# Solution of novel needs generation

## Goal of novel needs generation

In novel needs generation, our goal is to automate the novel needs generation and generate novel needs in batches.

## Intuition to the goal

To achieve this goal, an intuition is to derive the probability distribution of novel needs and then automatically sample novel needs data from the probability distribution. The automatic sampling process enables novel needs generation.

## Solution from the intuition

We can leverage statistical inference to infer the probability distribution of the novel needs. During statistical inference, we should (1) collect novel needs data sample, (2) parameterize the probability distribution with deep neural network, and (3) enable the parameterized neural network to approximate the ground-truth probability distribution by maximizing the likelihood of the novel needs data samples. After maximizing the likelihood of the data samples, the parameterized neural network can be used to generate novel needs through sampling strategies.

## Challenge in this intuitive solution

There remains a challenge on collecting novel needs data samples. Traditional novel needs data collection heavily relies on laborious survey works and expensive human expert annotation, which leads to the scarcity of **large-scale novel needs datasets**. The lack of **large-scale novel needs datasets** greatly restricts the exploration on novel needs. Particularly, the rareness of novel needs data implies that the limited data samples cannot reflect and reveal the characteristic of the ground-truth probability distribution. In this case, the parameterized neural network cannot effectively learn to approximate the ground-truth probability distribution due to the sparse learning signal from limited data samples.

A key challenge is to obtain **large-scale novel needs datasets**.

Based on our previous investigation, unsupervised sampling and generation approach has potential in synthesizing **large-scale novel needs datasets**.