# **Toolkit Idea**

## **Purpose:**

To help engineers practice **responsible system thinking** through a simple and fun role-playing/simulation game in which they must work together to complete a “successful” project. Note: We are not asking you to create a real robot obviously!

## **Game description:**

Name: “Engineers Village”

A simple role-playing game in which players will take on the role of engineers who handle different systems as part of a complex robotics project in which they will have to work together with one another to deliver an intelligent machine to solve the problems of people at the neighbouring village. They must think about the resource constraints and how one team’s work could affect the performance of the others and discuss the best possible way to complete the project.

## **Premise or background story of the game:**

The Engineers’ Village is known to be the home of very creative and hardworking engineers who are very eager to help people from neighbouring villages with their problems through intelligent machines or robots. Engineers are divided into those who oversee the ***software and database development***, ***mechanical design and manufacture***, ***electronics and telecommunication***, and ***materials and metallurgy***.

Village A is the client of the engineers in this game. The village doesn’t have enough farmers to cope with the increasing demand for food production in the village and they came to the Engineers’ Village for help to solve their farming problem. The players of this game, who act as the engineers, are planning to manufacture autonomous farming robots to make the farming process in Village A.

Your job as the engineers are to work together to make the best possible use of available resources (diamonds) in Engineers’ Village and ensure every engineer maintains good performance points so that the project can be considered successful.

## **How the game works:**

Game mechanics:

* There is **a total of only 20 diamonds** for the whole project that **must be shared** among all the engineers (players) and it is up to all the players how to share the diamonds that each of them will need to do their job.
* There is a **5-performance point** for each engineer that they need to maintain for the project to be considered **successful**. At the end of the players’ discussion, the total performance points of all engineers should be **at least 15 out of 20**.
* There is **a total of maximum 10 environment-impact points** that the players/engineers can accumulate. At the end of the players’ discussion, the **total of their environment impact points cannot be more than 10 points**.
* ***Software and database development team***:
  + Performance point: **5**
  + Diamonds: up to the players who will discuss with one another
  + Receive **2 cards**:
    - Card 1: Very large database server and high-end computing resources for storing their program/code.
      * **Diamonds (-5)**
      * **Electronics team performance point (-1)**
      * **Materials team performance point (-1)**.
      * **Environment impact points (+3)**
    - Card 2: Limited database server and ‘just enough’ computing resources for their program/code.
      * **Diamonds (-3)**
      * **Environment impact points (+2)**
* ***Mechanical engineering and manufacture***:
  + Performance point: **5**
  + Diamonds: up to the players who will discuss with one another
  + Receive **2 cards**:
    - Card 1: Completely Autonomous (no steering wheel), highest quality wheels and strong and large body, safety emergency button, more sophisticated but durable design.
      * **Diamonds (-5)**
      * **Materials team performance point (-1)**.
      * **Environment impact points (+2)**
    - Card 2: Semi-autonomous (with steering wheel), ‘good enough’ wheels, medium sized body, safety emergency button, more simple design.
      * **Diamonds (-3)**
      * **Environment impact points (+2)**
      * **Electronics team performance point (-1)**
* ***Electronics and telecommunication***:
  + Performance point: **5**
  + Diamonds: up to the players who will discuss with one another
  + Receive **2 cards**:
    - Card 1: Highly accurate sensors, smaller and compact electronic control unit board, completely autonomous and robots can communicate with one another, long-lasting power source.
      * **Diamonds (-5)**
      * **Software team performance point (-1)**
      * **Environment impact points (+2)**
    - Card 2: Semi-accurate sensors, larger electronic control unit board, semi-autonomous and robots cannot communicate with one another, good enough power source but not as good as in Card 1.
      * **Diamonds (-3).**
      * **Environment impact points (+2)**
      * **Mechanical team performance point (-1)**
* ***Materials and metallurgy***
  + Performance point: **5**
  + Diamonds: up to the players who will discuss with one another
  + Receive **2 cards**:
    - Card 1: Strong, highly durable and lightweight materials that might have to be imported from other village mining sites, more expensive metals for batteries.
      * **Diamonds (-5)**
      * **Environment impact points (+4)**
    - Card 2: Reasonably strong, not as durable (might need regular maintenance), heavier materials, cheaper metals for batteries.
      * **Diamonds (-3)**
      * **Environment impact points (+4)**
      * **Mechanical team performance point (-1)**
      * **Electronics team performance point (-1)**

## **Discussion:**

At the end of the game, the players discuss and explain the decisions they have made together for how they distributed the resources and the engineering choices after considering how their work affect one another.