Double Diamond Toolbook

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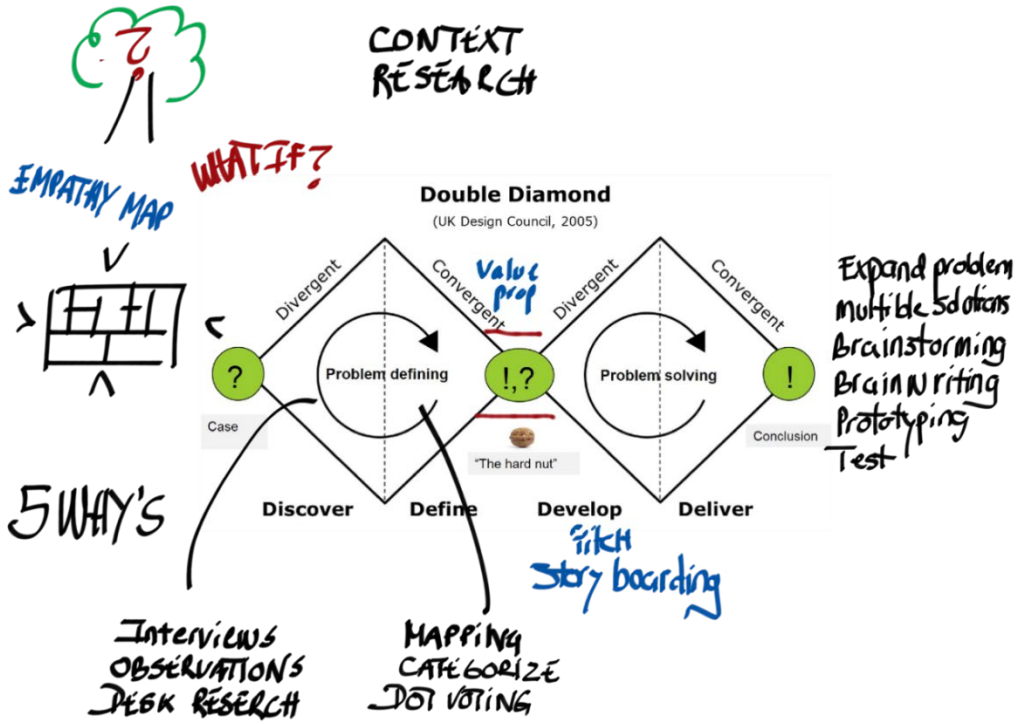


Preface

Working with innovation can sometimes be experienced as a chaotic and frustrating endeavor. Some would even say it has to be like this to actually lead to innovation, because **innovation is about change**, either by creating something new, breaking down the existing and replacing it with something else, or putting together existing or new elements in new ways. Often this is neither an easy or a smooth process. Therefore, to support and guide you in the work with innovation, we introduce you to the double diamond model and a set of supporting models and tools.

This document describes the **double diamond process model** and how the model is used in the course Innovation Pilot.

Furthermore this document is also a guide or **“cook book”** for how to work with the double diamond process model and which tools/methods to use at the different stages of the process model. In here you find descriptions of relevant methods to apply and references to other methods which can be found in the teaching material or at external sites.

Table of content

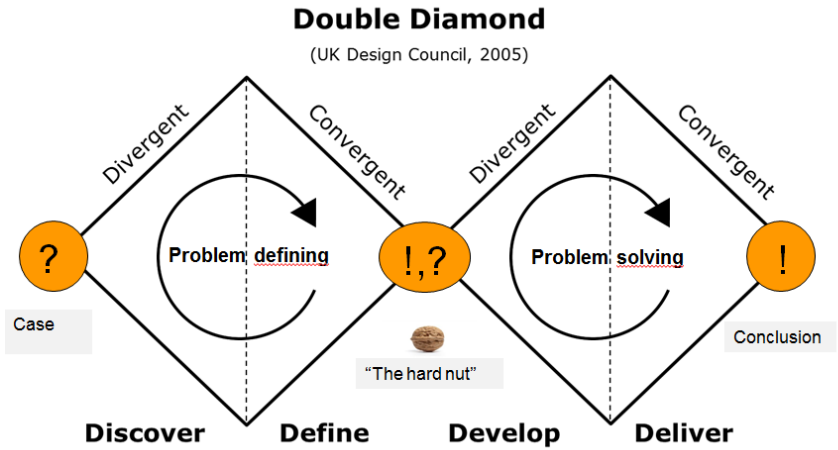
Why use double diamond in Innovation Pilot?

Double Diamond is a process model created by Design Council, a British organization, in 2005 (Design Council, 2005).

The model provides a **graphic representation of a design process.** The double diamond model presents four main stages across two adjacent diamonds.

At Innovation Pilot the Double Diamond structure is used to **understand customers and their problems and needs**, and explore creative and innovative ways to solve their problems and delight them.

When using the double diamond, you approach problems and solutions by using two different types of thinking: **divergent and convergent.**



PROBLEM

The **first diamond** concerns problem definition and understanding of a problem *(problem space).*

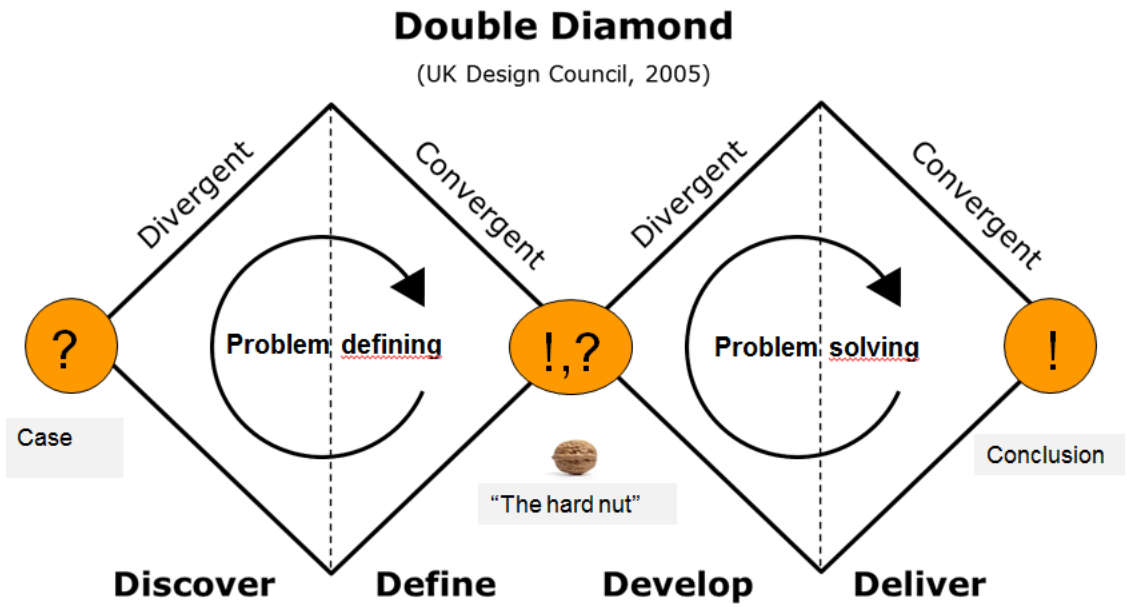
SOLUTION

The **second diamond** concerns the problem solving phase *(solution space).*

Each of the four stages is characterized by either **convergent or divergent** thinking.

The four stages in the double diamond process model

- Stage 1 - **Discover** – identify, research and understand the initial problem.
- Stage 2 - **Define** – limit and define a clear problem to be solved.
- Stage 3 - **Develop** – focus on and develop a solution.
- Stage 4 - **Deliver** – test and evaluate, make the concept ready for production and launch.



Divergent thinking

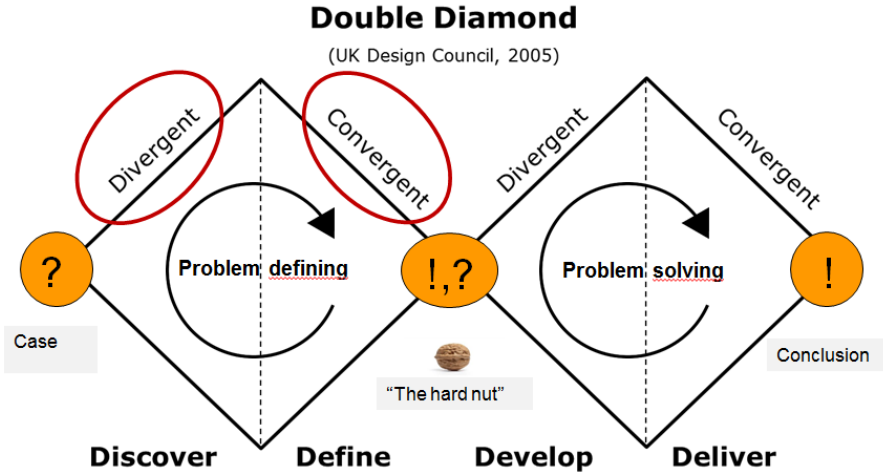
- Is suitable for **open ended problems** with **many solutions**
- Is a thought process used to generate creative ideas by exploring **many** possible options
- Is to think in **new solutions** and combining known facts into new constellations
- Not limited by rules or demands to find the right answer

It's about **saying YES!** Interesting!

Divergent thinking can be promoted by brainstorming, mind mapping etc.

Let's try and see what happens if we do like this!
To be **curious, explorative and investigate**.

Who knows where the treasure is hidden?



Convergent thinking

Convergent thinking is the opposite of divergent thinking, now we want to narrow down the possibilities and **focus on one problem** or **one solution** by following given rules.

It is about:

- setting up criteria for **decision making** and
- make decisions based **on facts and knowledge** and on analyses and evaluation from iterations and prototyping
- Use **theory and disciplinary knowledge** to make decisions

How to work with the double diamond process model

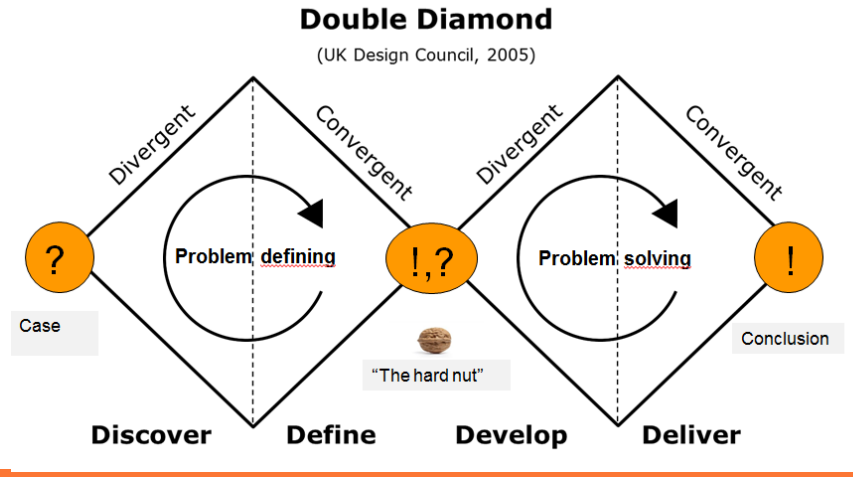
Double Diamond cook book

In Innovation Pilot the four stages in double diamond are framed by three events:

Discover starts with an event where the company present their challenge.

Define ends and **Develop** starts with an event, where the team meet the company (at Loop 2) or the facilitators (at Loop 1) and present their understanding of the problem and receive accept and feedback from the company regarding the defined problem.

Deliver ends by an event where the final proposal to the challenge is presented for the company.



Discover

The project starts with an investigation phase

In this stage the **initial problem and vision** are defined. The aim of the discover stage is to explore and **understand** the challenge and gather **deeper** insight into it.

The discover stage is mainly a divergent phase, where a **lot of questions** are raised.

The main activities in this stage is **asking a lot of questions**, market and user research, investigation of trends, stakeholder interviews, dialog with the problem owner and collection of knowledge from various sources.

In Innovation Pilot the **deliverable** after this stage is a description of the frame for the following process, registration of the existing knowledge and the **first formulation of the problem** (innovation brief) and **vision**.

Keyword for this phase is **mapping the context and explore the problem**.

Define

Definition of problem and tasks

In the define stage, the data and the generated ideas will be **organized** and **analyzed** with the aim to define a clear problem as a basis for the design of a solution in the later phases. To identify the main problem to focus on, the previously collected possibilities are reviewed and evaluated regarding their relevance and feasibility.

Running through this process **iteratively** is advisable to make sure the best problem is selected. The define stage is completed with **definition of the problem.**

Don’t assume that the company fully knows what the problem is! You need to let the **users and market lead you**!

The **deliverable** after the define stage is a presentation of the findings and a deeper understanding of the problem and the definition of the (innovation) question and a vision (an up date of innovation brief)

Keyword for this phase is **problem definition**.

Develop

Develop phase where ideas are turned into products or services

In the develop stage the focus will for the first time be shifted from the problem definition to finding a solution.

After the meeting with the company and feedback from them, the team can **revise their concept**, make analyses and prepare more **questions** to be investigated. The investigation is done by **prototyping and interaction** with the customer.

In the develop stage there is still production of knowledge and **all possibilities** are available. The prototyping-process will give a lot insights and unexpected possibilities will appear.

You should work on **at least three solutions** to the problem

The **deliverable** after the develop stage is a concept, which is validated with regards to users, market, technology and business case. One or more prototypes have been made.

Keyword for this phase is exploration of solutions

Deliver - Final test and deliver to the company - 1

From the number of solution approaches found in the develop stage, **the best solution** must be **identified** during the deliver stage. The ideas developed in the previous step are **tested**, checked against standards and regulations and optimized until the best possible solution is found. To test and communicate the solution, it can be useful to develop one or more prototypes. The aim of the deliver stage is to present a solution and a prototype in the end.

A method such as prototyping can be used to identify which ideas can be neglected and which ones seem to be promising. However, it is again important to run through this process **iteratively** in order to obtain feedback and experiences **from potential users** that can be used to improve the solution. Furthermore to make decisions with concerns to – Which **needs** are covered? What creates **value**? What is **important**? What has the biggest **potential**? What can be realized? Etc.

Deliver - Final test and deliver to the company - 2

In deliver stage it is important to remember that, what the team present for the company at the final pitch is the best understanding of the problem and the best proposal at that time. This is your **deliverable** in this phase.

For the final **pitch or video** it is important to choose the right way to communicate and that may not be a prototype but rather a good business plan.

Keyword for this phase is handing over the solution

Work with double diamond process model

Tools to work with in the different phases

In the following you will find a description of **how to work** in the different stages of the double diamond process model. Furthermore there will be an **overview** of the **tools/methods** which can be used in the different stages of double diamond process model. Some of these methods can be used in different stages and more than once.

Discover and define – what is the problem?

Purpose

- Investigate the challenge
- Ask questions and seek knowledge regarding the challenge
- Research of the context
- Identify a vision and a relevant problem

Do not look for the solution yet!

Methods (suggestions)

- Question tree
- Research design
- 5 why's method
- 4 H's method
- Qualitative analysis
- Observations guide
- Interview guide
- Desk research of the market
- Business model canvas
- Customer profile and value proposition
- Stakeholder analysis
- Categorization of the results and update of problem
- What if?
- Pitch

How to get started?
Case research and knowledge sharing

This phase is about generating and collecting insights and an **understanding** of the **problem** and the **company**

- What **market** is the case-company part of?
- Who are the **stake-holders** and the **customer**?
- Which **field** is the company involved in ?
- How is the company **interacting** with surrounding society?

Start with these questions and you have started the question tree exercise. You can do the exercise on whiteboard. It is also possible to use the program MIRO or *CoMapping:* www.comapping.com

The purpose with the exercise is to **prepare for the meeting with the company** and to identify where there is a lack of knowledge

- **Ask** as **many** questions as possible – don't look for solutions
- Find the most important **questions** to work on further
- Give each group some questions to investigate
- A good idea is to make a google-doc to gather the obtained knowledge

Organize knowledge and lists of questions

Preparation, before the company challenge:

- **Collect knowledge** based on the questions
- **Write** the findings, information, links and other questions in a document
- One or two persons collect and **organize** the **knowledge**
- Each group prepare a **list of question** to ask the company
- Each group find **one person** to write down the answers from the company (it can also be done with one person in the lab)

Wrap up, after the company challenge:

- Each group continue the work with the **question tree** based on the feedback from the company
- Each group should work on the **good question** (see next slide) – **what is the ”burning” question?** (you can strength the question by using the 5 x Why’s method and 4H’ methods)
- What is important for the further investigations?

Reframing

Are you solving the **right problem**? Try to take a step back and **rethink** the questions you are asking and perhaps you can come up with an **alternative definition** of the problem

Get some inspiration by Wedell-Wedellsborg paper “Are we solving the right problem?” The paper is available from DTU Learn the folder Teaching material

The good question and the vision

- The question should be including a **vision** and **motivate** us to act.

- The first question will lead to **more questions** and you should continue to make questions until you are close to practice and can try it out.

- It **takes time** to make the good question and you have to work with the question in several formats. But it pays back as the good question will lead to an innovation initiative which can become real due to motivated people.
- Critical to **validate** the question / problem with the **users and market**

The good question and the vision

Remember - a good question or the innovation question

- ... Should have a vision and **not include a solution**, which can be found in the question. If the question is leading, people working with it will not be open-minded and curious and try new ways to solve it.

- ... Does not include an answer, which is **already known**. A good innovation question motivates you and your team members to **take action** and to **test out** the idea because you do not know the answer.

- ... Is **prepared** thoroughly. This means the question has been **re-formulated** several times due to the fact that the first question will lead to more questions when working with it. During this work process the good question (innovation question) will show up.

Reference:

http://www.lederweb.dk/strategi/innovation/artikel/99749/skab-innovation-igennem-de-rigtige-sporgsmal

Create a vision, ask what if…….?

- To stimulate your visionary thoughts, try to detach your self from what is possible today. Look for **new possibilities**, dream big, ask what if any anything was possible….?

Innovation brief document

- List the **problems** you have discovered
- Use the **5 WHY's** methods and **4 H's** methods to find patterns
- Select the first version of the **"good" question** and make the first version for it
- Write the good question and vision in the innovation briefing document
- If you have any ideas for the next steps you can write them as well

Further knowledge research

- Divide the research subjects between the group members
- Do the **research**
- **Present** the results of the research for each other
- Be **visual** – take notes, use post its and/or draw

Plan the research

- Use the feedback from the presentation, the company or from your facilitator when you are planning your research
- Make a research design

Research design -1

For your research design, consider the following:

- What is the **problem/challenge** about?
- What do you need to know more about to be able to explore the problem?
- Why is this knowledge **relevant/important**?
- How can you obtain this knowledge? Which methods are the best/most suitable to obtain this knowledge?
- Who could be relevant to contact (**informants**) – eg. Users, customers, competitors, experts etc.
- **How** will you do the **investigations** (observations, interviews etc.) and in which context?

Research design - 2

Make an **observation guide** (approx. 1 page):
- What are you looking for (behavior, movements, patterns, interactions)?

And/or an **interview guide** (semi-structured) (approx. 1 page):
- Overall question/subject
- Open questions
- Questions regarding specific experiences or examples
- More specific questions to ask at the end
- Avoid leading questions

You can read more about observation and interview guide in Delft Design Guide

Research design – 3
”Desk research”

- What is the **market-related** context:

  – Who are the **competitors**? and who are their **suppliers**?
  – What are other companies in the same business market doing?
  – Are there **alternative technologies**?
  – What are the **economic conditions** on the market? (an estimate)

  →For more input on the market research, look at the chapter “Strategy”/Business Model Environment in the Business Model Generation book.

- What is the **tech related** context:
  - Do you need to know more about the technology, and the technical challenges and perspectives?

Business Model Canvas (BMC)

Business Model Canvas is a tool that you can use to describe and develop a business model for a company or project. The template contains so-called building blocks, which influence each other, and that way you can use it to develop a project. It is essential that you have a concept for a business, project or similar, on which you would like to develop a business model for. A good starting point is the **value proposition and customer segments** and then go through each building blocks and related issues.

You can use the BMC to get an overview of the company's business model. Mapping out an overview of the business model can be used with different purposes and at different phases of the double diamond:

- **Diagnosis**, are there any problems, misfits between the building blocks and alike that could inform the innovation challenge?
- **Scenarios**, what happens if we make changes in any of the building blocks? Like address the customers in new ways? Include more partners instead of doing it ourselves? Look at our value proposition in perspectives e.g.. as a service instead of a product etc.
- **Create new solutions**, develop and re-align one or several elements of the business model or create a whole new business model.

Business Model Canvas

You can download the canvas from this link:
https://strategyzer.com/canvas/business-model-canvas

References

- Business model canvas: https://youtu.be/QoAOzMTLP5s
- A. Osterwalder, Yves Pigneur, Alan Smith, and 470 practitioners from 45 countries, self published, 2010 www.businessmodelgeneration.com
- “Business Model Theatre”: https://youtu.be/LLKqthJOdN8

Online you can find additional examples and resources on Business Model Canvas. Just google “business model canvas”

Get to know the user(s)

Identify the user or different types of users:
- Who will be influenced by the problem/solution?

Remember! The user can be a customer, but it can also be the end-user (customer's customer)

- Describe the users (woman, man, children, age, family situations, level of education, etc.)
- What are the interest of the users and what can motivate the user?
- What is the situation you as a group would like to see for the user?
- Get out of the house and meet the user!
- Document with video and/or photos – and take notes
- Make a stake-holder analysis

Evaluate the results of the research

- Make your results visible:
  - Put the results out a table or up on a board and organize in categories
- Categorize and find some patterns and relations which can give a better understanding of the problem and perhaps can lead to some solutions?

A category is a group or a class of people or items ranged after common characteristics or attributes. An example could be that restaurants can be classified into three different categories depending on the prices level

- Update the innovation briefing document and describe how to continue your work

Develop & deliver
- the problem is defined but what is the solution?

Develop phase

A way to work in the develop phase:

- “expand” the problem – what kind of sub problems can you see?
- Multiple solutions
- Find the most important sub problems
- Brainstorming/brainwriting for sub problems
- What is a good solution? – make a drawing
- Make criteria for what is a good solution
- Pick some solutions
- Prototype
- Test

You can find inspiration for other methods to use – have a look in the Delft Design Guide (Develop and Deliver)

Develop & deliver
- the problem is defined but what is the solution?

After the ”hard nut” update the innovation brief document

- Is there a need for updating the innovation brief document with regards to the good question, vision and deliverables based on the research/collection of knowledge you have done since last week?

- Deliverables - what are you going to show to the company next time? It can be visualizations, prototype (and what kind of prototype?), test results, documentation for use of the prototype etc.

Expand the problem

- Which sub problems appear, if you are going to realize your vision and solve the problem you have formulated?

- Point out the most interesting and/or most important problems to focus on (perhaps use the tool ”Dot voting” for that)

Brainstorming/idea generation

- Make a brainstorming/idea generation on the selected sub problems – make at least 10 solutions for each sub problem (it is many – but it is necessary).

- Write the ideas on post its and place them on flipcharts (or the wall, whiteboard or the blackboard) – put the post its underneath the sub problem, they belong to

- Remember the rules for brainstorming:
  - Do not judge your own ideas or others ideas
  - Go after many ideas
  - Keep the focus on the subject
  - Continue on others ideas
  - Be open-minded

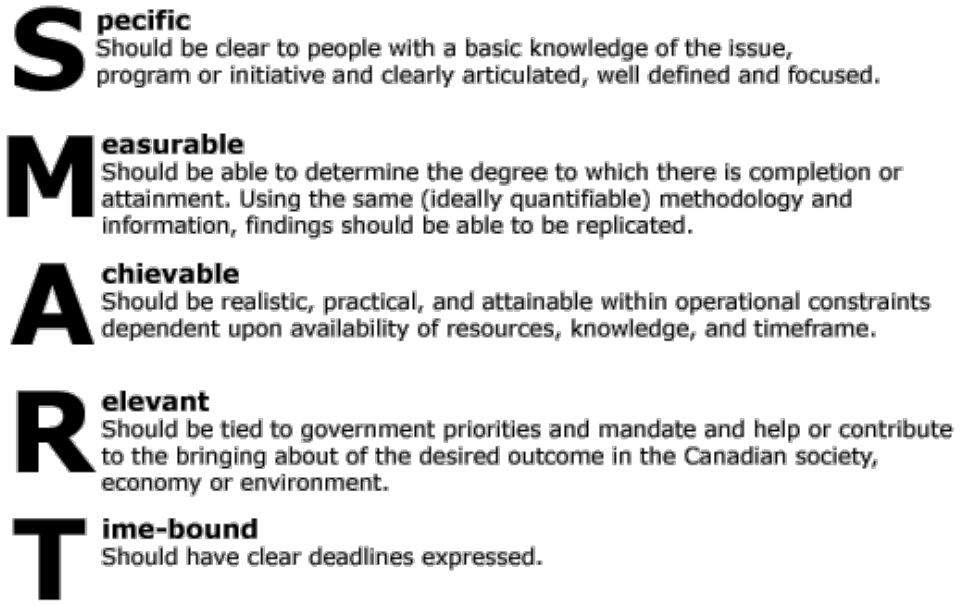
Synthesis – use of brain writing

- What is a good solution? Based on the many ideas you have produced
  - Each student in the group write or draw an idea on a piece of paper (done in silence –no talk!)
  - After 1 to 3 minutes the piece of paper is sent to the next person who will add more to the idea or be inspired for more ideas
  - The process continues until all the papers have been around the table
  - This give about 5 to 6 suggestions for a solution

For inspiration:
https://innovation.sites.ku.dk/metode/brainwriting

What is a good solution?

- Make criteria for a good solution – for example it could be to
  - Save money
  - Be sustainable
  - Smarter use of resources
  - Etc.
  - Use the SMART criteria:
    - Specific
    - Measurable
    - Achievable
    - Relevant
    - Within the time frame



Tools

Question tree (1/4)

How you do:

- A tree of questions can be drawn on a whiteboard, on paper or in a mind map – use of software.
- Select an item related to your innovation challenge, for example: "Security of patients" and write it on the board, on paper or on the computer.
- Write new questions triggered by the tag. Connect them with a branch. Example: "What is the Security of patients?" or "How can you do something with a patient'?".
- Questions connected with the subject-word are questions on "1. level". Questions associated with the first level issues are the second level issues and so forth. The literature says that the really good questions come on the 5th level - although it's explicit. They can show up anywhere.
- Experiment with variations of questions. Swap example "why...? with "how ...?"

Use approximately 20 minutes to write questions.

Discuss the questions: what questions point to the knowledge that is needed in the work? What question is so good that it can act as "Innovations issues"? What questions do I want to work with for a long time?

Question tree (2/4)

Good to know

Typically, someone will want to answer a question or come up with solutions immediately. But behind a proposed solution, there is always new questions and the group must ask "... what is the question?".

Example: The question "How can you do something with the security of patients?" can make anyone suggest "We can make an app!". The similar question might be: "How can an app be used to improve the security of patients?"

The method is very good at maintaining a group in a divergent/emergent field, and keep it from closing (going into solution mode) prematurely.

Example of software: Co-mapping: http://www.comapping.com

You can read more about the background for using the question tree method here: Coyne, Clifford & Dye in the article "Breakthrough Thinking From Inside the Box" (Coyne et al 2007).

Question tree (3/4)

Example

The assignment was "To support better quality of life for cancer patients" using "Free Joys". One can see how the one question leads to the next. First is the question, "what is free joys?", Then "what is joys" so "How to find out if it brings joy", after which a skip occurs and one formulates a question that was first perceived as crazy, but which ended up being the process innovation question:

"How can you make an app that has the same quality as the first cup of coffee in the morning?"

Question tree (4/4)

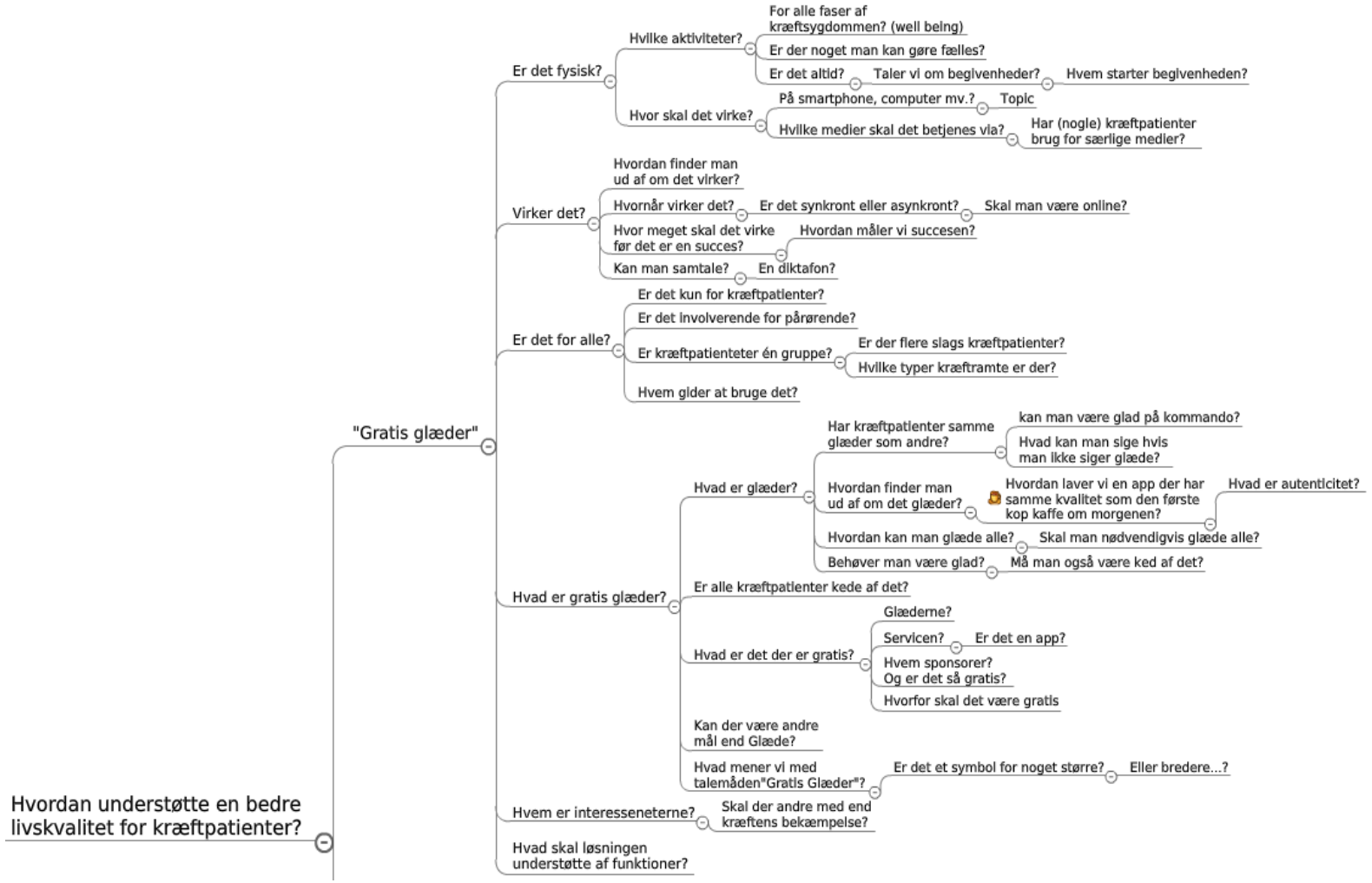


Figure 1: *Part of a tree of questions from an innovation process made for Kræftens Bekæmpelse.*
The tree of questions is made in the mind-mapping tool CoMapping. www.comapping.com

The 4 H’s Matrix (1/3)

The method is used to gather and organise information and knowledge concerning a subject, so a pattern appears and knowledge rise.

Game rules

Divide the table in 4 equal fields.

Use tape or mark with a broad pen on a large piece of paper.

In the four fields you write: WHO, WHAT, WHERE and WHY?

Number of participant: 1 – 20	**Duration: from 20 min to a whole day**

The 4 H's Matrix- Game rules (2/3)

WHO? **Actors, problem owner and users.**	**What?** **Information, consequences, facts, subjects, point, insight, technologies, etc.**
WHERE? **Places, institutions, organisations, on the stairs? Home at…? Etc..**	**WHY?** **Questions, problems, needs. Knowledge which is necessary to get in order to get going.**

While you share knowledge and present your research findings, you write on post-its short notes to the presented.

Only one subject or note on each post-it!

The 4 H's Matrix (3/3)

Distribute the notes in the categories

The matrix is filled continuously with information and can be used over a long period of design.

Change the location of the notes continuously so that they make the most sense.

When the group has documented as much knowledge as it holds, one can begin to look for correlations and identify issues.

Worth to consider

- It could be an idea to divide the group in four, so there is an owner of each category, example: Thomas is the owner of 'who?'. Thomas interviews his group member in order to figure out as much as possible on who this subject is about.

Game rules

- Divide the table in 4 equal fields. Use tape or mark with a broad pen on a large piece of paper.
- In the four fields you write: WHO, WHAT, WHERE and WHY.

DOTVOTING (1/2)

The method is used to select the most appropriate ideas from the criteria for a potential solution.

Number of participant: 2 – 20	**Duration: 20 – 60 min**

DOTVOTING (2/2)

Game rules

- One can use dotvoting to select a number of ideas out of a large batch of ideas. The exercise is therefore well suited to be an extension of idea generation, even though the method may seem simple, it can contribute in creating a useful dialogue in the group, when developing the criteria for the ideas. The output of dotvoting is a selection of ideas that can continue to develop a concept.

- The participants describe a minimum of five criteria that they believe a solution must meet. Then each use 1-3 "dots" which they distribute for the ideas they consider best meet the criteria. This can be done by putting a dot with a marker at each idea described on post-its. The ideas with the most dots (3-5 ideas) continues for further qualification.

Worth to consider

- The exercise can create a lot of discussion that can be time consuming, hence it would be a good idea to have a strict time frame.

The 5 WHY’s (1/3)

Problem identification

The 5 WHY’s method is question technique, which can be used to find basic causes or motives for a problem

Number of participant: **2 – 4**	**Duration: 10 – 30 min**

The 5 WHY’s (2/3)

The framework for the activity is set – time, game rules and mind set.

Game rules

- The intention is to find the basic or underlying causes and motives for problems, or people's attitudes and actions in a conversation, situation or interview.

- Ask a question that is relevant to the topic • Ask then 4 times in regards to the answer "Why ...?" The fifth answers often contain the fundamental reason.

The 5 WHY’s (3/3)

Example from IDEO:

- "Why do you exercise?" - "Because it's healthy!"
- "Why is it healthy?" - "Because it enhances my heart!"
- "Why is it important?" - "So I burn more calories!"
- "Why do you want it?" - "To lose weight!"
- "Why do you want to lose weight?" - "I feel a social pressure to look fit!"
- In the above example the problem was not about exercise, but about social acceptance.

Background

The method was originally developed by Sakichi Toyoda at Toyota and used in LEAN and Six Sigma process optimisation. The method has interpreted to the above version of IDEO.

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