

ANNEX 1: Three-day innovation hackathon process

Day 1: Problem statement development

1. Box Sprints

Participants used the different sides of a box to 'brainstorm' the benefits and barriers. Each participant contributed their individual ideas by writing them on sticky notes, ensuring an inclusive capture of ideas and placing them on a collaborative 'box' chart. This method mitigated issues often encountered in traditional brainstorming sessions, such as dominant voices overshadowing quieter participants or fear of criticism stifling creativity. Writing ideas individually before sharing enables deeper reflection and avoids groupthink (a group of individuals reaches a consensus without critical reasoning).

2. Prioritisation

Groups discussed the outcomes of the box sprints and used dot voting to prioritise the most critical issues and causes. The goal was to narrow down a few key aspects that required immediate attention. The process of convergent thinking focuses creativity into actionable insights, aligning group efforts on significant challenges.

3. Ishikawa Fishbone Diagram

Participants used the Ishikawa 'Fishbone' diagram to explore root causes of the problems identified in the previous step across various dimensions such as environment, technology, and leadership. The framework helps in systematically uncovering underlying issues that might otherwise be overlooked.

4. Problem statement formulation

A comprehensive and structured problem statement based on root causes. A consolidated problem statement was developed, highlighting pressing challenges and their causes.:

<<Inputs A, B & C>> are causing <<Problems X, Y & Z>>, leading to negative impacts of <<Barriers D, E & F>>.

Day 2: Solution ideation & Concept Statement

5. 'Other Point of View' (OPOV)

Participants selected a random word from a provided list and answered structured questions which firstly generates unrelated ideas, and then consider, one-by-one if these ideas could help to solve the problem. The OPOV technique leverages lateral thinking, encouraging participants to think different about their problem. These ideas were then applied to the identified problem, stimulating novel solutions.

6. Random Picture/Object Exercise

Similar to OPOV, participants analysed random images (ranging from e.g. funeral homes to cheese graters) and identified potential solutions by exploring their uses, components, and applications. Having a picture or object simulates visual thinking and taps into the brain's creative processes, often unlocking innovative connections that verbal-only methods cannot achieve.

7. Idea Clustering

All the ideas generated from the previous two activities were grouped into thematic clusters. Each cluster represented a potential solution, or project concept.

8. Concept Prioritisation

Using impact and implementation time as metrics, groups classified concepts into four categories, prioritising ideas that are both impactful and time-efficient (Figure S1).

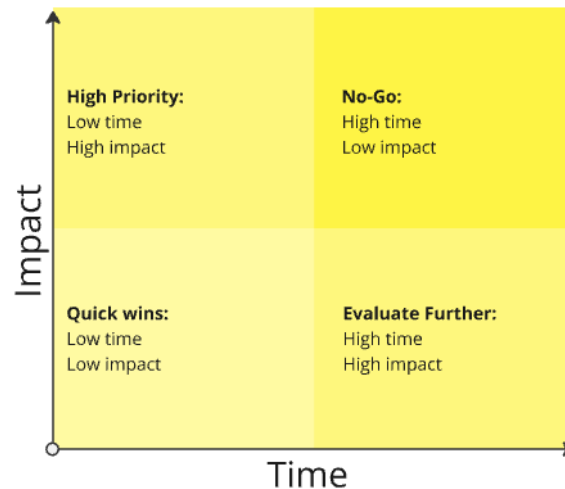


Figure S1. Impact versus time project assessment scheme.

Day 3: Concept Development

9. Six Thinking Hats

The Six Thinking Hats approach was used to develop and assess the final concepts. This activity, devised by De Bono (1985) separates thinking into six distinct modes, each represented by a coloured 'hat,' to ensure a comprehensive exploration of a problem or concept. This method encourages balanced discussions to develop concepts, enabling teams to consider multiple dimensions of a situation. All team members use the same hat simultaneously to align their focus. This reduces conflict and ensures everyone explores each perspective thoroughly before moving on.

Table S1. Questions related to the six thinking hats (synthesised from De Bono, 1985).

Hat	Role	Function
Blue	Process	What conclusion or summaries could we make moving forward with the issue or problem?
Yellow	Benefits	What are positive aspects of the current situation, issue or problem?
Green	Creativity	What is current information on issue or problem?
Black	Caution	What are the negative aspects of the current problem?
Red	Feelings	How does everyone feel about current issues or problems?
White	Facts	What is current information on the issue?