Micro City - Domain Analysis

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Indice

Introduction

This paper aims to define what the main concepts of *Micro Cities* are in order to agree on a common domain knowledge that will allow working groups to stay consistent and coherent during future works. To do so a ubiquitous language will be produced so that the core domain concepts will be properly analyzed and formalized. Moreover, their logics, interactions and relationships will be illustrated and explained through diagrams.

1 Context

The concept of *MicroCity* was born observing contexts with common characteristics, in which people may benefit from **self-awareness** and **situatedness** mechanisms in order to have a better experience.

Micro Cities concern areas with bounded temporal and spatial extension and with a high concentration of people called guests. Inside the *Micro City*, different types of activities may be carried out: these might be services (offering experiences or products), that are always operative and available, or events, that happen at a specific time and have a limited time duration. Most of the people inside the *Micro City* are significantly interested in the available activities that are operative during the *Micro City*'s lifetime. The latter may vary depending on the specific context of the *Micro City*, and it defines temporal bounds for activities. Thus, what we can say about a *Micro City* is:

- It can be assumed that all the guests are endowed with a wearable device (like a smartphone), so that they can interact with activities.
- It is limited in space: it presents well-defined physical bounds, that specify the domain's limits.
- It is limited in time: it presents well-defined operation periods, that specify when guests can benefit from activities.
- It presents heterogeneous activities that are physically situated and distributed inside it. These activities justify the existence of the *Micro City* because they are the reason why guests go to the *Micro City* in the first place. Activities may be static, meaning that they cannot physically move, or dynamic, which means that they may move if necessary. It can be assumed that activities can gather and send interesting information to guests. Finally, activities are able to satisfy a certain amount of guests with a certain frequency. Therefore, the number of guests that can benefit from an activity simultaneously is limited.
- The guests that take part in the *Micro City* may be individuals or groups of people, and they change, partially or completely, periodically. It can be assumed that guests are highly interested in the activities and that groups of guests have similar interests, so they move together inside the *Micro City*. Moreover, one may assume that a group of guests uses a single wearable device in order to benefit from the provided services. A *Micro City* also

presents internal operators, distinguished from guests, that do not benefit from activities (because they manage them).

- The high amount of guests that attend activities may cause the increase of waiting time before benefiting from them. This can also result in the formation of queues.
- Guests may pay a certain amount of money (fee) in order to access the *Micro City* and/or to benefit from activities.
- Activities may be proactively recommended to the guests, depending on their wearable-tracked position and their interests.
- If guests accept the recommendations given to them, they may receive rewards. Rewards may vary depending on the context of the *Micro City* itself, and they may concern:
  - A discount applied on a particular product/service or every activity inside the *Micro City*.
  - A cashback that may promote sustainable actions and behaviours.
  - Points that can be accumulated and that allow guests to collect prizes offered by the *Micro City*.
  - The improvement of an experience, such as the reduction of waiting time in a queue.
- A *Micro City* presents a map that may suggest or impose routes to reach the activities inside it. Guests can locate activities and orientate using the map.

2 Ubiquitous Language

The following table shows the ubiquitous language of the analyzed domain.

Term	**Definition**
Micro City	Area with bounded temporal and spatial extension. It is populated with guests interested in the activities inside it.
Boundary	Physical perimeter that defines the boundary of the *Micro City*.
Lifetime of the Micro City	The time span in which the Micro City is accessible by/open to the guests and the activities operate.
Guest	A person interested in the activities offered by the *Micro City*
Group of Guests	A set of guests that are interested in the same activities and move together.

Activity	Service or event that is carried out inside the *Micro City* and it's able to satisfy a certain amount of guests with a certain frequency. An activity is active during a time period that determines its operation time. Moreover, it may be static, if it can't move or dynamic, if it may move when necessary.
Service	Type of activity that is continuously available during the *Micro City*'s lifetime and allows guests to benefit from it at any time.
Event	Type of activity that takes place in a specific moment and is carried out only once; once it terminates, it won't be further available.
Satisfy	The action of an activity of providing the guests with an experience or a product.
Benefit From/Attend	The act of a guest of exploiting an activity and being satisfied by it.
Time Period	An activity's operation time span. It is defined by a start and a finish.
Duration	The time taken by an activity to satisfy one or more guests.
Waiting Time	Amount of time that guests wait before benefiting from an activity.
Queue	Set of aligned guests due to long waiting time.
Fee	Amount of money that guests may have to pay in order to access the *Micro City* and/or to benefit from activities.
Wearable	Device owned by each guest (or group of guests) that allows them to interact with the *Micro City*.
Worker	Internal operator of a *Micro City*. It does not benefit from activities because it manages them.
Recommendation	A proposal to benefit from a specific activity in exchange for a reward.
Recommend	The action of sending a recommendation to the guests.
Accept a Recommendation	The action of accepting an activity recommendation and performing the action recommended in order to receive a reward.
Reward	The recompense received by the guests that accept a recommendation. It may be given by activities or the *Micro City* itself in order to promote specific behaviours.
Map	The representation of the *Micro City* containing useful information for the guests, as it reports the activities' positions. It supplies indications to the guests about routes to follow.
Route	The path that links different activities.

Tabella 1: Ubiquitous language of the *MicroCity*.

3 Domain Model

After defining the fundamental concepts of the domain, it is important to underline the relationships among them. The following diagrams show the different types of relationships that define the domain's model.

The figure 1 shows the main elements of a *Micro City*. In particular, a *Micro City* is made up of many guests that may benefit from activities inside it. Each guest owns a wearable device that allows them to interact with the *Micro City*. Many guests moving together compose a group of guests. An activity may give rewards to the guests (or groups of guests) that follow recommendations.

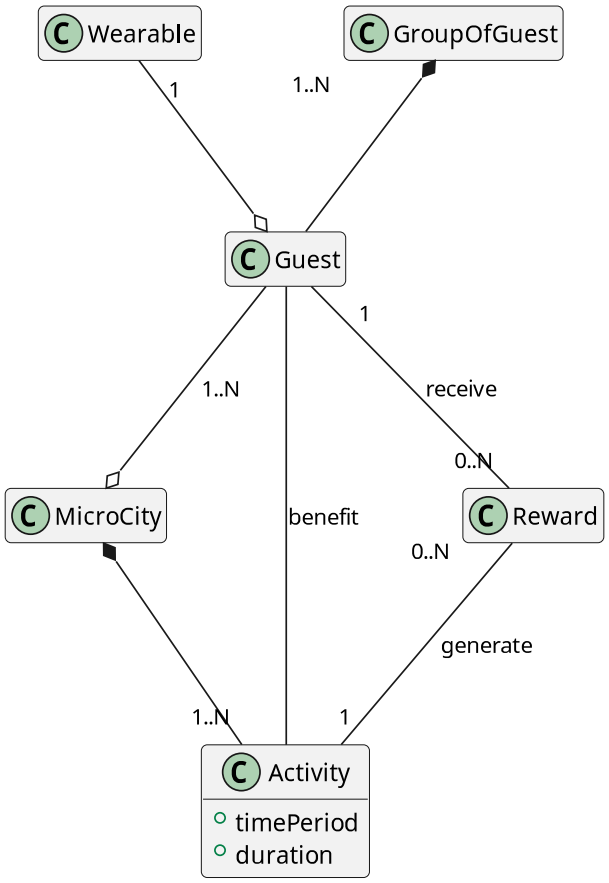

Figura 1: Class diagram of the *Micro City*'s domain model.

The figure 2 shows a diagram representing the organization of a *Micro City*. A *Micro City* has a map and many workers. Both activities and the *Micro City* itself may require the payment of a fee, that is an amount of money needed in order to access them. There are two types of activities: services, that are continuously available during the *Micro City*'s lifetime, and events, that take place in a specific moment and have a limited duration. Queues may form because of the waiting time needed before a guest can benefit from an activity.

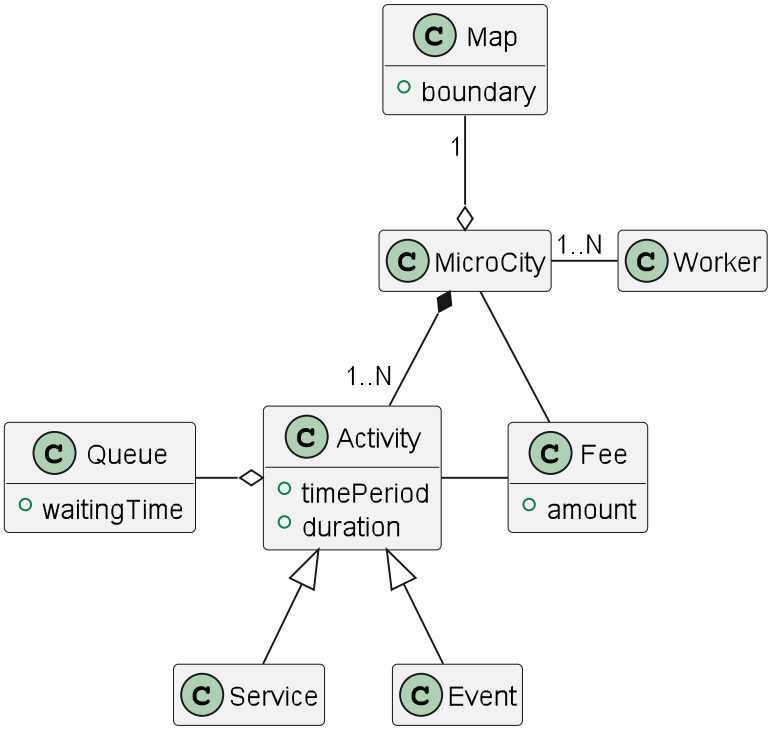

Figura 2: Class diagram that models the organization of a *Micro City*.

The figure 3 shows the sequence diagram that explains how a guest can obtain a reward.

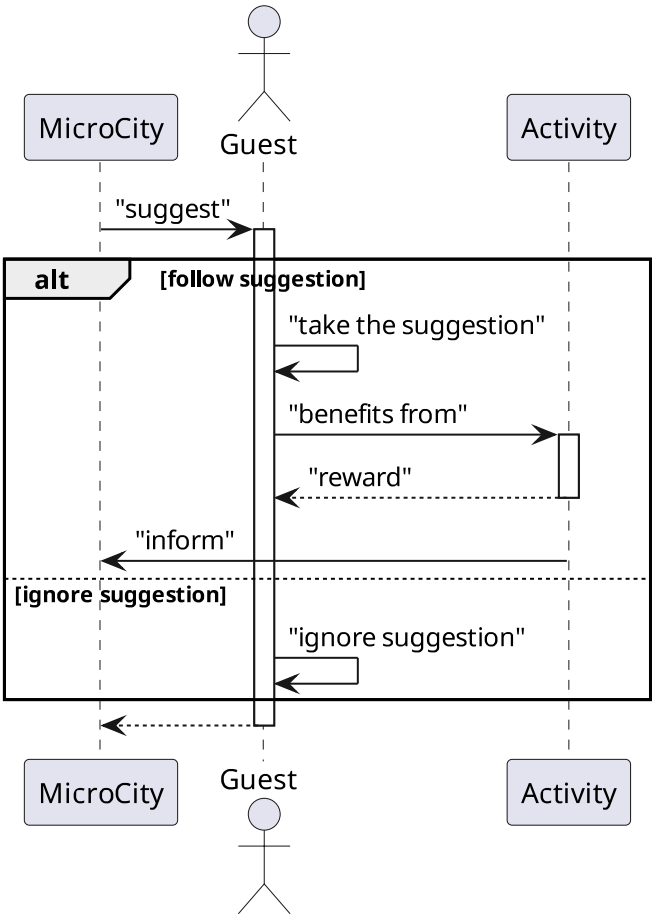

Figura 3: Sequence diagram that shows how to obtain a reward.

4 Application Scenarios

This section describes some application scenarios for the *Micro City*. Some examples could be:

- **Shopping Center** - In this context, the guests are the clients and their common objective is to benefit from services buying products sold by commercial activities. The activities are shops and restaurants; they may supply rewards in terms of discounts and cashbacks.
- **City Center** - In this context, the guests are the citizens and they move around a delimited area of the city center in search of events and shops. In this case, the possible rewards might be discounts and cashbacks.
- **Amusement Park** - In this context, the guests are the visitors and they are interested in attractions, restaurants and shows. In this case, the possible rewards may concern discounts and/or accumulable points, exploitable in commercial activities, or the reduction of the waiting time before entering an attraction.
- **Sports Center** - In this context, the guests are the athletes and their objective is to use fields, courts and pitches and participate in tournaments. In this case, the possible rewards may be the reduction of waiting time before using a sports field.

Micro City	**Guests**	**Activities**	**Rewards**
Shopping Center	Clients	Shops	Discounts/Cashbacks
City Center	Citizens	Shops & Events	Discounts/Cashbacks
Amusement Park	Visitors	Attractions & Shows & Shops	Discounts/Waiting Time Reduction
Fair	Visitors	Stands & Shows	Accumulable Points/ Waiting Time Reduction
Sports Center	Athletes	Fields & Tournaments	Waiting Time Reduction

Tabella 2: Some examples of application cases.