AI-based idea generation and evaluation… in an inspiring way?

Dr. Heikki Immonen, Karelia University of Applied Sciences.

Problem decomposition – breaking the problem in to sub-problems

Problem decomposition

Problem decomposition

Kiertopuu® – Upcycled and Charred Timber

Kiertopuu products can be used as surface material for a wide variety of applications. The charred surface is always either washed, brushed, or oiled to prevent smudging upon touch.

Various dimensions and surface finishing options are available for the product.
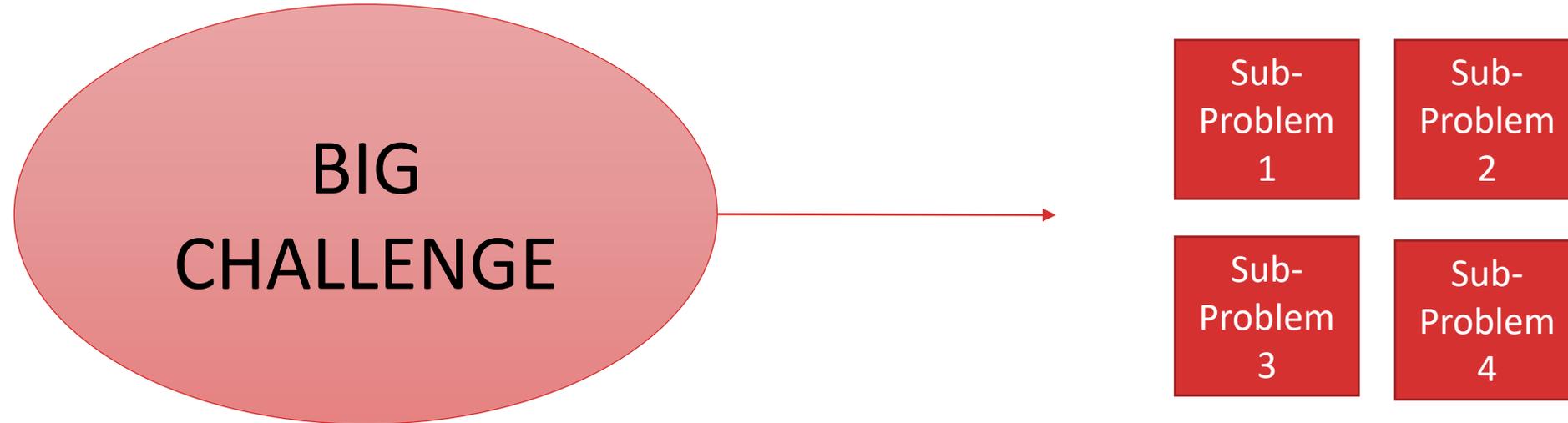
Explore our products on this page

Getting raw materials → Processing → Distribution → Use

Decomposition is about dividing a big challenge in to relevant sub-problems that can be partially solved separately.

AI-tip for problem decomposition

Below is a description of a challenge I have. Please, can you decompose the challenge to 3-5 main sub-problems?

Challenge description:

....

Family vacation problem decomposition

Sub-problem	Transportation	Accommodation	Activities
Current option			
Other ideas			

Family vacation problem decomposition

Sub-problem	Transportation	Accommodation	Activities
Current option	Car	Hotel	Amusement Parks
Other ideas			

Family vacation problem decomposition

Sub-problem	Transportation	Accommodation	Activities
Current option	Car	Hotel	Amusement Parks
Other ideas	Plane	Hostel	Shopping
	Walking	Tent	Museums
	train	Cottage	Live Music

AI-tip for ideation

Below is a description of a challenge and it's decomposition in to sub-problems. Please, can you create a morphological table based on the sub-problems and come up with 5 solution ideas to each sub-problem?
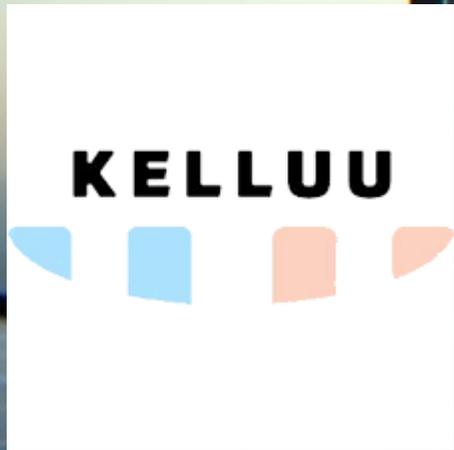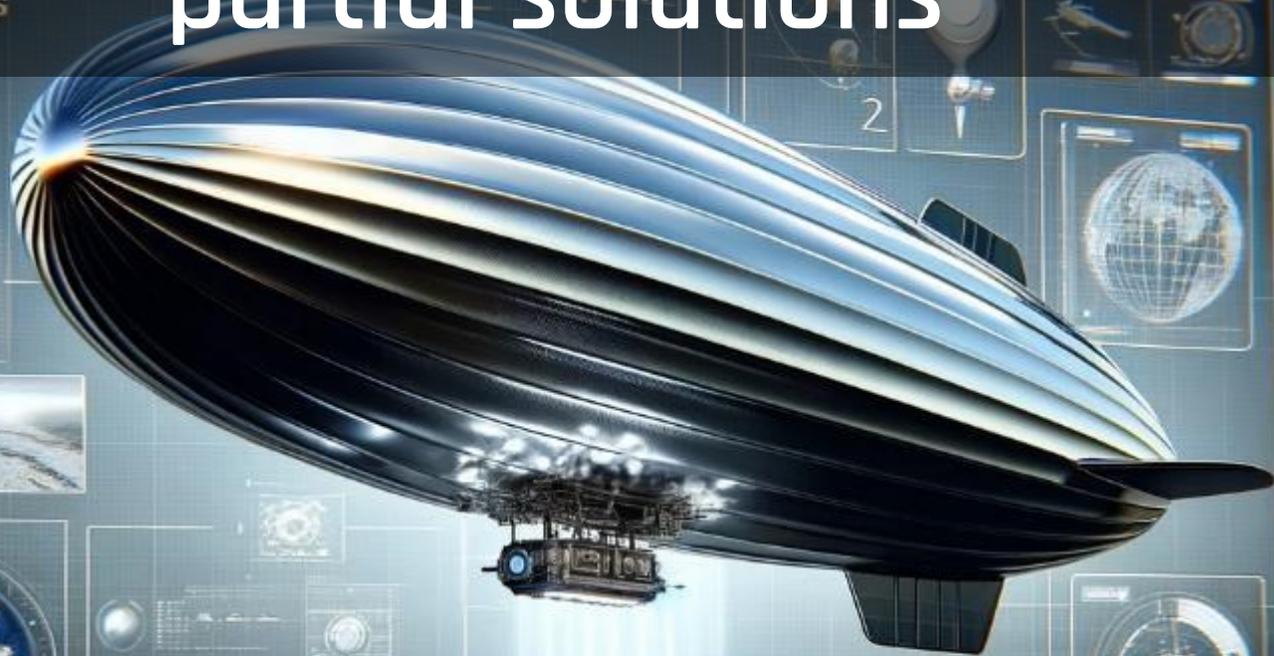
Challenge description:
….

Full solution (Concept) generation out of partial solutions

Full solution (Concept) generation out of partial solutions

Full solution (Concept) generation out of partial solutions

KELLUU

Copyright (c) Heikki Immonen 2023

You can use the table for generating novel and complete solution ideas (aka concepts).

Sub-problem	Transportation	Accommodation	Activities
Current option	Car	Hotel	Amusement Parks
Other ideas	Plane	Hostel	Shopping
	Walking	Tent	Museums
	train	Cottage	Live Music

MPLE = 4 * 4 * 4 possible concepts =
16 * 4 = 64 possible concepts
6 * 4 * 4 = 24 * 4 = 96

AI-tip for concept generation

Below is a description of a challenge and it's decomposition in to sub-problems with possible solution ideas linked to each sub-problem. Please, can you generate full solutions (concepts) using at least one idea from each sub-problem. Generate concepts that are innovative.
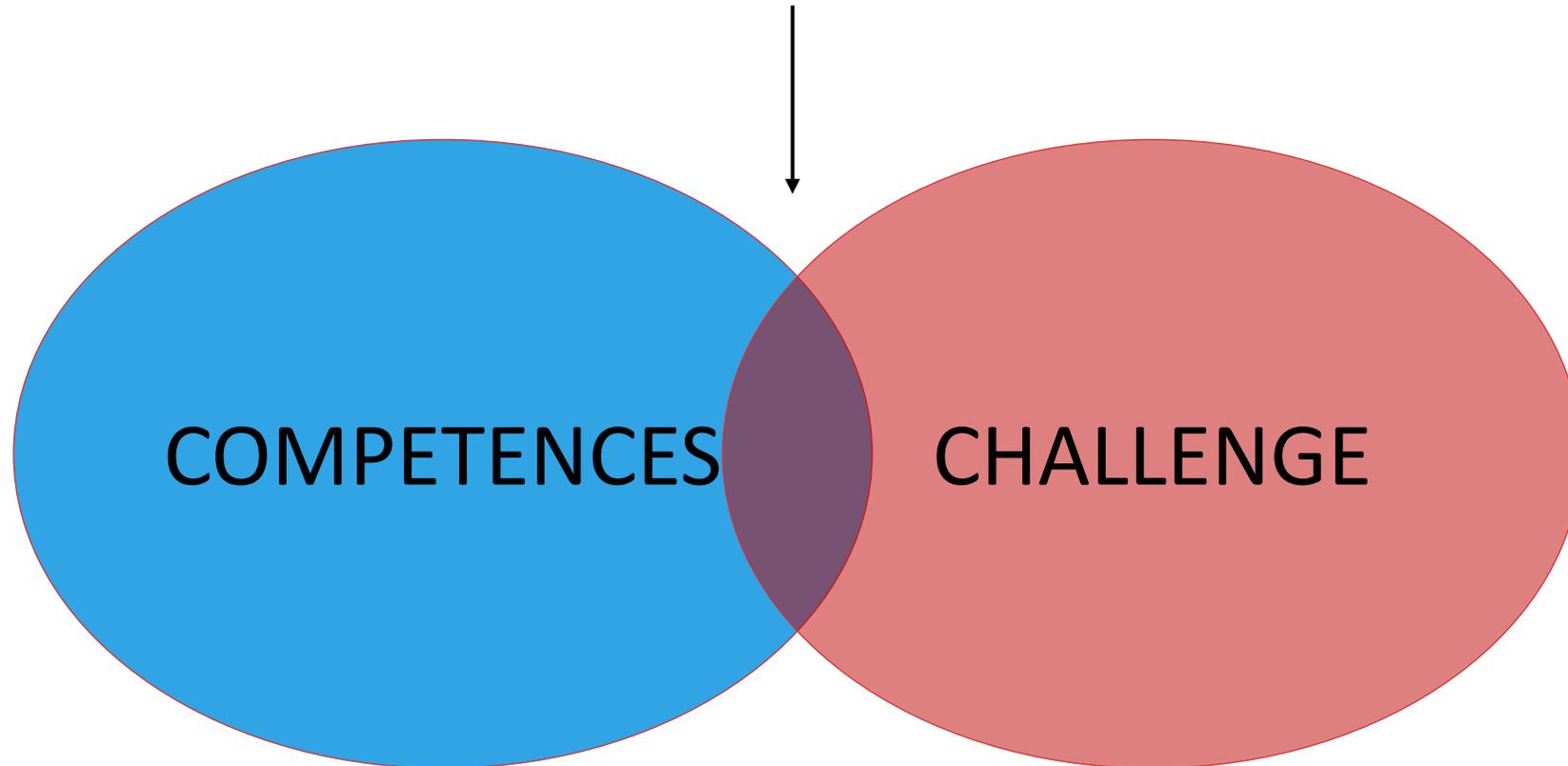
Challenge description:

Ideas based on unique competences

Ideas based on unique competences

Ideas based on unique competences

Ideas based on your own competences are good, because you can implement them and have expertise to evaluate them.

COMPETENCES

CHALLENGE

1. Create a list of your competences: work experience, hobbies, education, other experience

2. For each competence, ask: "can I use this competence to solve the challenge/problem somehow?"

AI-tip for competence-based ideation

Below is a description of a challenge and it's decomposition in to sub-problems and a list of my competences. Please, can you generate solution ideas to each sub-problem based on my competences?

Challenge description:

....

Biomicry and biologically inspired design

Biomicry and biologically inspired design

Biomicry and biologically inspired design

Biomicry and biologically inspired design

In <mark>biomimicry</mark> ideas developed by nature are captured

Nature (biomimicry)
Biologically inspired design

Method of travelling	Where to stay	What to do
Car	Hotel	Amusement Parks
Plane	Hostel	Shopping
Walking	Tent	Museums
train	Cottage	Live Music

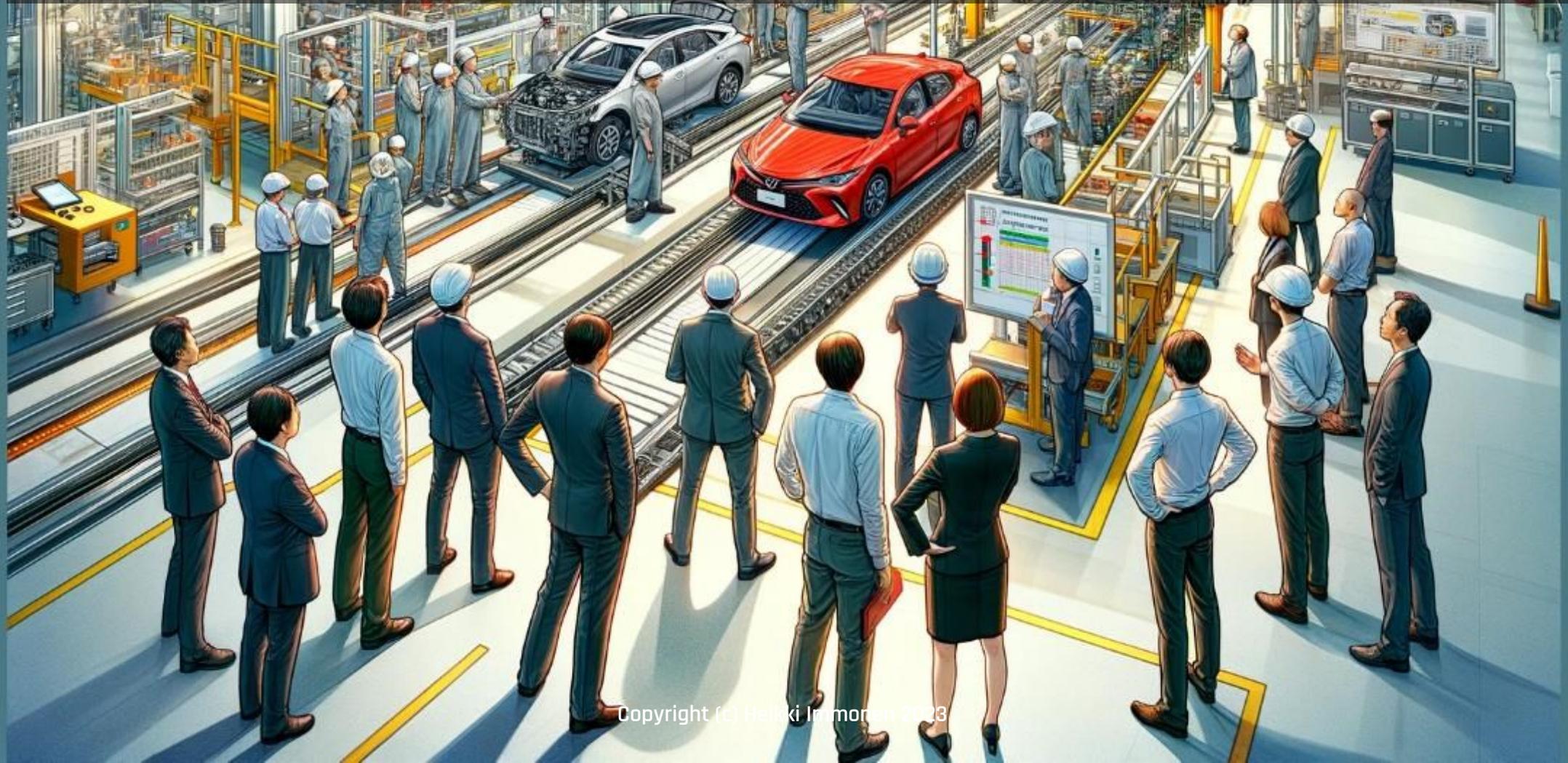# AI-tip for biomimicry-based ideation

Below is a description of a challenge and it's decomposition in to sub-problems. Please, can you generate 2-4 solution ideas to each sub-problem that are inspired by solutions that nature has already developed? Give each idea a proper title.

Challenge description:
….

Evaluating and improving ideas using contextual information

Evaluating and improving ideas using contextual information

Evaluating and improving ideas using contextual information

Process for using contextual information for idea improvement

1. Observe directly or interview

2. Convert findings in to design criteria

3. Evaluate and improve ideas based on criteria

AI-tip for interviews and field studies

Below is a description of a challenge and it's sub-problems. Please, come up with good questions that help me learn more about the challenge if I interview a person who knows more about or I go and do a relevant field study?

Challenge description:

....

AI-tip for converting findings in to design criteria

Below is a description of a challenge and it's sub-problems and additional information based on interviews/field studies. Please, convert the additional information in to specific design criteria I can use to evaluate and improve my ideas.

Challenge description:

....

AI-tip for using design criteria for evaluating and improving your ideas

Below is a description of a challenge and it's sub-problems, solution ideas I have and specific design criteria. Please, evaluate my ideas using the design criteria and improve them based on the design criteria.

Challenge description:

....

AI-tip for using official Hack Me Up criteria for evaluating and improving your ideas

Below is a description of a challenge and it's sub-problems, solution ideas I have and evaluation criteria. Please, evaluate my ideas using the evaluation criteria and improve them based on the evaluation criteria.

Challenge description:
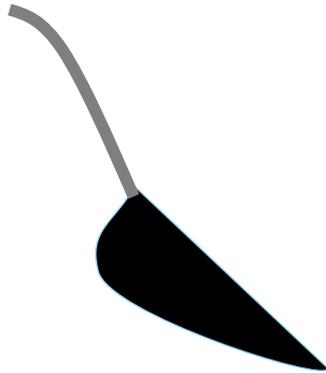
....

Defining the problem solution-independently

Defining the problem solution-independently

Key to good problem definition is ==solution-independence==

Functional abstraction

Ease of movement

Level of snow

==A lot==

Snow-level lowering

YARD

SNOW SHOVEL

==zero==

OPERAND

Snow-level lowering system

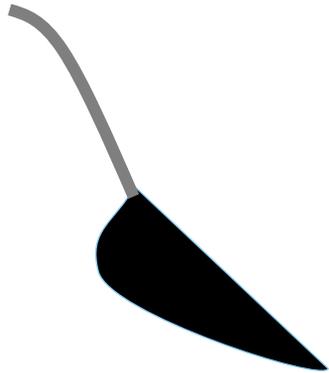# AI-tip for using defining a solution-independent problem and function

Below is a description of a challenge. Can you distill a solution-independent ==functional requirements== for problem solvers based on the description. Define these functions as ==operand== (what is affected by the solution) and the ==desired transformation of the operand==.

Challenge description:

....

After you have a solution-independent problem definition (function), creativity is easy

?

AI-tip for using <mark>ideating using functional requirements.</mark>

Below is a description of a challenge and functional requirements based on it. Please, generate possible solutions based on the functional requirements.

Challenge description:

....