EXPLORE AI ACADEMY

Problem solving

Design thinking

Problem solving

Wicked problems

> Many real-world problems are deemed wicked problems because they are **complex** with many **interdependent factors**. The nature of these types of problems makes them *seem* impossible to solve.

Obvious examples of wicked problems are those represented in many of the United Nations Sustainable Development Goals (UN SDGs): poverty, inequality, disparities of wealth and opportunity, climate change, access, and dignity.

Problem solving

Wicked problems

Some characteristics of wicked problems include:

Not comprehensible based only on quantitative and objective data.

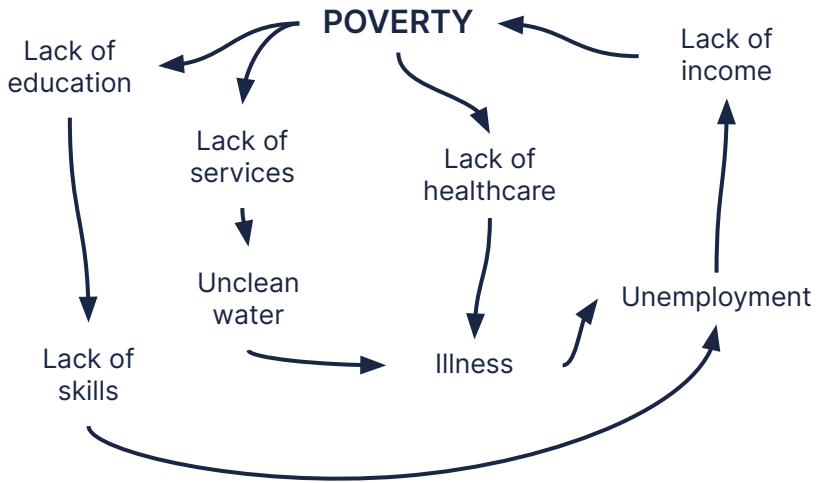
Do not have a specific number of potential solutions and there is no immediate “test” of these solutions.

Almost every *wicked* problem can be considered a symptom of another problem.

There is more than one explanation for the problem, depending greatly on an individual’s perspective.

It cannot be “solved” – we can only negotiate a possible solution.

In other words, *wicked problems* are “wickedly” difficult to solve because they do not exist in isolation.



Excerpt from The Ecosystem of Poverty: Lessons Learned from the $300 House.

Problem solving

Wicked problems and design thinking

Although **design thinking** was often linked to product design, such as user interface and experience design, it is now commonly used to **find solutions to wicked problems**.

The UN also recommends design thinking because it allows organisations to construct **innovative solutions** to the SDGs.

Design thinking is considered a powerful problem-solving and value-creation tool.

Problem solving and value creation are key principles to successful organisations.

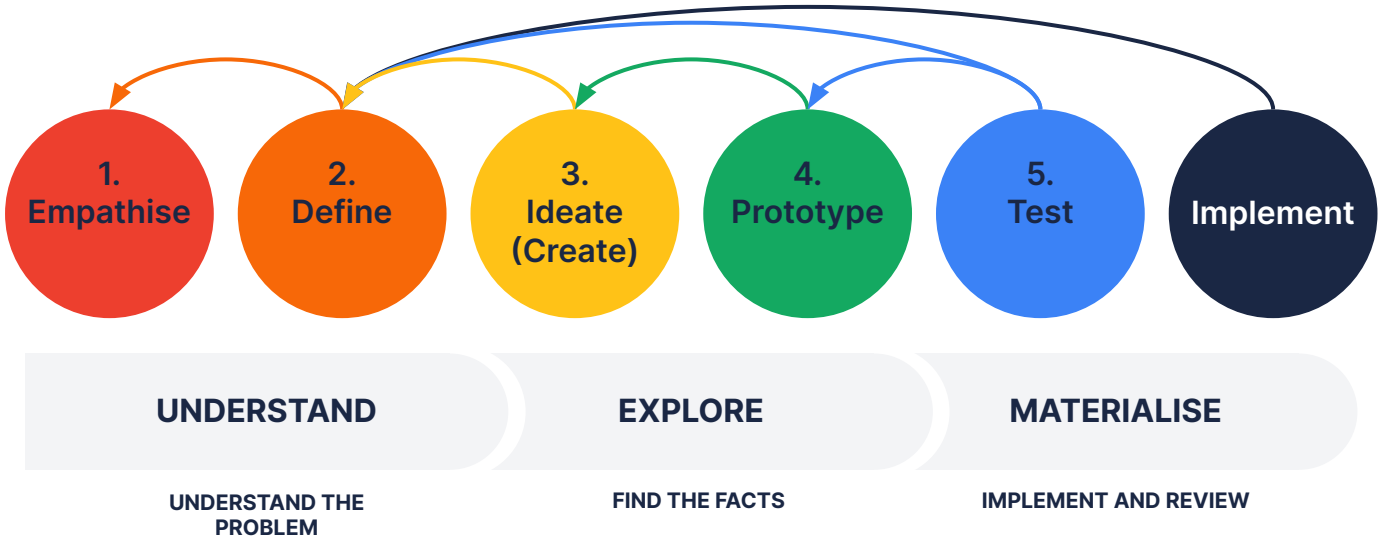
DESIGN THINKING is a human-centred and collaborative process to realise new solutions to these *wicked* problems.

Problem solving

Design thinking overview

> Design thinking is an **iterative** process to **redefine problems**, **challenge assumptions** (about the problem), and **create** innovative **solutions**.

A five-stage process



Problem solving

Design thinking stages

Stage 1: Empathise

Investigate how the problems affect people without assumptions and biases.

Stage 2: Define

Clearly define the problem highlighting the gap between the current (problem) and desired (outcome) state.

Stage 3: Ideate/Create

Create potential solutions to solve the problem defined in the previous stage.

Stage 4: Prototype

Design different variations of the potential solution at a smaller scale.

Stage 5: Test

Test the different prototypes to understand what the best solution to the problem is.

The prototype and test stages often require significant **reiteration** because it may indicate new problems, a misunderstanding of the problem, or an incorrect problem statement.

Problem solving

Design thinking cases

When design thinking could've helped

Many rural areas in Africa lack access to sufficient clean water. A merry-go-round (called playpumps) that pumps water into a reservoir tank as it turns was proposed and implemented across ten countries in Sub-Saharan Africa.

The proposition

Sufficient water would be pumped for the community when children play on the merry-go-round.

The outcomes

Playpumps require **more effort** than normal hand pumps and with no children around later in the day, village women have to **manually** turn the merry-go-round. Additionally, playpumps are expensive to install and maintain.

Many of the playpump sites have now been abandoned and villagers are back to using the former hand pumps.

The REAL problem

There is a real **water scarcity** at most of these locations, i.e. not enough supply to meet the demand. (A problem the playpumps cannot solve.)

Why it went wrong:

No one asked the communities if they wanted the playpumps; there was no local ownership of this solution.

Design thinking cases

When design thinking *did* help

The city of Makassar in Indonesia faced significant traffic congestion due to the increasing number of private vehicles and unreliable and unsafe public transport.

The proposition

A form of public transport, called *Pasikola*, that transforms public minibuses (*pete-petes*) into a shuttle service by having private and individual *pete-pete* owners register their vehicles.

The outcomes

A participatory approach was established where different sector stakeholders were involved. *Pasikolas* are now an official part of Makassar City Transportation with a focus on transporting learners to and from schools.

Traffic congestions on roads close to schools are now effectively reduced because fewer private vehicles are used to transport learners to and from school.

Why it worked:

The community and other stakeholders were involved in ideating possible solutions to the problem.

Problem solving

Data and design thinking

> Traditionally, design thinking depended on *qualitative* methods. Incorporating *quantitative* methods ensure not only a human-centred solution but also a robust one.

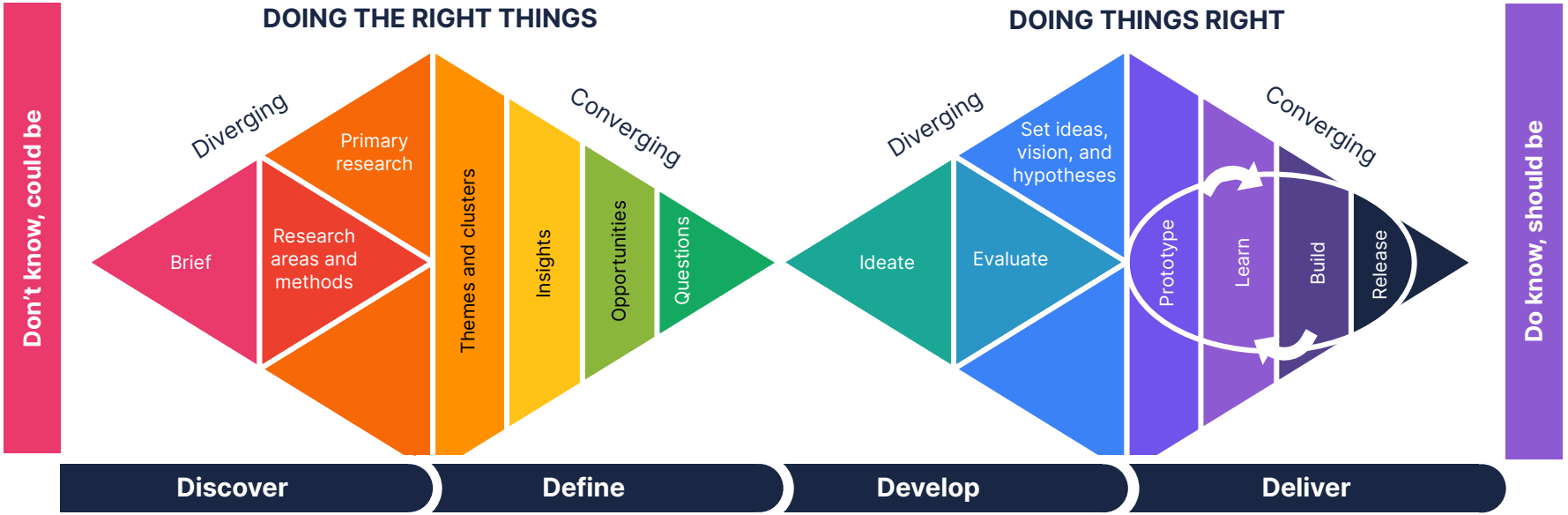
Empathise	Define	Ideate	Prototype	Test
How we can leverage **data** (*the quantitative evidence*) and **data skills**:				
Inform qualitative research with quantitative insights that ensure an unbiased approach.	Test problem statements against quantitative evidence to redefine and improve.	Select and prioritise possible solutions based on quantitative insights and evidence.	Ensure that the possible solutions solve the most important problems in the right order.	Provide confidence and more quantitative evidence that the possible solutions work as intended.

Design thinking also helps us organise our thoughts to create **optimal solutions** and **solve the "right" problems** with our data skills.

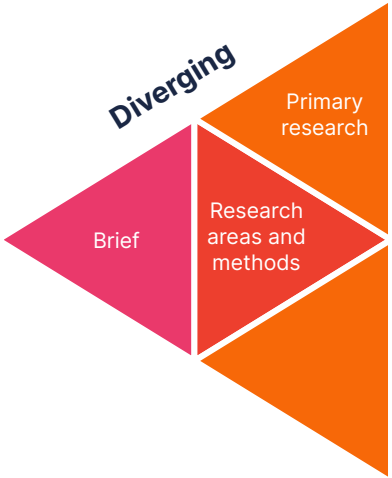
Problem solving

Design thinking: The double diamond

> Design thinking helps us to get from a state of **“don’t know, could be”** to **“do know, should be”** by not forcing convergence and embracing the different phases of the process.



The double diamond: Discover



The phase of free exploration.

The team **explores the problem** and tries to **understand the root cause** by doing research and applying free-form ways of ideation such as mind maps and brainstorming.

It's characterised by *divergent thinking*.

Divergent thinking* allows for a space of **open-minded understanding of the problem** in order to consider a wide range of opportunities.

Discover | Define | Develop | Deliver

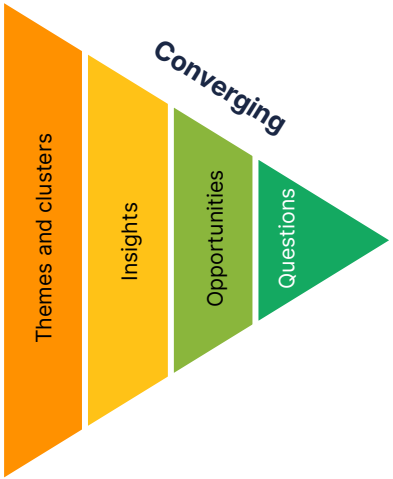
The problem space

*Divergent thinking is also referred to as *lateral thinking*. It is the process of creating many various ideas or solutions.

The double diamond: Define

The phase of explanation.

The team tries to **define exactly what the problem is** by using problem-solving methodologies such as root cause analysis and logic trees.



It's characterised by *convergent thinking*.

Convergent thinking* allows the team to **analyse the evidence** and **filter ideas** to narrow down the definition of the problem and ensure that all elements of the problem have been considered.

Discover | **Define** | Develop | Deliver

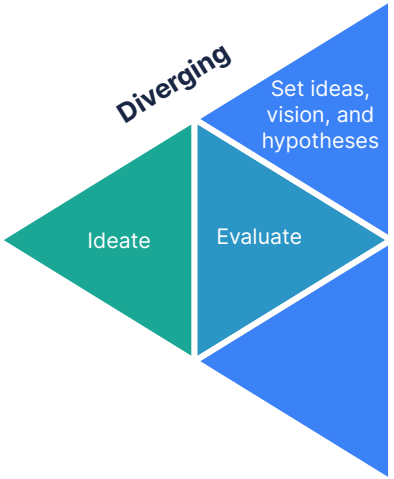
The problem space

*Convergent thinking occurs when established rules and logical reasoning are applied to understand or solve a problem.

The double diamond: Develop

It's characterised by *divergent thinking*.

Divergent thinking means that **every solution is an idea** to consider, which means there should be a **broad range of solutions** being considered.



The phase of ideation.

The team proposes and evaluates **all possible solutions** and/or **hypotheses.**

Discover | Define | **Develop** | Deliver

The solution space

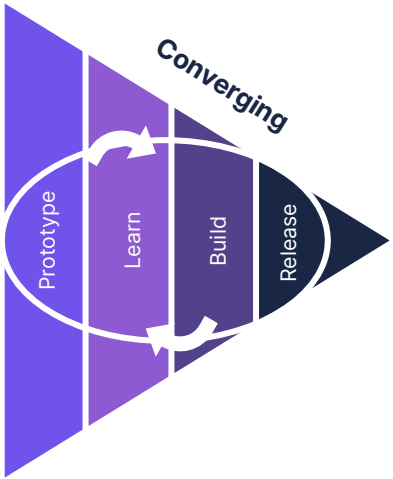
The double diamond: Deliver

The phase of implementation.

The team **prototypes, tests,** and **builds** the solution to the problem as an iterative process. Feedback is collected and necessary adjustments are made.

It's characterised by *convergent thinking*.

Convergent thinking allows narrowing down to the best possible solution to the problem.



Problem solving

Design thinking as a team process

The double diamond is often used in **highly collaborative teams** that include various different workstreams and specialities related to the relevant problem or project.

These multidisciplinary teams ensure that all the **different areas of the project are considered**. However, to ensure the successful use of the design-thinking process in such a setting, **complete understanding and integration** are required between team members.

There's a place for everyone...

Multidisciplinary collaboration involves various domains, skills, and activities. This means that team members may be an expert in one domain and a *generalist* in another but members are expected to know how to leverage collaboration; knowing when to call on other team members to step in.

Upskilling through collaboration

These types of collaboration therefore require members that are able to translate multidisciplinary knowledge to other team members.

Design thinking as a team process therefore helps us to expand our understanding of other domains.