning with the word 'how?'. They are encouraged to come up with as many questions related to the problem as possible. [04_Ideate_41_How_might_we]
3. **Selecting a question for idea generation:** Participants select one question that will serve as the basis for idea generation. Such decision should be agreed upon by all team members.
4. **Warm-up:** Before the actual brainstorming session, a short warm-up is conducted in order to help participants get into a creative mood.
5. **Brainstorming:** During this phase, participants focus on the problem and generate as many solutions as they can. There are no rules for organising or selecting ideas. All ideas are considered valuable. It is vital to write down every idea. One of readily available tools can be utilized, namely [04_Ideate_43_Hot_potato]
6. **Selecting the best ideas:** After the brainstorming session, participants select best ideas that will form the basis for solving the problem.

There are various types of brainstorming, but they all follow a similar pattern of generating and selecting ideas. Some of the most interesting types of brainstorming include:

1.Reverse brainstorming: Unlike traditional brainstorming, reverse brainstorming focuses on solving problems or generating ideas by identifying opposing, non-obvious or controversial perspectives. It reverses standard assumptions or perspectives. Instead of asking how to solve a problem, it asks how to make it worse. [04_Ideate_30_Reverse_brainstorming]

2.Association pyramid: It encourages unconventional thinking and opens the door to creative chaos that may lead to the discovery of new, unexpected solutions. [04_Ideate_32_Pyramid_of_associations].

3.Analogous solutions matrix: This is a way of thinking that involves looking for similarities between different situations, concepts or fields [04_Ideate_31_ Analogus_solutions_matrix].

4.Brainstorming 6-5-3: It is a slightly faster and more focused version of traditional brainstorming. In short, it works in the following manner: there is a group of 6 people and they have 5 minutes to come up with 3 ideas for solving a problem [04_Ideate_33_ Brainstorming_6-5-3].

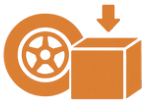
One of the most interesting variations is SCAMPER, which involves transforming, modifying and improving existing ideas. SCAMPER is a tool helping to generate ideas by means of analysing a problem from different perspectives and transforming it to find new solutions. Below, each letter of the acronym is explained:

1. **'Substitute':** Consider whether you can replace a part of the problem or its elements with something else. For example, can new, more advanced technologies be opted for instead of traditional building materials?

2. **'Combine':** Consider whether you can combine different elements of the problem in an innovative way. For example, can you combine functions of a mobile phone with those of a watch in order to create a smart watch?

3. **'Adapt':** Consider whether you can adapt elements of the problem to new conditions or situations. For example, how can you adapt the existing education system to remote learning?

4. **'Modify':** Consider whether you can modify an element of the problem to improve its functionality or performance. For example, can you modify the user interface of an app to make it more intuitive for users?

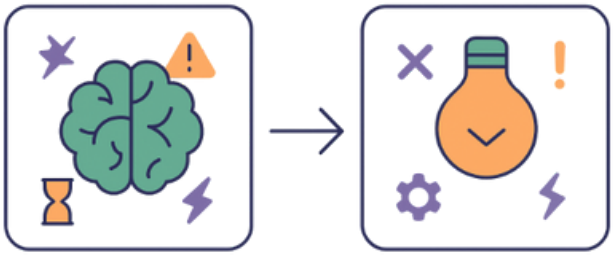


5. **'Put to another use':** Consider whether you can use elements of the problem for other purposes or in other industries. For example, how can old car tyres be utilized to create new products?

6. **'Eliminate':** Consider whether you can remove any elements of the problem that are unnecessary or inefficient. For example, can you remove unnecessary features from an app to simplify it and increase its usability?

7. **'Reverse':** Consider whether you can reverse any element of the problem or approach it in the opposite way. For example, instead of designing a product from start to finish, could you start with its final appearance and work backwards to achieve it?

By means of using the SCAMPER tool, you can approach a problem more systematically and generate new, creative ideas for solving it. Said tool can be utilized at any stage of the creative process to stimulate thinking and search for innovative solutions.



Reverse brainstorming is a creative tool basing on the human tendency to focus on negative aspects to generate positive solutions to problems. Here is how the process works in detail:

Formulate a reverse question: Instead of asking how to solve a problem, ask how to make it worse or more difficult. For example, instead of asking how to improve the quality of meals in a school canteen, ask how to make the quality of meals even worse.

Generate ideas: Brainstorming participants try to answer the reverse question by generating ideas on how to intensify the problem. There are no bad ideas, as the goal is to bring out as many negative aspects of the problem as possible [04_Ideate_42_Negative_brainstorming_technique].

Reversing the generated ideas: Once all the negative ideas have been collected, the next step is to reverse them in such a way that they lead to a positive solution to the problem. For example, if one of the ideas was to limit the variety of dishes in the school canteen, reversing this idea may be to increase the variety of meals.

Selecting the best idea: After the idea reversal process, the team selects the best idea that represents a positive solution to the problem.

Reverse brainstorming is useful when other creative tools do not yield the desired result. It helps look at a problem from a completely new perspective, which can lead to innovative solutions.

The association pyramid is a simple method to generate ideas by means of spontaneously creating associations related to a given problem. That is how you can apply this technique:

1. **Select terms related to the problem:** Each team member selects a term or concept related to the problem to be solved. It can be a keyword or a key concept related to the problem. In this section, it is recommended to define an Active Experience Map [04_Ideate_37_Active_experience_map], which focuses on qualitative assessment basing on user feedback. It will help visualise strengths and weaknesses, as well as opportunities and then - transfer all this knowledge to the idea generation phase.
2. **Writing terms on sticky notes:** Each participant writes a term of his or her choice on a separate sticky note. The more participants and diverse ideas, the better.
3. **Placing sticky notes on a sheet of paper:** Sticky notes with terms written on them are placed on a large sheet of paper or other surface next to each other, forming the base of a pyramid.
4. **Creating associations:** Team members begin to connect adjacent sticky notes, creating associations based on their meaning. Such associations can take the form of words, short sentences, or even drawings. Knowing which ideas or concepts are related, it is possible to define a convergence map, which is a process of selecting and refining the ideas generated during the ideate phase [04_Ideate_38_Convergence_map].
5. **Repeat:** The process of connecting sticky notes and creating associations continues until a single concept is selected to represent the top of the pyramid.
6. **Inspiration for finding solutions:** The concept at the top of the pyramid serves as inspiration for finding a solution to the problem. It can be a starting point for further discussion, idea generation or exploration of different possibilities for solving the problem.

Analogous thinking (based on such tools as the 04_Ideate_31_Analogus_solutions_matrix tool) is a technique in the case of which we **analyse existing solutions** and consider how they can be applied in a completely different situation.

Below, the mode of its operation is discussed:

1. **Find an existing solution:**
- Start by identifying a solution that already exists.
- It could be a product, a service, a way of organising work, a business model – anything that works in a different context.

2. **Consider how it can be applied:**
- Next, analyse how the solution could be used to solve your own problem.
- It is where creativity comes into play, as you need to transfer the solution to a completely different situation, often with different realities and needs.

3. **Look for similarities and analogies:**
- The essence of this technique is to look for similarities between an existing solution and the problem.
- Such similarities may relate to function, structure, mode of operation, and sometimes - even user emotions or experiences.

4. **Generate new ideas or solutions:**
- Basing on such analogies, you begin generating new ideas or possible solutions to your own challenge.
- Sometimes, it will be an adaptation of an existing idea, other times – the inspiration to create something completely new.

5. Uniqueness and innovation:
- Interesting and surprising connections, even very distant ones, often lead to most original and innovative solutions.
- Therefore, it is vital to be open to unconventional associations and allow yourself to think freely and creatively.

Analogical thinking is a valuable tool when it comes to problem solving because it allows to look at a situation from a completely new perspective and discover unexpected, unconventional solutions.
In the idea generation phase, we can also take advantage of tools such as **collaborative sketching,** where participants work together in order to visualise solution concepts by drawing or designing either ideas [04_Ideate_36_Collaborative_sketching] or scenarios [04_Ideate_34_Scenarios], which help us understand how our ideas fit into the lives of users, and **lateral thinking,** which is a creative and unconventional approach to problem solving. This approach is often used in the context of innovation and design to generate novel solutions and push the boundaries of traditional thinking. [04_Ideate_35_Out_of_the_box]

3.3.4 Building a culture of innovation

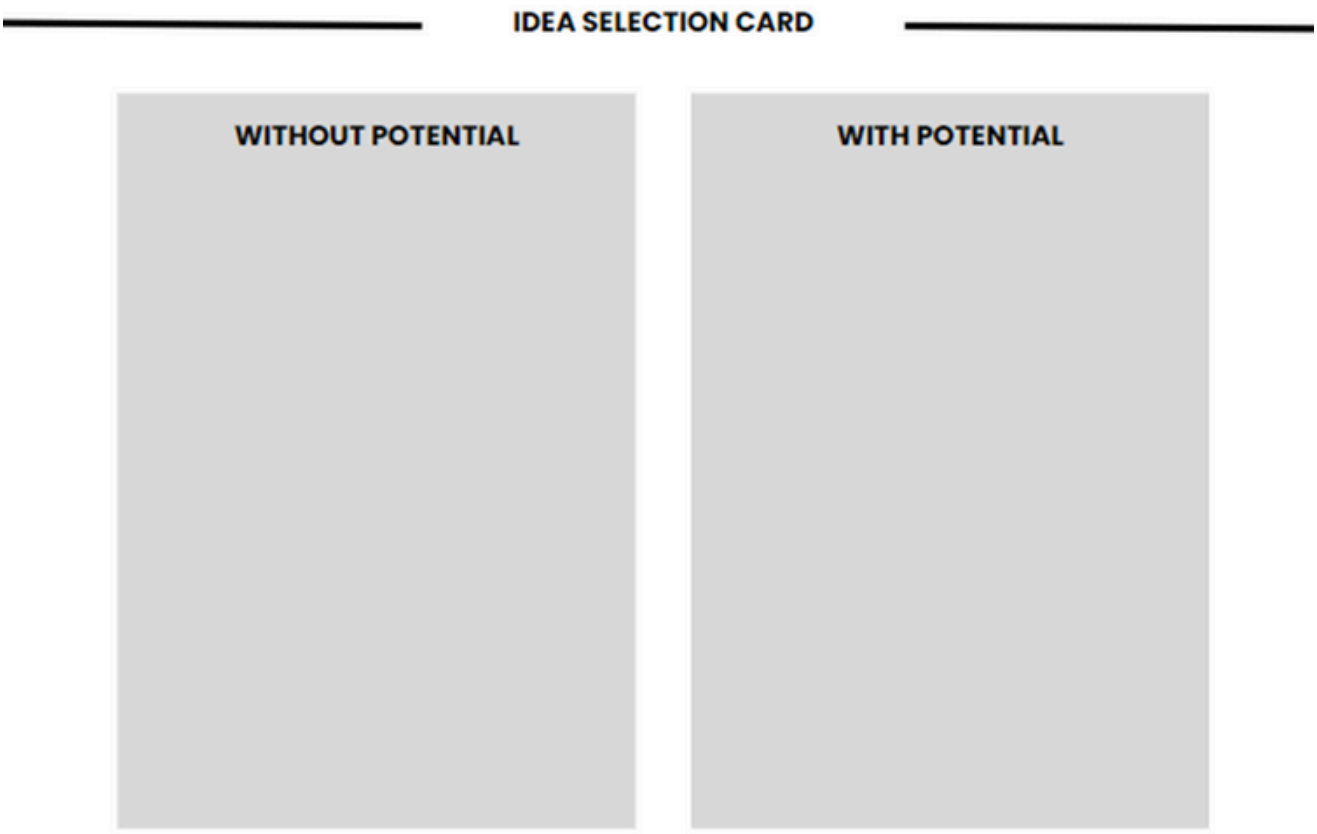
When generating and developing ideas, we need to utilise various techniques and tools to help us during this intensive and creative phase.

Below, there are some practical tips that can help select and evaluate ideas generated:

1. **Match tools to the problem:** The choice of proper tools depends on the type of problem faced. Simple problems may require shorter ideation sessions and simpler tools, while more complex ones will require more advanced techniques.
2. **Diversity of techniques:** It is worth experimenting with different techniques to find the ones that suit the needs of the team and the specifics of the problem best. Some popular techniques include brainstorming, SCAMPER, reverse brainstorming, association pyramid, analogical thinking, as well as the idea shopping technique [04_Ideate_44_Idea_shopping_technique].
3. **Break during the idea generation phase:** By separating idea generation from idea selection, you give the team the required time to rest and reflect on the ideas. A break can help reduce emotions and provide new perspectives.
4. **Discuss ideas:** After the idea generation session, it is worth taking some time to discuss and reflect on ideas collected. In this 'reflection phase,' it is possible to fully understand different perspectives and make a preliminary selection of ideas.
5. **Selecting and choosing ideas:** Once all ideas have been collected, they should be reviewed and categorised. They can be divided into 'unsuitable' and those that 'have implementation potential'. It is also worth considering additional categories such as 'promising', 'for later', 'unconventional' or 'crazy ideas', for example by means of managing ideas with dashboards [04_Ideate_46_Managing_ideas_with_idea_dashboards]

By using a variety of techniques and tools, along with appropriate idea selection, it becomes possible to effectively manage the ideation process and select best solutions to our problems.

Selecting the right idea: The next step should be to select one idea from those having implementation potential. It is the most difficult phase, as we have to choose one idea that will become the prototype for the solution.



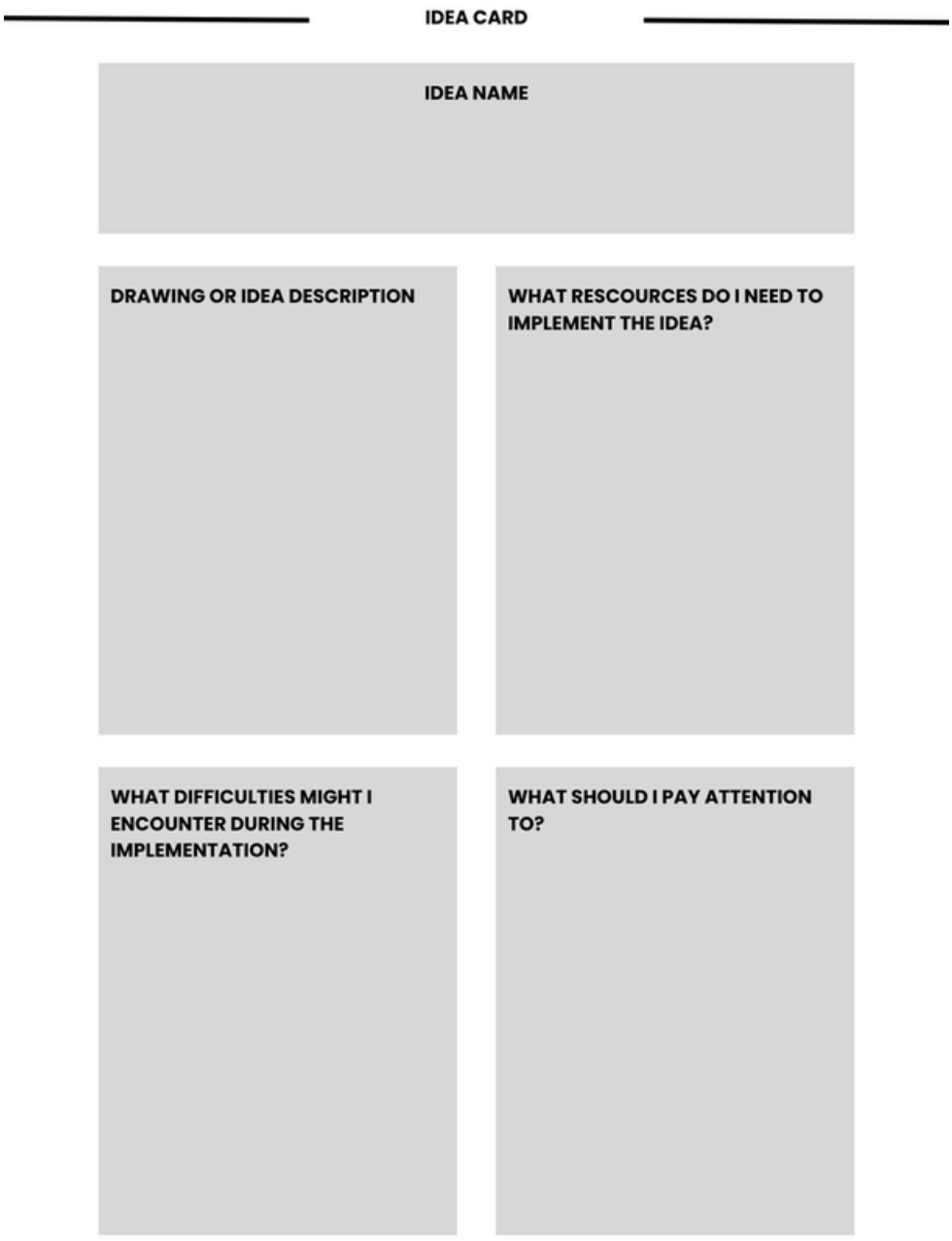
How to quickly choose the right idea?: The selection can be made using a simple point voting method. Each member of the creative team can describe their his or her idea on an idea card. These can include a working title for the idea, a drawing or description of the concept, a list of resources needed to implement it, and as well as potential difficulties that may arise during implementation.

Making a selection can be a time-consuming process, but it is important to make a decision based basing on careful analysis and consultation with the team. [04_Ideate_45_Ideating_with_the_idea_funnel]

The selected idea should then be then presented to all team members (this it is also a the time to deepen and refine the ideas). After the presentation, the idea cards can be displayed in a shared area for everyone to see., Voting based on the use of dots can be initiated then.

The dot voting method allows for a quick and transparent decision-making process. Each member of the creative team receives a certain number of dots (3 to 5). The dots serve as votes that can be cast for a specific idea (but members cannot vote for their own ideas). Dots can be split or combined to indicate a preferred idea. Once all votes have been cast, the dots are counted and the idea with the most dots is selected. If there is no winner in after the first round, the process can be repeated until a single idea is selected.

The ideate phase is the stage where many ideas are generated. Most of them will not be implemented, but it is worth documenting them (they can create a library of ideas). The selected idea should be described by means of using an **idea card.** If the project team has time, an additional creative session can be organised organised in order to further develop the selected idea. This The additional work on the idea will facilitate the next phase of design thinking – prototype.



SUMMARY

3.3 Ideation – Creative idea generation

3.3.1 What is ideate and why is it important?

Ideation is the third stage of the Design Thinking process, following empathy and problem defining. It is the moment of transition from understanding challenges to creating solutions, without judgement or limitations. Participants of the process generate as many ideas as possible using a variety of techniques.

Features of the ideate phase:

- It enables the exploration of multiple solutions,
- It builds creative courage; there are no bad ideas,
- It strengthens teamwork and energy,
- It opens the way to testing and learning through action.

SEN example– special school:
At a school for students with disabilities, the teaching team worked on improving augmentative and alternative communication (AAC). After defining the problem, namely - 'students who do not use verbal language have limited opportunities to express their needs,' an ideation session was organised. Brainstorming and the SCAMPER method were taken advantage of. Over 40 ideas were generated, ranging from a picture system on the wall to tablets with personalised software. The concept of a set of cards and an application with teacher voice recognition was selected for further development.

Example: Krzysztof (male), IT teacher and IT Teacher Training Course

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Context: Krzysztof, an IT teacher, signed up for a training course that was supposed to teach him latest IT technologies in a flexible online format. Despite his initial enthusiasm, technical problems and **outdated materials meant that the course was much less effective than initially expected.**

Description of failure:
o **Technical problems:** The e-learning platform frequently crashed, causing frustration and wasting the valuable time of the participant.
o **Outdated materials:** Some of training materials were outdated, which reduced their educational value and discouraged participants from continuing their learning.
o **Lack of interaction:** Limited opportunities to interact with instructors and other course participants made Krzysztof feel isolated. He struggled to stay motivated

Analysis and conclusions:

o Identification of problems: Krzysztof realised that key elements such as platform stability, relevance of materials and opportunities for interaction were essential for an effective online course.

o Search for solutions: Krzysztof decided to look for alternative courses that would better meet these criteria. He also considered participating in more interactive formats, such as webinars or in-person workshops.

Positive results:

o New approach to learning: Krzysztof began using a variety of knowledge sources, including interactive educational platforms offering more up-to-date and engaging materials.

o Sharing insights: Krzysztof shared his experiences with other teachers, helping them avoid similar mistakes and choose better courses.

o Skill development: Despite his initial failure, Krzysztof improved his critical thinking and educational resource selection skills, which contributed to his professional development.

Embracing a positive attitude towards failure as part of an innovative culture is crucial for continuous development and adaptation. Positive failure, as can be seen in Krzysztof's case, may lead to valuable lessons and inspiring results contributing to the overall progress and success of an organisation.

3.3.2 Key principles and stages of ideate

Principles of effective ideation:

1. Quantity over quality – the more ideas, the greater the chance of finding the right solution.
2. Do not judge – every idea is welcome.
3. Build on the ideas of others – creative development of thoughts.
4. Encourage bold, even 'crazy' ideas.
5. Link ideas to a predefined challenge.
6. Document everything – for example: on a board, sticky notes, cards

Stages of ideation session:

1. Preparation
   - Define the goal (for example: by improving VET practices).
   - Select participants (diversity is important).
   - Select tools: brainstorming, SCAMPER, analogies, etc.
   - Prepare a creative workspace.
2. Generate ideas
   - Short warm-up exercise.
   - Clear reminder of the rules.
   - Individual or team-oriented work.
   - Collecting ideas (cards, online, on a board).
3. Selection and choice
   - Grouping ideas.
   - Voting, for example by using a points system.
   - Selecting 1–3 best ideas for further development.
   - Documentation in the card [04_Ideate_46_Managing_ideas_with_idea_dashboards].

Problem:

Students do not engage in practical activities related to the construction and configuration of computer networks, perceiving them as monotonous and detached from real-life applications.

Method used: Brainstorming with students and teachers – a joint session to generate ideas for making practical classes more attractive.

Ideas generated:

· Organising an IT escape room in the network lab, with tasks necessitating problem solving in the field of configuration and diagnostics,

· Creating a mobile field game on cyber security,

· Educational campaign, prepared by students for younger classes, on online threats and digital hygiene.

Effect:
The team decided to implement the 'IT escape room' concept. Students took on the roles of IT specialists, solving practical network tasks in a game-based scenario. The new form of classes significantly increased the level of engagement and motivation to learn.

Problem:
Students have difficulty remembering first aid rules when they are taught exclusively in the form of a theoretical lecture.

Methods used:
•**SCAMPER** technique – utilised to modify traditional teaching methods,
•**Reverse brainstorming** – to identify factors that may hinder effective knowledge acquisition.

Ideas generated:
•Creating realistic rescue scenarios by means of using VR technology,
•Using rescue mannequins equipped with sensors that respond to correct techniques,
•Organising team competitions with time and accuracy assessments.

Result:
The project team decided to implement a VR application with interactive feedback. The new solution was integrated into the training programme. It significantly improved the level of engagement and effectiveness of first aid rule retention among participants.

Practical example – SEN: students with dyslexia

Problem:
Students with dyslexia have difficulty assimilating written content, which reduces their learning effectiveness and limits their independence while working with educational materials.

Methods used:
• **Analogy map** – used to transfer familiar patterns from other areas,
• **Brainstorming and solution scenario planning** – selecting the best concept from among many proposals.

Ideas generated:
• App that reads text with animations illustrating the content
• Book cards with QR codes linking to audio recordings
• E-learning platform with gamification elements

Result
The team created a **prototype mobile application** integrating sound and image to support users with dyslexia in reading and understanding text. Participants of the educational programme felt more independent and had greater control over their own learning process.

Practical example – VET: hotel management school

Problem
Students of a hotel management vocational college have difficulty serving guests in stressful situations, especially in interpersonal ones requiring quick reactions and maintaining professional standards.

Methods used:
•**SCAMPER technique** – modifying elements of traditional exercises,
• **Emotion mapping** – analysing students' reactions in stressful situations and their impact on behavioural patterns.
Ideas generated:
• Recording scenarios with a 'difficult customer' played by students,
• Digital hotel desk simulators,
• Sessions with actors playing roles of guests.
Effect:
The school implemented a point-based assessment system, in the case of which students earned points for participating in simulations and analysing their own video recordings. Each situation was discussed in detail with the teacher, which increased the level of reflection and awareness of their own communication skills.

3.3.3 Tools supporting ideate

For the ideation phase to be truly effective, it is worth consciously selecting tools that stimulate creativity, engage participants and help break routine-based ways of thinking. Such tools support both the generation of new ideas and their selection, transformation and development. When it comes to educational work, especially in VET and SEN contexts, the choice of technique should be adapted to the level of the group, its diversity, as well as the complexity of the challenge. Below, some of them are specified:
Brainstorming
It is the most commonly used tool in the ideation phase. It allows to quickly generate many ideas in a short period of time. It works well in small groups of students as well as while working with adults, such as teachers planning new teaching materials. Versions: classic, written, online.
SCAMPER
It is a technique for systematically transforming existing solutions. The name comes from the first letters of the English words: Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, and Reverse. Each of them is a question that stimulates a different perspective on the problem.
Example of use: trainers developing new ways of teaching first aid rework an existing e-learning course using SCAMPER questions. For example: 'What can we combine?', 'What can be reversed?'.
Reverse brainstorming
Instead of asking, 'How can we solve the problem?', we ask, 'What could make it worse?' It helps identify hidden barriers and stereotypes. It is particularly useful when working with groups that are resistant to change.
Example of use: in a special school, the team asks 'How can we effectively discourage students from communicating?', which leads to a better understanding of their needs when developing an AAC system. [04_Ideate_30_Reverse_brainstorming]

Analogical thinking (analogus solutions)
It is a technique that involves transferring solutions from other fields. For example, the following questions can be asked: 'How would a courier company solve this problem? How about a symphony orchestra?' It helps think outside the box.

Example of use: vocational education teachers are looking for ways to improve the student internship system, drawing inspiration from Uber's logistics. [04_Ideate_31_Analogus_solutions_matrix]

The 6-5-3 method
It is a structured form of brainstorming: 6 people generate 3 ideas in 5 minutes. Afterwards, they pass the sheet on to the next person. Everyone develops previous ideas.

Example of use: a group of SEN educators use this method to create a catalogue of ideas for activities for children with autism spectrum disorder, developing each other's ideas. [04_Ideate_33_Brainstorming_6-5-3]
Association pyramid

It is taken advantage of to develop a single idea in multiple ways by means of creating increasingly detailed or abstract associations. It helps to deepen understanding of a topic and find non-standard solutions.

Example of use: hairdressing school students build an association pyramid based on the 'image' word and create image service designs. [04_Ideate_32_Pyramid_of_associations]

Scenarios
This method is based on creating realistic, context-based situations that reflect the user's needs. They give participants the sense of authentic action and testing of ideas.

Example of use: social care school students create scenarios for supporting seniors in their daily activities and search for solutions for each situation. [04_Ideate_34_Scenarios]

Convergence map
Such tool organises ideas according to criteria such as cost and value, feasibility and innovation. It helps move from the generation phase to specific solution selection.
Example of use: a team of vocational teachers selects three concepts for lessons developed in an ideation session that are most realistic to implement in the coming semester. [04_Ideate_38_Convergence_map]
Idea dashboard
It has the form of a collective document or board for managing ideas: evaluating them, assigning them to categories, and marking them for further development. It can be prepared in physical or digital form.
Example of use: a VET project team introduces a dashboard with columns: "to be developed", "to be tested", and "rejected", which streamlines the management of further prototyping. [04_Ideate_46_Managing_ideas_with_idea_dashboards]

3.3.4 Building a culture of innovation

Effective ideation requires the creation of conditions:

- openness and safety (no one ridicules ideas),
- courage to experiment,
- acceptance of failure as part of the learning process.

Example: In a VET institution, students designed an application to help prepare for job interviews. In the test version, the application did not work as expected, but error analysis led to the creation of a better tool in the next iteration cycle.

3.4 Prototype – Creating Solutions

3.4.1 What is prototype?

Design thinking and prototyping culture. The creators of Design Thinking emphasise that prototypes not only allow designers to verify their understanding of design goals, but also grant them better insight into themselves and their users. Prototypes are therefore not only used to visualise designed solutions, but are also taken advantage of as a means of communication with the recipients. Prototyping is not just a technique. It is also a culture and a language.

Prototyping culture. Prototyping culture encourages designers to continuously improve and refine their work. Prototypes not only solve problems, but they also open doors to further discoveries. It is a form of experimentation, in the case of which each prototype strives to be a better version of itself, requiring both technical skills and imagination.

Prototyping language. Prototyping is a specific language. Each prototype is created through collaboration with potential users, who become integral parts of the creation process. A clear and understandable language of prototyping is key to obtaining valuable feedback from users.

Practical action. Prototyping reflects a practical approach to action involving testing, learning from mistakes and making improvements. Siad approach helps better understand design challenges and adapt them to user needs.

Prototyping culture is considered to be an essential part of the design process, which uses prototypes to explore, experiment, verify and communicate with users before final implementation. It is an approach that is based on several key principles and values that promote experimentation, openness to unconventional thinking, as well as and the ability to question established norms.

3.4.2 Prototyping culture – experiment, learn, improve

Prototyping can be taken advantage of in various areas of design, such as product, user interface, experience, service or graphic design. Nevertheless, regardless of the field, the culture of prototyping emphasises the creation of working models of solutions for the purpose of testing and improvement.

The basic principles of prototyping are as follows:

- **Iterative nature of prototyping**, which means that models are created, tested and evaluated in cycles, allowing for any and all shortcomings to be identified and improved based on feedback.
- Encouragement of exploration and experimentation, where prototypes are tools for testing different variants and concepts, not just for confirming assumptions.
- **Fast action,** which means rapid and often imperfect prototyping in order to identify and correct potential flaws in the solution.
- Focus on users, allowing them to be involved in the development process early to understand their needs and expectations.
- **Acceptance of risk and mistakes,** where mistakes are treated as learning opportunities and pointers for improvements.
- **Goal orientation,** as prototyping aims to create an effective solution to a problem having measurable results.
- **Communication and feedback,** which are crucial when it comes to gathering pieces of information about prototypes and making changes to them.

The culture of prototyping can be therefore perceived as a way of thinking and acting that allows for the verification of ideas and the improvement of solutions, taking into account both needs and expectations of users. Its principles and values are extremely useful when it comes to the Design Thinking process, helping optimise solutions before their final implementation.

What is prototyping? Prototyping is a method to transform an idea into a working solution. It is a method of concretising ideas and giving them a tangible form. Prototyping puts the results of work obtained in previous stages of the design process in the real world. Its aim is to test strengths and weaknesses of the designed solution, as well as to indicate the further direction of work. Prototyping is an attempt to imagine a solution and guide the process of its realisation.

3.4.3 Principles of effective prototyping

Prototyping is an experimental phase of Design Thinking, in the course of which project teams attempt to capture key features of the designed solution in the form of a working model and test it on users. It allows for the verification of the value of an idea (for example: checking whether the idea actually solves users' problems) and its gradual improvement.

Prototypes should be interactive. When creating a prototype, it should be kept in mind that it should help understand the idea (or some element of it) as optimally as possible. Therefore, a well-prepared prototype should be something tangible (a prototype is something you can interact with). A prototype should not only visualise the idea, but also allow to test all the key functionalities of it. This way, one can imagine the solution as if it were being used.

A prototype is a working version of a solution. A prototype is a simple representation of an idea, a working version of it. It is designed to help verify the value of an idea and provide feedback from users (the purpose of a prototype is to gather information quickly). Its role is to refine the idea for a solution, so the state of the prototype is fluid and subject to continuous verification. Creating a prototype brings the team closer to the final version of the solution.

Prototyping is a process of experimentation. Prototyping is a process of experimentation. In the course of the discussed phase, various possibilities are tested and various questions about the value of the idea are asked. A prototype, according to popular opinion, is a trial balloon for a solution. Therefore, during the creation phase, anything that helps present the idea and gather the necessary information about it is allowed.

Prototyping is a learning process. Prototyping can be also considered to be a learning process. It is the opportunity to verify objectives of the design process and its basic assumptions (such as the knowledge of user needs). The prototyping process also teaches how to deal with failures and make mistakes at various stages of the design process that contribute to its ultimate success. Prototyping allows to learn from mistakes and use said knowledge to improve solution idea.

The place of prototyping in design thinking. Why do we prototype? Prototyping is the transition from the conceptual phase to the implementation stage of a given solution. It is worth noting that prototyping can be taken advantage of at various stages of the Design Thinking process and helps save both time and costs associated with implementing a solution, while at the same time reducing investment risk. Additionally, it promotes a proper communication and cooperation within the design team.

3.4.4 Types of prototypes and forms of presentation

There are numerous ways to create prototypes. The choice should depend on the team's preferences, available resources, and the purpose of the prototype. Prototypes can vary in fidelity, from low, which is used for quick and inexpensive testing of basic functions, to high one, which is closer to the final version of the solution. Each type of prototype has its place in the design process and turn out to be useful, depending on the needs and context of the project.

When starting prototyping, it is worth considering the form in which we would like to present our solution. The choice of prototype form is crucial, as it allows to create a communication tool that is best suited to the type of project.

The first step while realising an idea is to make a concept sketch. It is a simple visual method that analyses concepts through a few preliminary images to understand how it works [05_Prototype_51_Concept_sketch]. There are numerous different forms of prototypes. They may have the form of visual, physical, service-related or software and application prototypes. The choice of a specific form should depend on project objectives, available resources and user needs.

- **Visual prototypes** take the form of sketches, diagrams, storyboards05_Prototype_47_Storyboard] or graphic designs. They are basic forms of prototyping that help visualise solution concepts. They are relatively easy to produce and are often opted for at the early stages of a project. Visual prototypes can take various forms, such as storyboards (sets of images or sketches), mock-ups (graphic model presentations) or films.
- **Physical prototypes** are physical models or objects created in order to illustrate a solution. These can be mock-ups, 3D models [05_Prototype_56_3D_prototyping], mechanical prototypes or products made from real materials. Physical prototypes are particularly useful when it comes to projects involving physical products, architecture or engineering.

- Service-related prototypes refer to simulations of interactions between users and a solution. These can be scenarios, role-playing [05_Prototype_59_Role_play], service maps or other tools helping to understand what the use of a product or service will look like.
- Software and application prototypes are working models of user interfaces, features or entire applications. They can be clickable prototypes, interaction simulations or MVP (Minimum Viable Product) prototypes containing basic features of a product or application. When it comes to digital prototypes, it is easier to try to imagine our ideas statically through certain specific features and generate an explanatory prototype that simulates its use. This way, the user can already see what the concept will look like in detail, even if it does not yet work as such. [05_Prototype_52_Mock_up]. If we also want to include the organisation of the interface content or navigation system in the design, as well as the definition of customer interaction via the website, mock-ups should be the optimal tool to use. [05_Prototype_53_Wireframes]

The choice of prototype form is vital, as it allows for effective communication of design concepts and understanding of user needs. Each prototype form has its advantages and may be appropriate in different design situations.

3.4.5 Step-by-step prototype creation process

While choosing how to create a prototype, there are several important factors that should be taken into account. Firstly, look **at what motivates the team and what skills its members have, as well as the resources** available, such the tools or materials being at your disposal. The choice is also influenced by the **stage of the prototyping process:** early stages may require simpler prototypes, while later ones may require more advanced ones. Next, consider what goals you want to achieve by creating a prototype. Is it a tool for testing ideas or rather a presentation of a finished solution? All of the aforementioned matters should be taken into account in order to choose prototyping methods and forms in a pragmatic way. It should be practical and tailored to the needs of the project. It will ensure that the prototype helps explore the value of your idea and leads to the best possible final solution. A useful tool in this process is the creation of a Prototyping Card [05_Prototype_48_Prototyping_card].

Prototyping is a process that requires focus and determination, but it is also flexible and may be adapted to project needs. Below, there are a few rules to keep in mind while creating prototypes:

1. **Define the purpose of prototyping:**
- Before starting to create a prototype, you need to clearly define why you are doing it. Are you verifying project assumptions, exploring the functionality of a solution, or trying to understand user needs? The purpose of the prototype helps you focus on the relevant aspects of the project.
2. **Adopt the user's perspective:**
- Prototypes should be created with users and their context in mind. What designers like may not always be suitable for users. It is crucial to consider who will be using the solution and whether it will find it easy to use. [05_Prototype_55_Prototyping_innovative_classroom_design]
3. **Simplicity:**
- Prototypes should focus on most important features or aspects of the solution. Avoid overly complex prototypes that may be difficult for users to understand. The simpler the prototype, the easier it is to get clear feedback.
4. **Speed:**
- Prototypes should be created relatively quickly. Do not focus on perfection or aesthetics, but on getting a working model. The sooner you can test a prototype, the sooner you will be able to make improvements.
5. **User interaction:**
- Prototypes should allow users to experience the designed solution directly. It will help understand how users will use it and identify potential problems.
6. **Accept fluidity:**
- Prototyping is an iterative process involving multiple versions of a specific solution. Be ready for change and do not get too attached to your initial assumptions.
7. **Monitor progress:**
- Document conclusions and observations from each stage of the prototyping process. It helps organise the process and avoid repeating identical mistakes.

8. ule of thumb: Even if you are not sure what to do, it is worth taking action. Prototyping is a process that allows to learn and develop ideas through action.

Prototyping is a key stage in the design thinking process, requiring both adequate preparation and planning. Below, there are a few steps to take when preparing to build a prototype:

1. Set a prototyping deadline: Choose a specific day or period for building the prototype. It helps focus your work and concentrate your efforts on achieving the goal set.
2. Choose the right location: Find a space that is large and comfortable enough to work in. Make sure that all the necessary materials and tools are within reach.
3. Discuss the purpose of prototyping: Before you start working on the prototype, discuss what you want to achieve with your team. Will the prototype be used for research, functionality evaluation or project communication? It helps determine the type and form of the prototype.
4. Select questions about the prototype: Think about questions you want to ask when testing the prototype. Such questions should relate to the functionality, usability, performance, or appearance of the prototype. Moreover, consider defining the target audience for the prototype and their expectations.
5. Re-evaluate the solution idea: Before building a prototype, it is a sensible idea to re-evaluate the solution idea with your team. Agree on the concept and resources needed in order to create the prototype. You can also create a concept card containing all the relevant information.

Following said steps will help you plan and execute the prototyping process effectively, enabling you to gain valuable feedback for the next stage of the project.

Prototyping is a key step in the Design Thinking process that requires proper planning and consideration of various factors. Below, there are a few steps to follow when creating a prototype:

1. Select a prototyping method: Before you start creating a prototype, consider which prototyping method you would like to opt for. Define the scope of the prototype, its level of fidelity, as well as the target audience. It is also vital to consider the available resources, time, and costs.
2. Sketch the prototype: Before creating the actual prototype, it is helpful to create a sketch. It can help you visualise your initial idea and align your team's work. You can create several sketches, each with notes about most important features of the prototype and the user.
3. Prototyping loop: The process of creating a prototype is iterative and consists of several loops. Each loop involves preparing the prototype, testing it together with users, and analysing the data collected. Completing each loop helps improve the prototype and brings you closer to creating a better solution.

Prototyping loops should be carried out for as long as comments and feedback on the prototype continue to emerge. The more loops are carried out, the easier it will be to refine the prototype and prepare it for further testing. [05_Prototype_58_Paper_wireframing] It is also crucial to ensure that the prototype is as simple as possible so that it is straightforward for users to understand. It makes the prototyping process more efficient and allows the solution to be better tailored to users' needs.

The presentation of the prototype is a key stage when it comes to the prototyping process. Once the prototype is ready, it is important to focus on its presentation, especially when user testing is approaching. Below, there are a few steps to take to properly prepare the prototype for testing:

1. **Testing context:** It is worth considering where or in what situation the prototype will be tested. Choosing the right context can influence how tests are conducted and how users understand the prototype. For example, if a mobile application prototype is to be tested, it would be beneficial to conduct tests in an environment being similar to real-life use, such as on the street or in a shop.
2. **User testing:** It is vital that the users testing the prototype are as close as possible to the actual end users of the solution. Their opinions and reactions will help evaluate the usability and functionality of the prototype. Selecting a diverse group of users may provide different perspectives and help identify different user needs.
3. **Prototype functionality:** The prototype should be understandable and easy to use. Ensuring that the interface is simple and intuitive may contribute to a better assessment of its usability by users. It is also paramount to ensure that all key features of the prototype are available and work correctly.
4. **Prototype aesthetics:** The appearance of the prototype is important as well. An aesthetic and attractive design may encourage users to interact with the prototype and positively influence their overall impression. Paying attention to appropriate graphic presentation can make the prototype more attractive and engaging to users.

While creating a prototype, keep in mind that it is a process, not a one-time activity. Some prototypes may be successful, whereas others may require revisions or even be rejected. It is crucial to devote sufficient time to the prototyping process to ensure both the quality and usability of the prototype, which will ultimately contribute to creating the best possible solution for users.

SUMMARY

3.4 Prototyping – Creating Solutions

3.4.1 What is prototype?

Prototyping is an experimental phase of the Design Thinking process, which involves transforming ideas into tangible, testable models. A prototype can be a simple sketch, a physical model, a digital mock-up, as well as a service simulation. Its purpose is to swiftly gather feedback, test assumptions and understand whether the designed solution meets the needs of users.
Moreover, it allows for early detection of errors before significant implementation costs are incurred.
Tools: [05_Prototype_48_Prototyping_card], [05_Prototype_51_Concept_sketch], [05_Prototype_55_ Prototyping_innovative_classroom_design]

3.4.2 Prototyping culture – experiment, learn, improve

Prototyping is not merely a technique – it is a way of thinking and acting.

- When it comes to a prototyping culture:
- mistakes are treated as a source of knowledge,
- iteration and quick actions are promoted,
- solutions are tested early and often,
- users are treated as active co-creators,
- numerous variants of solutions are tested.

A culture of prototyping enhances creativity, openness to unconventional approaches, as well as promotes dialogue between designers and users. The aforementioned approach helps designers identify shortcomings at an early stage, before investing time and resources in full implementation.

3.4.3 Principles of effective prototyping

1. **Define the goal** – determine what you want to test.
2. **User-centred** – prototype with user needs and capabilities in mind.
3. **Simplicity over aesthetics** – a prototype should work, not look good.
4. **Act quickly** – create cheap, quick models.
5. I**nteraction** – allow the user to test the solution.
6. **Collect feedback** – test in realistic contexts.
7. **Iterate** – build subsequent versions basing on test findings.
8. **Document the process** – note down observations and corrections.

Cards: [05_Prototype_57_Paper_prototyping], [05_Prototype_58_Paper_wireframing]

3.4.4 Types of prototypes and forms of presentation

Visual – sketches, storyboards, diagrams [05_Prototype_47_Storyboard]. They help quickly visualise an idea and start a conversation.

- **Physical** – mock-ups, 3D models, and handmade constructions [05_Prototype_56_3D_prototyping]. They are ideal for technical and craft education.
- **Service** – role-playing, scenarios, service maps [05_Prototype_59_Role_play]. They are useful for designing processes and interactions.
- **Digital** – clickable mock-ups, application prototypes [05_Prototype_52_Mock_up], [05_Prototype_53_Wireframes]. They are used in ICT and online education.

The choice depends on the goal, resources and audience. It is worth starting with low fidelity and gradually moving on to more advanced forms.

3.4.5 Step-by-step prototype creation process

3.4.5 Step-by-step prototype creation process

1. **Set the prototyping goal** – testing functionality, user experience, expectations.
2. **Select a method** – consider the phase of the process, team skills, time, as well as available materials.
3. **Concept sketch** – create a map of ideas and main features of the solution [05_Prototype_51_Concept_sketch].
4. **Build a prototype** – it should be tailored to the level of fidelity required for testing.

6.**Analyse data** – group information, identify patterns, create version 2.0.
7.**Repeat the loop** – each iteration should bring you closer to the best solution.

Practical examples
VET – Vocational catering school
Problem: Students are unable to work together effectively when preparing meals in the kitchen.
Prototype: Staging teamwork in the kitchen with role division, an order system and a real-time clock.
Result: Students learn how to plan their work, communicate, as well as divide tasks in stressful conditions.

VET – Adult education (ICT sector)
Problem: An online course on cybersecurity did not engage participants.
Prototype: A clickable course model with quizzes, decision simulations and an interactive dashboard has been developed.
Result: Better understanding of threats and how to respond, increased engagement.

SEN – students with ASD
Problem: Students with autism spectrum disorders had difficulty with spatial orientation in the school building.
Prototype: A sensory path with touch boards, symbols and signal points.
Effect: Increased independence and reduced stress among students.

VET – Construction vocational college
Problem: Difficulties in understanding spatial relationships and building plans. Prototype: 3D model of a building section with elements that can be freely dismantled and reassembled. Result: Understanding functions and sequence of activities on a construction site.

Summary: Prototyping is a process of experimentation, action and learning. It allows for various solutions to be tested with users, assumptions to be verified and ideas to be iteratively refined. Thanks to its culture, teams learn quickly, cheaply and efficiently, at the same time minimising the risk of failure when it comes to the final implementation.

3.5.1. Importance of feedback and feedback-oriented culture

Design Thinking is an approach to problem solving that emphasises user involvement and openness to feedback. Feedback plays a key role within its scope. What exactly is feedback?

Feedback is information or evaluation of actions, behavioural patterns or achievements of a specific person or group of people, taken advantage of to eliminate errors or improve performance. It can be positive, confirming correct actions, or negative, indicating areas for improvement.

In today's world, feedback is extremely important in management, communication and professional development. It helps people exchange opinions and information, therefore contributing to the creation of a feedback culture. Said culture consists of a set of principles promoting openness to feedback and encouraging the constructive exchange of opinions and information.

When it comes to the Design Thinking process, feedback plays a key role at every stage. Engaging users and maintaining an open approach to feedback allows designers to better understand user needs and expectations, as well as solve the problems they are working on more effectively.

Therefore, feedback should be objective, precise and clear in order to fulfil its purpose. By pointing out strengths and weaknesses, feedback helps to find the best solutions and implement improvements that really matter.

A feedback culture is more than just sharing opinions. It is also oriented towards creating an environment where people feel comfortable sharing their opinions and assessments without fear that they will be taken personally or that their intentions will be misunderstood.

When a feedback culture is developed, the quality of interpersonal relationships improves. Openness to constructive feedback, focus on helping and supporting each other, regularity in sharing opinions, connection to a learning culture, ensuring psychological safety, as well as supporting consistency in action are most important assumptions of this culture.

Thanks to a feedback culture, people can understand their strengths and weaknesses better and get guidance on how to develop. It also provides an opportunity to build trust and strengthen interpersonal relations.

Thanks to a feedback culture, people can understand their strengths and weaknesses better and get guidance on how to develop. It also provides an opportunity to build trust and strengthen interpersonal relations.
In the context of design, feedback is an integral part of the process. Every opinion has value and can contribute to improving the overall design. Therefore, a feedback culture should be present at every stage of the project so that every team member feels appreciated and motivated to continue developing.
Feedback in the Design Thinking process. The value of feedback in the Design Thinking process is not limited to the final stage of the design process. It is visible at every stage of Design Thinking:

- **Empathize:** The value of feedback is evident in the first phase of the process, during which it is crucial to identify problems and determine user needs. Understanding their perspective requires both empathy and direct contact. Obtaining feedback at this stage is essential when it comes to perceiving the problem through the eyes of the users.
- **Define:** Feedback is also important in the second phase of Design Thinking, while defining the problem. Feedback allows to precisely define the design challenge and capture the essence of the problem. It is also a key to identifying most important values that users prioritise.
- **Ideate:** Feedback is crucial in the idea generation phase. Feedback can be taken advantage of in the creative process, especially when users are involved, as well as when evaluating ideas.
- **Prototype:** Feedback is vital during prototyping. Its value is revealed in the process of improving the prototype solution.
- **Test:** It has to be mentioned at this point that the stage during which feedback plays the most important role is the testing one. In this phase, feedback allows for the value of the prototype to be verified. Feedback helps determine what works and what does not when it comes to the designed solution.

Feedback in the Design Thinking process helps design teams understand the essence of the problem they are solving better. What is more, it allows them to determine what is important to users and stakeholders. Feedback enables learning from mistakes. It makes it possible for failures and setbacks to be treated as investments. Ultimately, feedback makes the design process effective and leads to developing solutions that meet the needs and expectations of users.

Testing is a crucial stage of the Design Thinking process, because it verifies the value and functionality of a solution. The way we test is critical to the success of a project. Why is it so important to test at all?

Testing is like checking the quality of a new mobile phone before it hits the market. Imagine that you have an idea for a revolutionary phone with features that people dream of. How do you know if your phone actually works as it should? How do you know if people will want to use it?
This is where testing comes in. It is the process of presenting the prototype to users – the people for whom this phone is being developed. We want to see what they like and dislike, what works well, as well as what requires improvement.
Testing also allows to check three important matters: whether he idea is feasible (namely - whether it can be implemented), whether it will be profitable (so whether people will want to pay for our phone) and whether it will be attractive (whether people will want to use it).
That is exactly why testing is so important. It is our chance to make sure that our idea really works and meets the needs of users. It is the way of checking whether we are on the right track to creating something truly valuable.

3.5.2. Iteration and pivot – testing as a learning process

Testing is the moment when we go through the final check of our project. It is the time when our prototype reaches real users, allowing us to see how it works in real life. At this point, we want to check if our solution really works and meets people's needs.

Testing is like a crash test for a car – it allows checking whether our solution will stand the test of time and whether it is safe to use. That is why we need the commitment and focus of all members of the project team. The success of the testing phase will determine whether our solution will ultimately be launched on the market.

Furthermore, testing is the last chance to improve our project. If users report any issues or suggestions, we will have the opportunity of fixing or incorporating them before the solution is rolled out on a large scale. Thanks to that, the testing phase serves as a summary of all our design efforts. It is the moment when we check whether our work is actually delivering the expected outcomes and whether our solution is ready to face reality.

Why is testing important in the Design Thinking process?

Testing plays a key role in the Design Thinking process for a number of reasons:

1. **Evaluating the effectiveness of a solution:** Testing allows to verify that the designed solution actually addresses the identified problem and meets user needs. Users have the opportunity of interacting with the prototype and show how it works in reality.
2. **Understanding user needs:** Testing makes it possible to gather feedback and observations that help the design team understand user needs and expectations better.
3. **Identifying areas for improvement:** Testing helps uncover issues that did not surface in earlier stages of the design process. It allows to identify them and make key adjustments.
4. **Minimising risk and reducing costs:** Testing allows weaknesses in the solution to be identified and corrected early on, reducing the risk of costly mistakes in the course of implementation.
5. **Increasing the value of the designed solution:** Testing provides concrete evidence of the solution's effectiveness in practice. It shows that it was created in response to factual needs of the audience.

Testing increases user satisfaction and engagement by means of showing that their voice matters. Direct interaction with users allows to make more informed design decisions and tailor solutions to their real needs.

Testing phase is the culmination of the entire design process. It is the stage when the solution takes its final shape and becomes ready for implementation. It is important to be aware that testing can lead to a change in direction. However, and this is a natural part of design work. A ‘pivot’ is nothing more than a change in the concept of a solution in response to user needs and expectations.

A pivot may be necessary when original assumptions prove to be wrong or the solution does not work as intended. It is not a failure, but rather - the opportunity for reflection, learning and improving the idea. That is why pivoting is a natural part of the Design Thinking method.

Testing is sometimes perceived as the most important stage, because even the best idea may not work. If the solution proves to be wrong, it is testing that allows to see this and start the process again.

Testing can be treated as a research process, verifying the hypothesis pertaining to the usefulness of our solution. There are many similarities between testing and scientific research:

1. Data collection: We observe user behaviour and record it in order to draw conclusions.
2. Behavioural research: We analyse how users react and what they find difficult.
3. Experiments: We test different variants of prototypes in order to evaluate their effectiveness.
4. Feedback collection: We collect user opinions, which serve as a valuable source of information for further development.
5. Data analysis: We analyse data for patterns and user needs.
6. Iterative nature: The testing process, similarly to research, is cyclical, leading to continuous improvement of the solution.

The discussed approach allows us to get to know users better and create solutions that are truly tailored to their needs. It is the foundation of effective design.

3.5.3. Role of the user in testing

Testers play a key role in the design process. Their involvement can have a factual impact on the final design of the solution. Below, there are some important roles that test participants play:

1. **Providing a user perspective:** Testers represent end users, so their reactions, needs and comments are invaluable to designers.
2. **Detecting errors and problems:** Test participants help reveal shortcomings that were overlooked previously. Basing on their feedback, the design team can make proper improvements.
3. **Evaluating usability and functionality:** Their experience indicates whether the solution is intuitive, understandable and fulfils its function.
4. **Verifying design assumptions:** Testers help confirm (or refute) our assumptions about how users will take advantage of the solution.
5. **Providing diverse perspectives:** The more diverse the group of testers, the greater the chance for the design to meet the needs of different people and contexts.
6. **Optimisation of the designed solution:** Feedback from users is vital for further improvement. It leads to a better, more refined result.
7. **Increased user confidence:** When users know that their opinion matters, they are more likely to use the solution and trust it more.
8. **Reducing risk:** Testing allows to identify potential errors early on and avoid costly corrections later on.

What is the conclusion? Involving users in testing is not just a good practice, but the foundation of effective design. Their involvement and feedback are invaluable when it comes improving the design and tailoring it to the needs of users.

3.5.4. Test participants selection

Selecting participants for the testing process is a key step in ensuring the effectiveness of the project. Below, the specificity of the process is discussed:

1,Appropriate representation of the target group: Before selecting testers, you need to determine who the main users of the designed solution will be. Testers should reflect this group and be able to understand the context of the solution.
2.Diversity of participants: In order to ensure comprehensive testing, participants should be selected from different backgrounds, genders, ages, experiences, and needs. It allows to look at the project from different perspectives and understand the different needs of users.

3.Motivation to participate: Testers who are emotionally invested in the testing process are more likely to provide honest feedback and cooperate better. Therefore, it is paramount to ensure their motivation and commitment.
4.Appropriate test group size: Small test groups make it easier to control the testing process and allow participants to express their opinions freely. Nevertheless, it is important to maintain a balance in order to ensure that the group is sufficiently representative.
5.Preparing participants: Proper preparation of participants for the testing process is essential. They should fully understand the purpose, process and expectations of the testing. Providing appropriate working conditions is also important when it comes to test effectiveness.
6.Selection criteria: Before starting the selection process, it is recommended to develop clear criteria for selecting testers to ensure both consistency and reliability of the testing process.

The test participant selection process is a crucial element of design thinking that requires precision and care. With the right selection, it is possible to ensure that testers' opinions will be valuable and contribute effectively to the improvement of the designed solution.

1. Testing is a key process in design relying on principles to ensure its reliability and effectiveness. Below, there are some important principles to follow:
2. Focus on the goal: The goal of testing should be clearly defined before the process even begins. It is vital to specify exactly what we are looking for and what information we want to collect. Preparing test scenarios and instructions helps focusing on the goals and tasks.
3. Observation and recording: It is important to focus on observing user behavioural patterns and recording their reactions during testing, rather than engaging in discussions. Users should explore the prototype independently. Their reactions should be thoroughly documented to ensure the objectivity of the process.
4. Openness to criticism: Test participants should be open to criticism and understand that its purpose is to improve the design, not to judge them personally. Criticism of the prototype should be treated as a suggestion for improvement and a natural part of the learning process.
5. Appropriate selection of participants: Test participants should reflect the characteristics of the solution's target users and be tested in an environment being similar to the real one. It is also vital that people who have previously participated in tests do not take part in subsequent rounds, as this ensures result reliability.
6. Flexibility: Unforeseen situations may arise during testing, so it is paramount to remain flexible and ready to adapt to changing circumstances. It is a sensible idea to have alternative scenarios and test plans prepared.

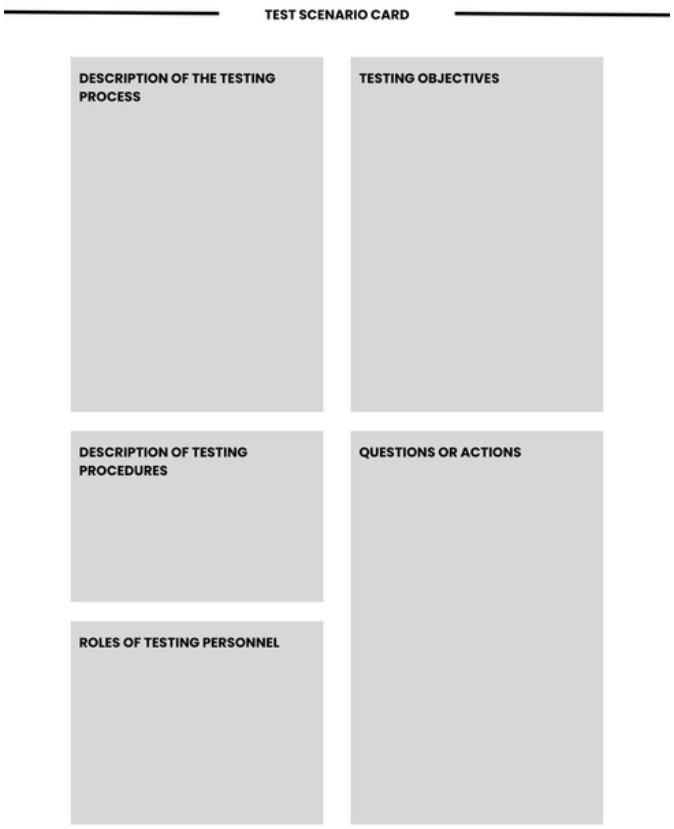
By following the principles presented above, we ensure that testing will deliver reliable, valuable data that will guide the project in the right direction. It is also important that all participants of the testing process fully understand and agree with these principles.

3.5.5. Testing process

Testing is an important step in the Design Thinking process that allows to verify whether our solution meets user expectations. Here is a step-by-step overview of the process:

1. **Preparing for testing:** The first step is to define the purpose of testing. We consider what we want to achieve and what questions we want to answer by testing our prototype. It may include checking usability, identifying problems or comparing different versions of the prototype. It is important to formulate clear objectives that are aligned with major objectives of the project. It is also helpful to define roles that team members will play during testing. To move on to the testing phase, it is required to first define our hypotheses, which will then need to be tested using an appropriate experiment or test. The crucial pieces of information may be collected in a hypothesis matrix [05_Prototype_54_Hypothesis_matrix].
2. **Test scenario card:** A test scenario card containing basic information about the process of collecting feedback from users may be helpful. It may include a description of the testing process, testing objectives, testing procedures, tester roles, as well as a list of questions or actions to be performed during prototype testing.

By following these steps, we can effectively prepare for testing our solution, which will allow to obtain valuable feedback from users and tailor our solution to their needs better.



Selecting test participants is yet another important step in the Design Thinking process. They will provide us with valuable insights about the prototype and help us understand what needs to be improved. Below, the way of achieving it step by step is discussed:

1.Preparing for testing: First, we define what we want to achieve during the testing phase. It is worth considering who the main users of our solution will be. We can also prepare personas, which are fictional user profiles that will help us select right participants. [05_Prototype_60_Student-centric_assessment_strategies]

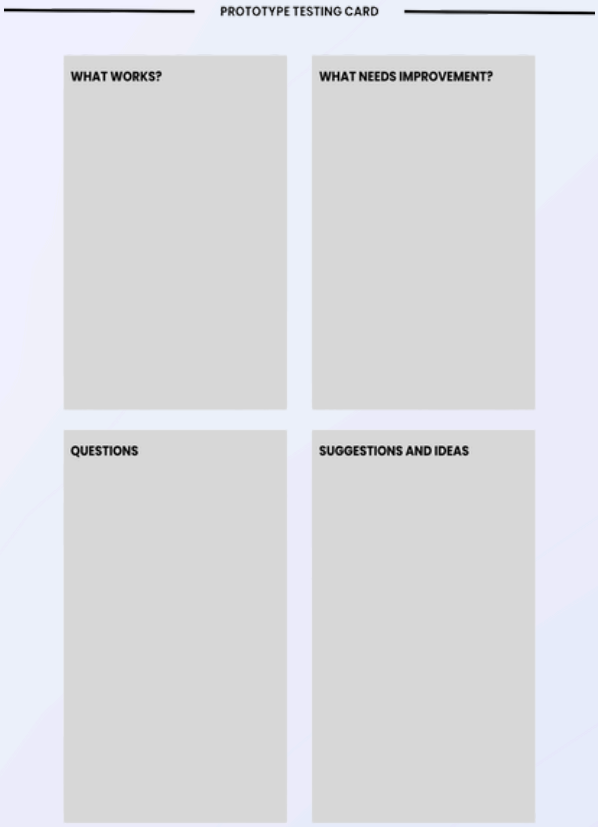
2.Selecting test participants: We select people who reflect our target users best. It is important that they resemble target users in terms of demographic characteristics, such as age and education. We can also ensure diversity in the test group.

3.Determining the number of participants: Typically, tests can be conducted with 5-10 people. Said number may vary depending on the type of prototype and testing objectives.

4.Recruitment tools for participants: We can take advantage of various tools, such as online surveys or recruitment interviews. It is vital to ensure that the testers are not involved in the creation of the solution and do not have any personal emotional ties to it.

5.Preparing test materials: Afterwards, we prepare all the materials we will use during the tests. They can have the form of scenarios, questionnaires, and tools for recording the testing process, such as cameras or voice recorders.

6.Conducting tests: Before starting tests, we explain the purpose, process and rules of testing to the participants. We assure that they can freely express their opinions. During tests, we observe their behaviour and reactions, while at the same time carefully documenting all comments.



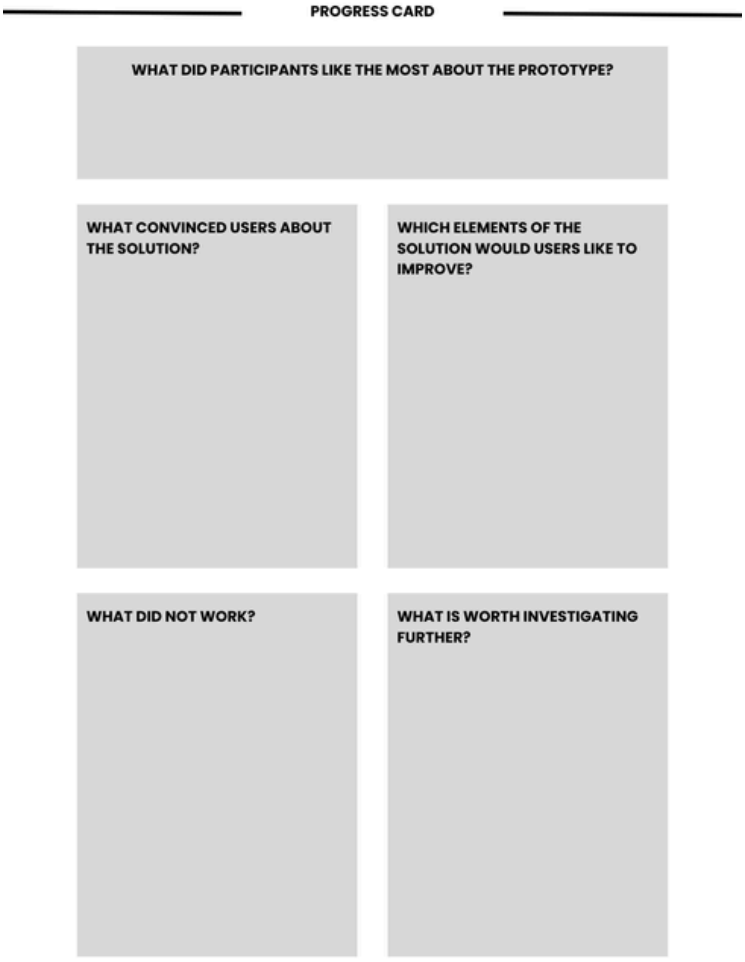
7.Prototype testing card: To gather information, we may opt for a prototype testing card, where we note what works well, what needs improvement, and any questions or ideas the participants have.

By following said steps, we will be able to conduct effective tests of our solution and obtain valuable feedback from users.

Summarising is an important step after conducting a test session, allowing us to gather users' opinions and impressions of the prototype. It can be done in the following manner:

1. **Summary with users:** After the test session completion, we may ask users to share their opinions and impressions of the prototype. We can also ask for suggestions for improvements. It is crucial to document all feedback received thoroughly.
2. **Feedback analysis:** The consecutive step is to analyse the pieces of information collected. We synthesise the material and evaluate it in terms of testing objectives. We look for anything in the data that could help us improve the solution. We can organise our findings by importance and take advantage of them to improve the prototype.

3.Progress card: We may organise the collected information in a progress card. This card can refer to questions such as: What did the participants like the most? What convinced them to use the solution? Which elements would they like to improve? What did not work? Are there any additional issues worth investigating?
By summarising and analysing the feedback collected, we can understand the needs and expectations of users better, as well as implement appropriate improvements in our project. It is paramount that we conduct such sessions regularly in order to continuously improve our solution.



Making adjustments to the prototype is one of key moments when it comes to design. It allows our idea to develop in a tangible way. The specificity of the aforementioned procedurę is as follows:

Using the information gathered: By means of utilising the information gathered during testing and analysis, we identify suggested changes and improvements to our prototype. **Basing on data collected from testing, we identify what needs to be changed, which features should be improved, what should be simplified, as well as what should be added.** Said suggestions will help create a better version of the solution. **The aforementioned observations are a direct guide pertaining to how to improve our prototype.**

Creating the next prototype: Basing on insights gathered, we modify our prototype by implementing the suggested changes. They may include changes to the user interface, features, or processes. **The team makes changes, sometimes cosmetic, sometimes profound ones, as well as develops the next version of the prototype.** The new version of the prototype should be ready for the next round of testing.

Repeating the testing process: The testing process is not a one-time event in character. We introduce changes and repeat the tests in order to determine if our fixes have produced the desired results. **Testing is not a one-time event. Each new version of the prototype should be tested to ensure that the changes are efficient in nature. Said cycle can be repeated several times until we achieve a satisfactory result.**

Market launch: Once all testing rounds have been completed and the necessary improvements have been made, our solution is ready for implementation and market launch. Then, we can start working on its implementation and promotion. [05_Prototype_49_Implementation_roadmap], [05_Prototype_50_Business_model_canvas].

Making improvements to the prototype is a key stage when it comes to the design process, allowing to refine the solution created and tailor it to the needs of users. Through repeated testing and iterative approach, we can create a product that truly meets the expectations of our customers.

SUMMARY

3.5. Testing – verification of the solution with users

Testing is the stage during which the prototype is handed over to users. Their feedback allows to check whether the designed solution actually works in practice, is understandable, useful, as well as effective. It is the moment when the design thinking process comes full circle, but it does not end there. It can lead to further iterations or pivots if the solution requires fundamental changes.

3.5.1. Importance of feedback and feedback-oriented culture

Feedback is present at every stage of Design Thinking – starting from empathy, through problem definition, up to testing. In the testing phase, it becomes a central tool for evaluating the value and functionality of the prototype.

- What is feedback?

It is an assessment, observation or comment on the performance of a solution, its function or user perception. It can be verbal, written, or oriented towards user behaviour and emotions (such as frustration, satisfaction).

- Feedback culture

It refers to an environment, in which constructive opinions are welcome and mistakes are treated as learning opportunities. The project team should create a space where testers feel safe and can speak honestly about what is not working.

Practical example – SEN: special school, students with aphasia

Problem
Students with aphasia had difficulties using an augmentative and alternative communication (AAC) app effectively, predominantly due to the fact that icons were too abstract and did not reflect their everyday experiences.

Action:
As part of the application testing, observations and consultations were conducted with users, mainly – students, support teachers and speech therapists. The analysis showcased that the standard set of icons was not sufficiently understandable or useful for students in everyday communication.
Solution:
The team decided to personalise the interface by means of introducing photos of real objects, people and places from the students' environment (for example: a photo of the school common room, a carer or their own mug).
Effect:
After the modifications being introduced, the application significantly increased its functionality and accessibility. Students began to use it more independently and effectively. What is more, the communication process became more natural and embedded in their real-life context.
Practical example – VET: healthcare

Problem:
Medical students were taking advantage of an interactive nursing procedure simulator, but the application interface was too simplified and differed from actual systems utilised in hospitals. Said fact made it difficult to transfer skills to the professional environment.

Action:
During a feedback session organised after prototype testing, students and instructors pointed out the need of better representation of real nursing tools, both visually and functionally.

Solution:
The project team modified the simulator environment by means of introducing interface elements and scenarios similar to the actual patient care system (including electronic documentation, desktop layout, and medical terminology).

Effect:
The change to a more realistic interface significantly improved the usability of the tool. Students rated the simulator as preparing them for professional practice in a hospital better and increasing their confidence in the context of their future work.

3.5.2. Iteration and pivot – testing as a learning process

Testing is not the end of the process. It is a stage of drawing conclusions and deciding on the next steps.

- Iteration – minor adjustments based on feedback.
- Pivot – changing the direction of a solution when it proves to be wrong.
- Hypothesis verification – testing as a form of experiment that verifies assumptions.

Tip for moderators: Support the team in accepting 'failures' as the source of knowledge. Use the hypothesis matrix [05_Prototype_54_Hypothesis_matrix] in order to formally track which assumptions have been confirmed and which have not.

3.5.3. Role of the user in testing

Users serve as an irreplaceable source of knowledge. Thanks to them, it is possible to:
receive direct information about the operation of the prototype,
learn about real problems that may not have been visible to the design team,
identify emotional reactions to the solution, which are crucial in education and working with people.
Practical example – SEN: students with ADHD, vocational school
Problem
Students with ADHD participated in tests of an e-learning platform, but had difficulties maintaining attention during longer educational modules. A decline in concentration, discouragement and difficulties with regard to completing tasks in one go were observed.
Action:
As a part of the prototype testing, student behaviour was observed and feedback was collected from teachers and participants. The need for shorter, more dynamic modules, as well as a reward system to strengthen motivation to learn was identified.

Solution:
The project team redesigned the course structure:
– the content was divided into short segments with the possibility of taking breaks,
– a point-based system and badges were introduced, which students received for completing specific tasks,
– gamification elements were used to support activity and maintain attention.
Effect:
The modernised prototype of the platform was better suited to needs of students with ADHD. Students were more actively engaged. What is more, teachers noticed an increase in perseverance and greater independence in completing educational tasks.

3.5.4. Test participants selection

Effective testing requires a sensible selection of testers who represent real users. The following should be ensured:

- representativeness of the group – age, skill level, special needs,
- diversity of perspectives – gender, experience, learning style,
- awareness of the purpose – participants must understand that they are testing a prototype and not being evaluated.

VET example (logistics): Students from different years of education and practical training teachers were invited to test a warehouse management system, allowing for the prototype to be tested in conditions close to those in the workplace.

3.5.5. Testing process

1. Preparation of a test scenario

- Definition of test objectives and key questions.
- Select tools for observing and documenting results.

2. Conducting tests

- Participants complete the tasks independently.
- Moderators observe, as well as document reactions and comments.
- Participants may also complete short questionnaires.

3. Collecting and analysing feedback

Key questions:

- What worked well?
- What needs improvement?
- Did the user understand the prototype's functions?
- What was surprising?

1. Making improvements and iterating

- Feedback leads to decisions: we improve, change direction (pivot) or continue developing the solution.

Examples of testing in practice

In order to illustrate the importance of the testing phase better, below, there are two examples of Design Thinking applied at the testing stage. The first one in the context of vocational education and training (VET) and the second one is related to users with special educational needs (SEN).

Example (VET – vocational education)

A group of technical college students worked on a prototype of an improved socket wrench for car mechanics. After empathy, problem definition and prototyping stages, young designers created a physical prototype of a tool with an adjustable handle in the school workshop. Afterwards, they invited apprentices and instructors from a nearby car workshop (reflecting target users) to test it. The testers were given the prototype wrench to perform typical tasks (unscrewing bolts in hard-to-reach places, etc.). Observations: the tool worked well, but the mechanics had trouble adjusting the handle while wearing thick gloves. Moreover, the wrench was a bit too heavy. Feedback: the testers praised the idea of an ergonomic handle, but suggested adding a non-slip coating and slimming down the design. The students carefully noted the comments and then made improvements. They replaced the metal handle with a lighter composite one and enlarged the handle adjustment knob. The improved prototype was retested, confirming that the changes worked (mechanics could easily use the tool even while wearing gloves; the reduced weight decreased hand fatigue). Thanks to several rounds of testing and improvements, the students' project was a success. The tool was created that actually improved the work of mechanics.

Example (SEN – special educational needs)

At a vocational school, students carried out a Design Thinking project aimed at making life of people with physical disabilities easier. One of the teachers, using a wheelchair (a potential user), asked the class to design a solution that would keep her dry in the rain (ordinary umbrellas were uncomfortable to use while in a wheelchair). During the ideation phase, the students came up with various concepts and then built several prototypes of improvised 'wheelchair umbrellas'. Then, it was the time for testing. They invited the teacher (for whom they were designing the solution) to try out each prototype and give honest feedback. Testing process: the teacher tested the prototypes one by one, imitating everyday situations (riding with the 'umbrella' in the rain). The students watched closely, noting what worked and what caused problems. Example situation: one of the prototypes had a retractable bar attached to the wheelchair, which proved to be unstable. The wobbly bar did not keep the umbrella upright. Seeing this, the students came up with an idea for improvement – during the test, they inserted several straws into the hole in the bar in order to stiffen it. The solution worked provisionally, which they immediately noted as an area for improvement of the prototype. The teacher shared her impressions and evaluation of each idea on an ongoing basis. She emphasised what she liked (for example: one umbrella also covered the legs well) and what required improvement (for example: difficulty while unfolding the device on one's own). The students collected feedback and implemented changes: they strengthened the pole structure, added an easily unfolding mechanism and used lighter materials. After further testing, it turned out that the improved design fulfilled its function. The teacher was able to move freely in her wheelchair in the rain while at the same time staying dry. The students not only created a useful prototype, but also learned empathy and the importance of iterative improvement. Their final product genuinely improved the quality of life of a specific person.

Conclusions

It is important to note the enormous potential of Design Thinking in generating user-oriented ideas, products and designs. This methodology has introduced us to a new philosophy, emphasising the importance of placing the user at the centre of our creative processes. It has equipped us with a variety of techniques tailored to different contexts, provided us with a set of tools and clear instructions, as well as offered invaluable recommendations and tips to avoid common pitfalls. Thanks to such insights, we are equipped better to develop solutions that can truly meet user needs and improve the quality of life in our sphere of influence.

Before we dive into our projects, however, there is a valuable lesson to consider. Consider the story of an integration exercise led by a company CEO in which employees were tasked with creating a complex dessert using a detailed recipe. Despite having all the necessary ingredients, tools, and instructions, none of the teams was able to create the dessert. The failure was not caused by the recipe itself, but rather - by a lack of experience, communication and understanding of the subtleties involved in the process.

The presented analogy perfectly reflects the challenges we may face when applying Design Thinking for the very first time. As with baking, the first attempt at applying a new methodology may not yield perfect results. There are intangible factors, such as experience, teamwork, effective communication, as well as learning from mistakes that play a key role in achieving success. The CEO's reflections offer us some valuable lessons:

- Recipe or instruction manual does not guarantee success: The same set of instructions may lead to very different results. The key is to persevere, learn from each attempt, and refine the initial approach.
- Tools alone are not enough: Understanding how to use tools effectively and knowing when to apply them is essential. Practice and experience will increase your ability to utilise their full potential.
- Expect challenges: Unforeseen obstacles are inevitable. However, with the right training and preparation, you will be equipped to overcome them better.

- Communication and collaboration: Open dialogue within the team and with users shortens the learning curve, while at the same time improving joint problem solving.
- Leadership is key: A mentor or an efficient leader may provide guidance and help steer the project in the right direction, especially when the path forward is uncertain.

Said lessons are directly applicable to the Design Thinking process. While this methodology offers tremendous opportunities, it also presents challenges that require patience, persistence, as well as the willingness to learn and adapt. Using Design Thinking does not guarantee immediate solutions. Instead, it provides a framework for deeply understanding a problem, even if the solution remains elusive or complex.

Moreover, it is crucial to approach Design Thinking without preconceived solutions. The process is designed to unravel complex, human-centred challenges, not to solve technical issues with predetermined outcomes. The real value lies in exploring and understanding the problem, which in turn leads to innovative solutions that may not have been obvious at the start.

Finally, it is important to remember that tools are not the end goal. They should be perceived as a means to support meaningful dialogue, reflection, and documentation of intangible ideas. It is equally important to assemble the right team, being diverse in terms of knowledge and skills, led by a strong leader who can guide the group to achieve its goals.

As we conclude this Manual and embark on our Design Thinking journey, let us approach the challenges with an open mind, ready to experiment, learn and innovate. The process can be demanding, but with the right approach, it can translate into creating effective solutions that truly resonate with people's needs.

Closing remarks of the ‘Design Thinking in Vocational Education’ Manual

This manual has been developed in order to support educators and creators of innovative educational solutions when it comes to designing more creative and tailored teaching processes. Its main objective is not only to present theoretical knowledge about the Design Thinking methodology, but above all else - to provide practical tools and inspiration that can be taken advantage of in everyday educational work. This Manual is aimed at teachers, educators, trainers, and developers of educational tools operating in the field of vocational education and training (VET), being the area of key importance for the development of modern economies.

As authors, we believe that introducing Design Thinking methodology to the vocational education sector opens up new perspectives when it comes to teaching and learning. Design Thinking allows teachers and educators to go beyond the traditional teaching framework, which often involves one-sided knowledge transfer. It encourages them to explore educational processes that practically engage participants in the learning process. The ‘Design Thinking in Vocational Education’ Manual aims at helping build an environment in which learners, teachers and educators jointly participate in the creation of innovative educational solutions, addressing real problems and responding to the real needs of both vocational education and labour market.

Thanks to this publication, teachers can design more creative and flexible educational processes that are specifically tailored to requirements of students, while at the same time supporting their personal and professional development. For designers, the Manual in question is an inspiration and a guide that allows them to create innovative educational solutions based on proven methods and practices.

An additional advantage of the Manual is the adaptation of Design Thinking, which enriches vocational education with tools and methods successfully used in business, making the teaching process more engaging and efficient in character. The Manual highlights the added value of this methodology, emphasising its potential in transforming vocational education, especially in the context of adapting it to the dynamically changing labour market.

One of key elements of the Manual is to show how Design Thinking may contribute to increasing student engagement by harnessing their curiosity and creativity. We wanted to showcase specific activities and tools characteristic for Design Thinking that can support teachers, educators, trainers and developers of educational tools in defining problems, generating ideas, prototyping solutions, as well as testing them in practice. It would make the teaching process more dynamic and tailored to the expectations of learners.

Furthermore, we wanted the Manual to include guidelines for building an empathetic approach to education, which is the foundation of Design Thinking. Developing the ability to understand learners' perspectives and the context in which they operate allows teachers and educators to design more inclusive and diverse learning environments. When it comes to vocational education, where students often have very different experiences, interests and goals, the discussed approach helps create personalised development paths that respond more precisely to their needs.

The transformation of the vocational education sector, to which this Manual can contribute, requires a response to the contemporary challenges of the labour market. The Manual encourages the use of Design Thinking as a tool to support learners in developing key skills for the 21st century, such as creativity, collaboration, adaptation to change, as well as the ability to solve problems in innovative ways. Through the use of Design Thinking, vocational education can become more flexible and effective, preparing students for jobs that are still in the process of being created, such as those requiring completely new knowledge and competences.

The 'Design Thinking in Vocational Education' Manual contains theoretical foundations, practical tips and specific tools that allow to understand and effectively implement the Design Thinking methodology in education, including vocational education. This publication has been created for teachers and educators who want to change their approach to teaching by means of introducing more creative, flexible and learner-centred teaching processes. The key message of this publication is to show the added value of adapting Design Thinking in education, which is reflected in three fundamental areas.

The first one is creating more engaging educational processes that is mainly focused on the needs of learners. Unlike traditional, one-sided teaching models, the design methodology allows educators to perceive learners as active participants of the learning process. By means of using design tools, teachers and educators can understand the needs and expectations that learners have in their everyday educational experience better. The Manual provides guidance on how to design lessons that not only impart knowledge but also build engagement through an interactive and practical approach. It makes learners feel heard and understood, which in turn promotes motivation and effectiveness in learning.

The second key area of focus of this Manual is the development of key competences in the context of vocational education and training (VET), in particular: creativity, innovation, design thinking, and problem-solving skills.

The modern labour market requires vocational school and technical college graduates to not only have solid professional knowledge, but above all – to have the ability to:

- think creatively and critically,
- respond to technological and organisational changes quickly,
- cooperate in interdisciplinary and diverse teams effectively,
- initiate and implement innovations in real professional conditions.

The Design Thinking methodology in the VET environment supports the development of the aforementioned skills through an iterative process: starting from defining problems in specific professions, through generating ideas, up to testing and implementing solutions.

The handbook contains practical exercises, case studies and ready-made educational project scenarios that have been developed for use in various professional sectors, such as hospitality, social care, IT, and engineering. The proposed activities are aimed at both students and trainees, as well as at vocational teachers, trainers and educators.

As a result, the VET educational process can become a space for experimentation, discovery and learning by doing, which is in line with the needs of today's economy and society.

The third area of benefit of using Design Thinking in education is the ability to respond to dynamic changes in the labour market effectively. At a time when rapid technological development, demographic processes and climate change are forcing the acquisition of new professional competences, traditional curricula often fail to keep pace with contemporary transformations affecting the labour market. This Manual shows how to use Design Thinking to design educational programmes that are flexible and adapted to challenges. By analysing market trends and engaging students in real-life projects, teachers and educators can prepare learners for jobs of the future, while Design Thinking allows for rapid testing of new solutions and adaptation to changing needs, expectations and opportunities.
The 'Design Thinking in Vocational Education' Manual is not only a collection of knowledge and tools, but also an invitation to change the way we think about education. Adapting Design Thinking to the needs of education opens up new opportunities for educators and learners, facilitating the creation of educational solutions that respond to the challenges of the modern world in a more efficient manner. This Manual encourages experimentation, collaboration and the discovery of new paths of development that can transform education into a space for innovation and future-oriented skills.

We encourage all users of the Manual to make practical use of the tools and methods presented within it scope, believing that their application can bring about significant changes in educational processes. The Manual was developed in order to support educators, trainers and leaders in vocational education, not only to adapt their working methods to the dynamically changing needs of students, but also - to go beyond the traditional teaching patterns. Design Thinking offers a wide range of possibilities that can revolutionise the approach to teaching and learning.

Cooperation and exchange of experiences

The Manual emphasises the importance of cross-sectoral cooperation and the exchange of good practices. Only through active cooperation between educators, designers and educational institutions is it possible to develop a modern and sustainable vocational education system. We would like to invite you to share your experiences and use the results of the project within the VET network.

As the authors of this publication, we strongly believe that cross-sectoral and international cooperation is the key to success when it comes to implementing modern educational tools. The implementation of this Manual was made possible thanks to the involvement of partners from Poland, Spain and Cyprus, which allowed for the exchange of diverse experiences and perspectives. This publication is an encouragement to continue this cooperation and share experiences within the VET network, as only through joint action can the potential of Design Thinking in vocational education be fully exploited.

We believe that this Manual is only the beginning of the road to more innovative and inclusive vocational education. We would like to encourage you to continue your efforts to develop skills of the future, promote international cooperation, as well as modern teaching methods.

The vision behind the creation of the 'Design Thinking in Vocational Education' Manual is to showcase vocational education as a dynamic, change-friendly ecosystem that is adaptable and ready to shape future generations of professionals.

Its authors perceive it as a step towards the positive transformation of vocational education. We believe that the utilisation of Design Thinking and the application of Design Thinking-oriented tools in vocational education will allow for the creation of new educational paths that will meet the needs of the 21st century.

Acknowledgements and contact

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We would like to invite you to contact us and continue our cooperation. All additional materials and pieces of information on the project can be found on our website. We would also like to encourage you to share your experiences and successes within the VET network.