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INTELLECTUAL OUTPUT 3. Educational support content targeting instructors

## Smart parking in the city

Topic: smart parking, traffic, critical thinking, collaborative skills

### Introduction

Many city centers experience extra traffic due to difficulties in finding parking. In some cities, it has been estimated to be around 30% of the traffic which is affiliated with the driving around for parking. This increases the CO<sub>2</sub> emissions significantly, and car owners are not very happy about this searching for parking.

## Description of the activity

### Context

With technology it is possible to create a smart sensor, internet-based system in the city to optimize the search time for parking and direct cars towards nearest available parking facilities, including on ground and underground parking facilities, the parking problem can be diminished and hereby the CO<sub>2</sub> emissions. However, the establishment of the smart sensor internet infrastructure comes with a cost as do the establishment of parking facilities.

The smart sensor internet infrastructure must be built to fit the roads and the parking facilities. The parking facilities need to be established in a city which not necessarily can fit big buildings for houses. Therefore, a negotiation needs to take place among the stakeholders of the city in relation to whether it is best to tear down existing buildings to build parking spaces or to establish more expensive underground parking. Furthermore, some are not in favor of having cars in the city center and are therefore will possibly argue against the idea of smart parking.

Following are some suggestions for roles that students may undertake:

**Role 1:** Traffic designer. This role involves designing the network of parking spaces around the city as well as the tariffs that drivers must pay for using them, which will help regulate the use of parking spaces. Designing the tariffs effectively will encourage drivers to use the smart parking spaces only when necessary. It will further encourage drivers to avoid driving to the city center with their cars unless this is absolutely necessary.

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**Role 2:** Financial controller. This individual will decide on the overall budget to be allocated for the design and installation of a smart parking network in the city. The financial controller will further manage the revenues from the tariffs paid by drivers for using the parking spaces.

**Role 3:** Drivers. Drivers are interested in using the spaces and will pay tariffs for the use.

The following figure demonstrates the roles and the interactions between them.

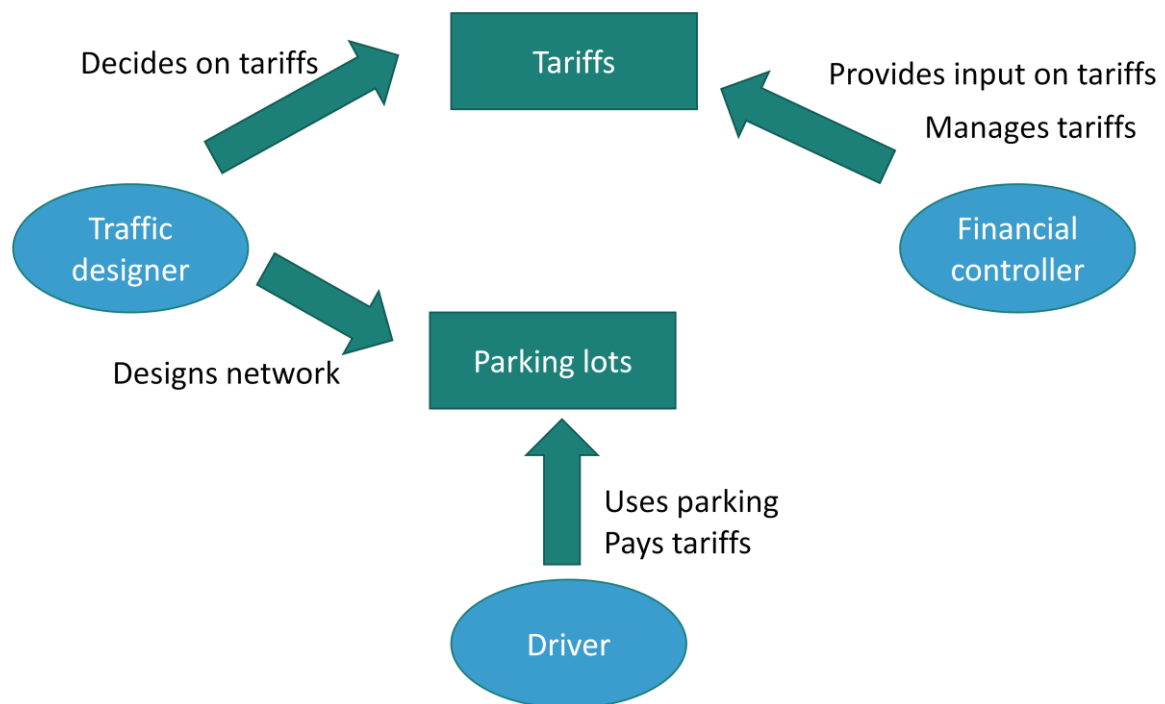


Figure 1. Roles actions and interactions.

### Learning goal

- To help students understand the connections between environmental, social, and economic aspects of everyday life.
- To help students experience how to achieve cooperation between different parties with different goals and needs.
- To help students become competent in taking an integrative approach in researching city management and related environmental issues.
- To create conditions necessary for navigating the challenges modern society and environmental changes pose for the public and private sector.



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## Learning objectives and outcome

The overall purpose of the smart parking in the city scenario is to experience the conflicts of interests there are in a real city when it comes to establishment of just one part of a city's infrastructure (parking). It demands good collaborative skills, compromises, critical thinking, and of course a good flair for optimizing decisions.

The smart parking in the city scenario explores the full HERA game using the communication and planning facilities in the game to discuss, negotiate, and agree on decisions that then can be implemented in the simulation of the scenario.

Participants can explore the consequences of their decisions and insights to what it means in real life to work with complex decisions. As a prerequisite for the scenario, a city must be created in the game that includes rich enough facilities for students to meaningfully engage in a complex discussion related to smart parking. The city may include, for example, residences, shopping centers, cultural establishments, sports facilities, etc. One idea can be to create a number of different cities with variations of the size of the city center, tall buildings, etc. that will support various difficulty levels: the bigger the city the more challenging the game offering different possibilities for placing parking spaces and smart internet infrastructure.

## Core concepts

- Sustainability. Encouraging decision making in terms of environmental protection and the impact of human activities on their surroundings both short- and long-term.
- Nature-based solutions. Solutions to real-life challenges that are based on processes the functioning of nature.
- Ecosystem services. Services and systems that directly or indirectly benefit communities.
- Smart parking. A complete system that allows drivers to find parking when needed by regulating supply and demand.
- City management. Managing the services, revenues, and expenses of a city.
- Transversal skills: collaboration, critical thinking, analytical thinking, innovative thinking.

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## Class activity

1. The teacher presents the problem to the class and introduces the scenario and game.
2. The students brainstorm in order to understand the problem and the parameters within which they have to work. This includes the available city budget, the city plans that restrict the locations on which parking spaces may be built and may influence their capacity, installation and management costs, citizens commuting patterns, and more.
3. The students are encouraged to come up with as many ideas as possible through brainstorming. Techniques of design thinking could be used for promoting innovative design and the introduction of a human-centered solution that address actual needs of city citizens.
4. The students are asked to jointly decide on the ideas to implement from the pool of suggestions that they came up with taking into account restrictions, such as city plans, budget, and commute patterns.
5. The teacher forms groups and gives students their roles in the game.
6. The students play the game according to their roles.
7. The students discuss the game results and their roles; the teacher gives feedback.

## Assessment methods

This is a collaborative, open ended activity in which not a single solution exists. Self assessment is useful in this scenario offering students the benefit of taking responsibility of their learning. Students will discuss their roles within their group and reach a decision on whether they achieved their goal or not. Students may further present their solution to the entire class receiving evaluation from their peers. Finally, the class may decide on the more creative solutions among all teams.