Trash | Track

Project Analysis

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Introduction

This paper presents some analytical considerations about how I would develop the Trash Track Project. If the prospective is to live in a much more sustainable city where 100% recycling is reality, the amount and flow of wastes and trash that society produce today, must be drastically reduced. To do that, we need technical as well as cultural innovation. This means that even if the smart tags can be a way to develop and facilitate closed loop value chain for companies, facilitate disassembly of multiple material objects and maybe, develop recycling banks locally - payback based on the quantity of recyclables that any individual can provide – or control and certify the disposal of certain kind of wastes, it must be said that the amount of garbage and wastes should be reduced from the top of the production/consumption chain, and not at the end.

For the above reason I would try to create a link between the presentation of the removal chain as it is now and the presentation of future sustainable scenarios showing how they will work in the future and how services[1] for an upstream rubbish flow could be implemented in the large-scale retail trade.

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1 - Examples of these possible services are described in: "Scenari SDOS di riduzione a monte dei rifiuti, prodotti dalla filiera alimentare e della carta" Politecnico di Milano, DIS Indaco, for ASM Brescia, C.Vezzoli, L.Orbetegli, F.Ceschin.

1 //Device's design

The main target in the design of the Tag is to remain attached to different types of product and remain hidden as much as possible in order to not interfere with their routes and end of life destination.
Due to the variety of shapes and materials and the possible loss of the Tag, I would design a sort of band-aid to attach and protect it. The device can be provided with a pre-cut adhesive patch, with a thin pad or case to protect the device's edge and to avoid its removal by other objects levering on it when the tag is outside the object. The lower side of the Tag will be attached to the object trough a high performances bi-adhesive layer. Two little rings at the sides of the tag can be useful to attach it to textile fabric or pierced surfaces with a thread or a string. These could be an easy way to provide a reliable enough fixing on different objects, it should be easy to remove in case of recycling and it is not demanding to make.
A system to recover the tags is advisable and should be created, maybe informing the employees of the dumps and recycling centers, but it is clear that it can be problematic to manage.

back   front

Tag   ~2,5 x3,5cm   Adhesive patch   Pad   bi-adhesive
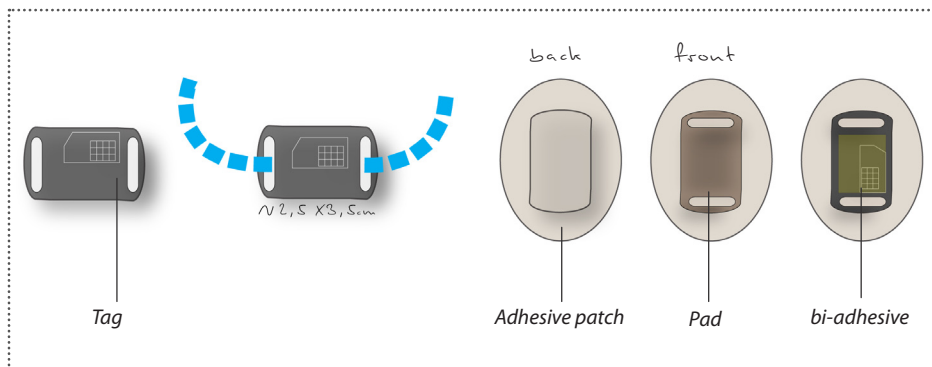
Finally, instruction on how to attach the device should be given to the people whose trash is tracked, such as, for example, that it is better to hide it inside the object when possible.

2 // Potential Users

Making visible the removal chain of a city and providing the citizens a future scenario where all the trash and garbage is reused, collected and recycled, has a strong educational aim.
For this reason, with the collaboration of NYC major's office, I would provide the tags to student of classes of the five boroughs - to better cover the urban area - and make them experience how the removal chain works. Students are probably those who will live in a city where 100% recycling is a reality, so it is important to educate them first and maybe make them collaborate in the design and development of a future scenario with less waste. Furthermore the support of a school and a teacher can facilitate the course of the project.

Other individuals that can be involved are environmentalist groups *(e.g. Freecycle NY ?)* that already promote the reuse of those objects that can be useful for somebody else, through a mailing list and other tools.

3 // How

Tags with an identification code will be provided to the students together with the access to the Internet site where they can track their objects' end of life journey. The student will be asked to fill in a form, on the web or via mobile, with a short description of the object:

- ***Family/ Category*** *(electronics, packaging, bottles ,clothes...)*
- ***Material*** *(multiple, plastic, paper, glass, textile…)*
- ***Short Description*** *(clean, dirty, broken, good conditions)*
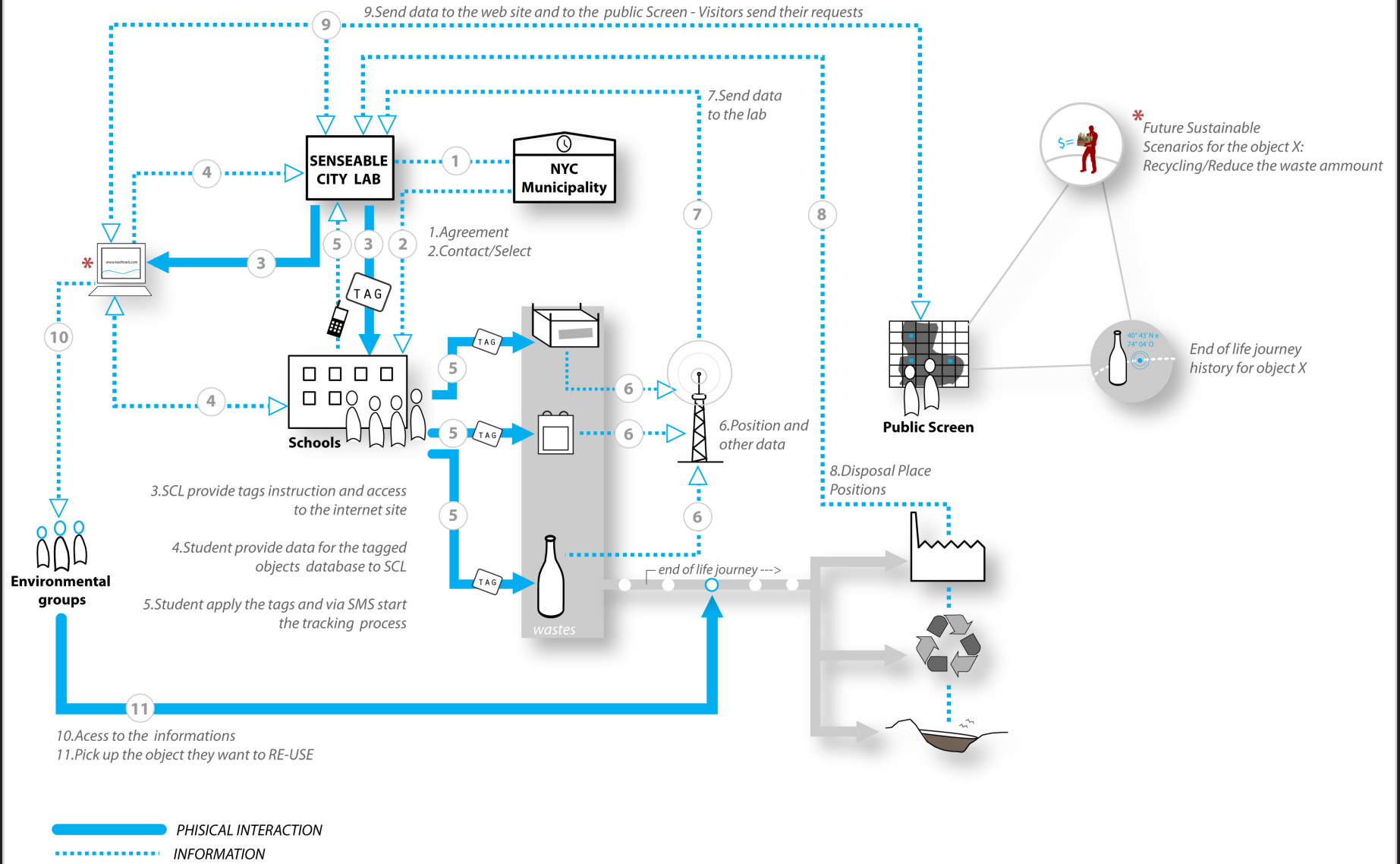- ***Where they thrown away the object*** *(Recycle bin, undifferentiated, on the floor...)*

The Project team should provide the students a brief introduction on the topic, instructions about what to do and a list of candidate objects that may be interesting to track (or ask them what they think is more interesting).
When the object is thrown away, students will be asked to start and confirm the beginning of the tracking process sending an Sms with the given Tag Code or, in alternative, calling the Sim card embedded in the tag. A third option can be ask them to send a standard format Sms with all the above characteristics, gathering them with this format.
Suddenly a database with all the information needed will be created and made accessible to students and environmental groups and communities present in the city.
Students can be involved in the analysis of the collecting process, pointing out the bottlenecks and inefficiencies, writing reports and analysis on a dedicated space on the web site and eventually be included in the design and idea generation for future scenarios.
Environmental communities and associations, who already exchange used

9.Send data to the web site and to the public Screen - Visitors send their requests

SENSEABLE CITY LAB

NYC Municipality

7.Send data to the lab

1.Agreement
2.Contact/Select

* Future Sustainable
Scenarios for the object X:
Recycling/Reduce the waste ammount

TAG

End of life journey
history for object X

Schools

6.Position and
other data

Public Screen

3.SCL provide tags instruction and access
to the internet site

4.Student provide data for the tagged
objects database to SCL

5.Student apply the tags and via SMS start
the tracking process

8.Disposal Place
Positions

wastes

end of life journey --->

**Environmental
groups**

10.Acess to the informations
11.Pick up the object they want to RE-USE

━━━━━━━ PHISICAL INTERACTION

········· INFORMATION

System Map

stuff or enable the culture of reuse, will be able instead, thanks to the data-base and the site, to see if there is something they can find interesting, local-ize it and pick it up: To see that an object has been reused or changed owner can be extremely valuable from an educational point of view, since environ-mentally this is the best option.

5 // Information Presentation

Considering the number of objects tagged, it will be fundamental for both the internet site and the public screen to allow the user to quickly scroll, visu-alize and choose the object or the family of objects they want to track.
Different functions based on simple queries to the database and other tools will be offered on the internet site to the student's whose trash is tracked, the environmental groups and normal web users. Differently from the other us-ers, the students will have a user name and password to log in and work on the site in a private area. The same software and functions will be re-proposed at the exhibition at the New York Architectural League, but with different mo-dalities for the visitors.
Basically, it should be possible for the user to navigate on satellite views (*e.g. Google earth*) of the city/world trough a tool bar that allows him/her to move among the different functions and receive specific information on a single or a group of objects. Reported below a brief description of how the informa-

tion should be presented on the internet site:

- ***Where are all the tracked objects?*** This software visualizes the posi-tion and concentration of all the object in real time on a satellite map. The interface should allow the user to visualize also the routes of all the object at different ΔT.

- ***Where is an object?*** When one object is visualized, it will be possible to know all the information present in the database about it. As indicated in the project proposal it will be possible to see which object it is, its coor-dinates, its path at different ΔT and street view as well as his embodied energy and data on his impact.

- ***Where are all the object with a certain characteristic in common?*** By a simple query to the database the user will be able for example to see (*always on the map*) where al the objects of a certain material are or where all the electronic devices are. Since objects with similar features can have different disposal path and end of life the user will be also able to skip from an object to another to compare them.

- ***What happens there?*** The user will see that one or a group of objects will concentrate in certain point, that can be a collecting centers or the final disposal or recycling centers. With the collaboration of the Sanita-tion Office, these places should be localized. Every disposal/ collecting
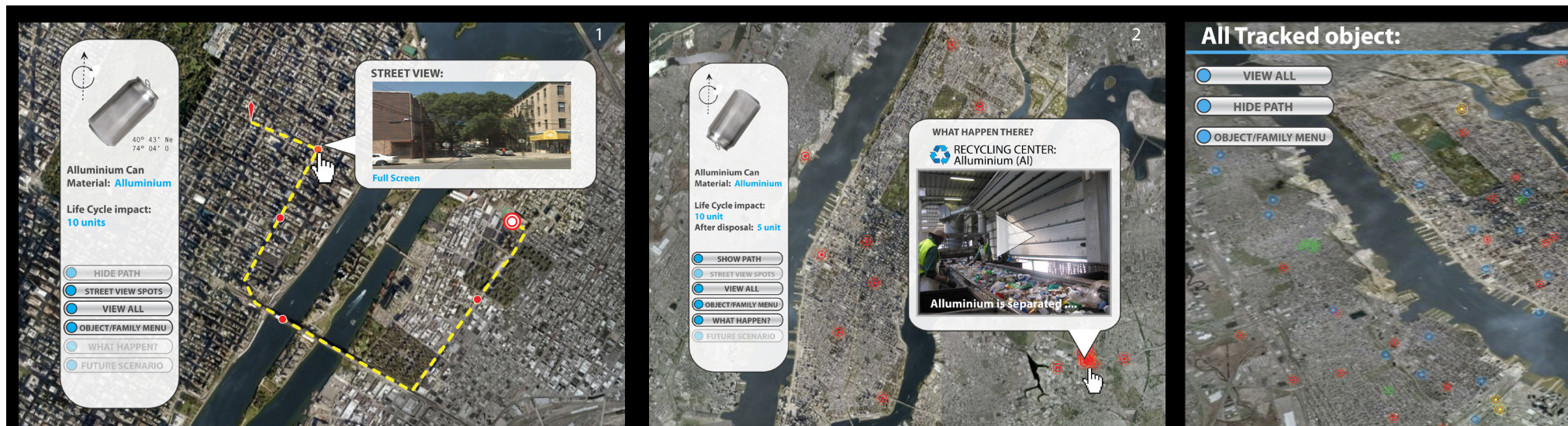

Fig1: Examples of possible Interfaces on the web: 1.Single Object and Street View, 2.What Happen there? 3.All the tracked Objects.

center will own a video describing it. When an object arrive at destination *(position of the Tag equal to the position of a disposal/collecting center)* information and description of the process that it will undergo, the environmental cost of it and the intrinsic problems of one object 's production and consumption, will be presented to the user with movies or documentaries *(maybe made by E.Linke)* by clicking on the map. The same should happen in case of an object that crosses the borders arriving in another poor country: an explanation of wastes' black market should be presented. Moreover, Depending on the final destination, the environmental impact of an object will "increase or reduce": the value of this difference can be presented to the user numerically or graphically.

- **Future Scenarios: what can be the disposal process of an object, or family of object in the future? Will we use it / them as we do nowadays?** Objects gradually reach their final destination. Clicking on the last destination of the object the user receives information about the end of life processing for a certain object or a group of. But how this process will be in the future? Will we use that object as we do now? For examples maybe we won't use plastic bottles as we do in these days: normally we buy, drink and throw away, but maybe in the future detergent companies will produce specific reusable plastic bottles, setting up services to sell their product on tap at the stores o directly via home delivery

(in the picture: Allegrini Casa Quick 1998: nowadays these kind of services are spreading). The user should have the possibility to see what can be done in the future to reduce the environmental impact of a product both technically, since new technologies will improve the the removal-chain, that on a behavioral level since consumer habits will probably change. Different scenarios should be prepared and presented for any group or family of objects after once gathered all the information about the objects. Student might be also involved in the idea generation and collaborate at the design of these scenarios and services.

5.2 // Exhibition at the New York Architectural League

The functions and software presented above will be repeated also within the public installation, but with different modalities, considering the different fruition of the information between the internet user (who have more time and more interaction) and the exhibition visitors. Depending on the budget, the technologies and the space available for the exhibition, I would suggest two concepts for possible interactive installations both providing a short movie about the end of life path of an object, its disposal process now *(path + what happens there*) and a future scenario about the future use and disposal of that object *(Future Scenario)*:
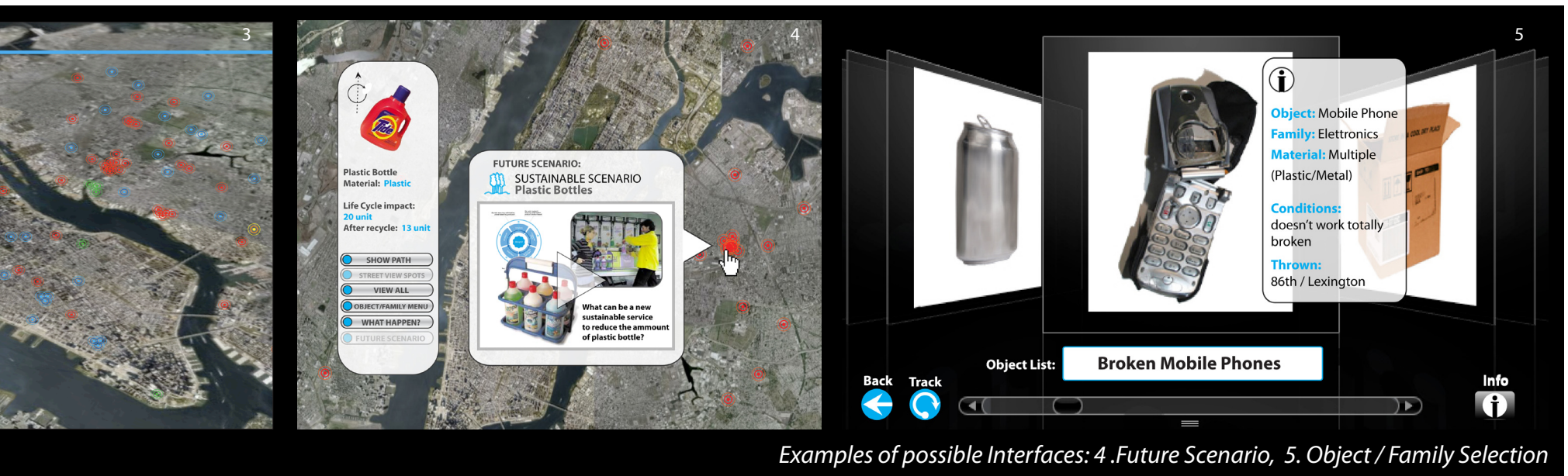
Examples of possible Interfaces: 4 .Future Scenario, 5. Object / Family Selection

1 . Rfid: One possibility would be to provide the room with n objects similar to those tracked. Any object will be equipped with an rfid tag. Passing the object on a reader will make the user visualize a short documentary for that piece of garbage, its disposal process and a future scenario.

If there is the possibility to place more screens, the purposes can be divided: one screen to visualize all the tracked objects (no interaction), another will visualize a specific object , another a family. Finally Other two screens will show the disposal process/environmental impact and the future Scenario for the chosen object.

2. SMS: The second idea is to allow via Sms to request to visualize the path of the desire object. Visitors interested can send an SMS with the Tag's code, then a description of the object and its most relevant information will arrive on his mobile. Afterwards the visualization of his path, where all the other objects member of its family are, its disposal process and finally its scenario will be played. A general storyboard of how I would present the information inside the little movies/documentary is shown in Figure 2. All the tag codes and an object list will be provided to the people at the installation. A second screen continuously showing the position of all the tracked object can be eventually added or, as before, more screens with different purposes.

In the figure below: the sequence of how the information could be presented.

5 – Computer Architecture

The project is based on a database that could be used for multiple tasks:

- Gather information on users *(describe the sample).*
- Gather information of the different types of waste and characterize them on multiple levels.
- Have information about the objects' paths and position.
- Organize the data for the development an appropriate software support tool.

The database could be used for different purposes:

- Position: *tracking of the different waste (main task)*
- Internet Application: *Internet site - object's registration*
- Data analysis: statistics for analysts at different ΔT
- Presentation on public screens

Trash Track Project: All Tracked object // Send SMS

Plastic
Elettronic Devices
Paper
Multi Material

Plastic Bottle
Material: **Plastic**

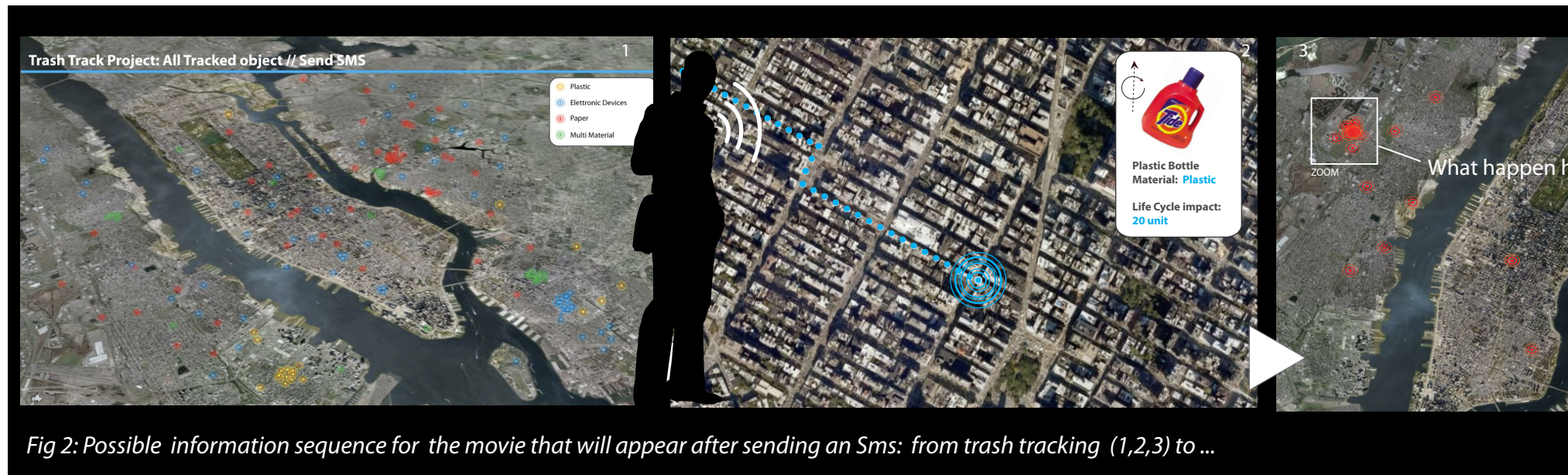Life Cycle impact:
**20 unit**

ZOOM

What happen h

Fig 2: Possible information sequence for the movie that will appear after sending an Sms: from trash tracking (1,2,3) to ...

The first phase of the project will require to the user to register the object that will be tracked. This is the first step to collect data in a structured manner. Users whit access to the site can after Log In:
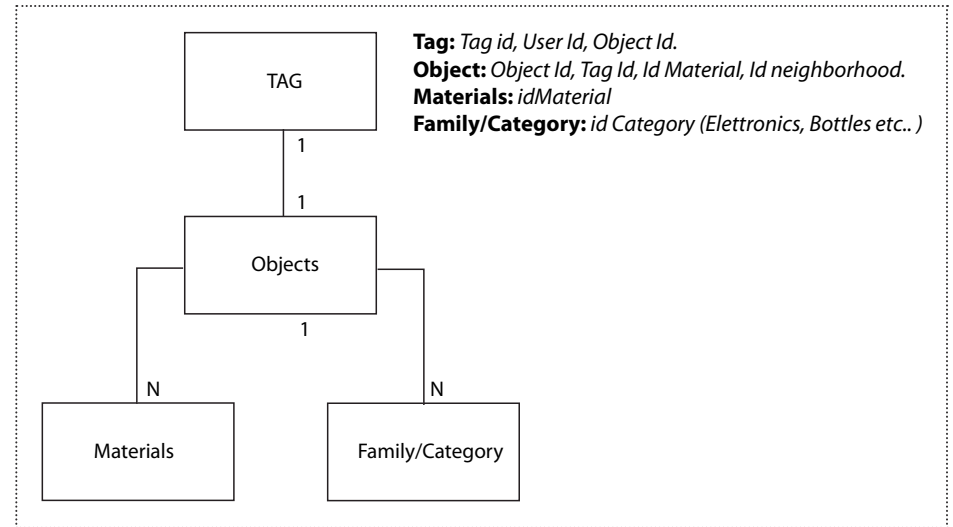
- Register a new object;
- Visualize one object's path;
- Visualize the flows of the whole project;

The users will register in a specific table with his name, surname and its neighborhood, in this way it is possible to have a feedback of how the collecting process work and eventually identify critical points.

Neighborhood 1 — 1 Users

Users: *User id, Name, Surname, school, Neighborhood Id*
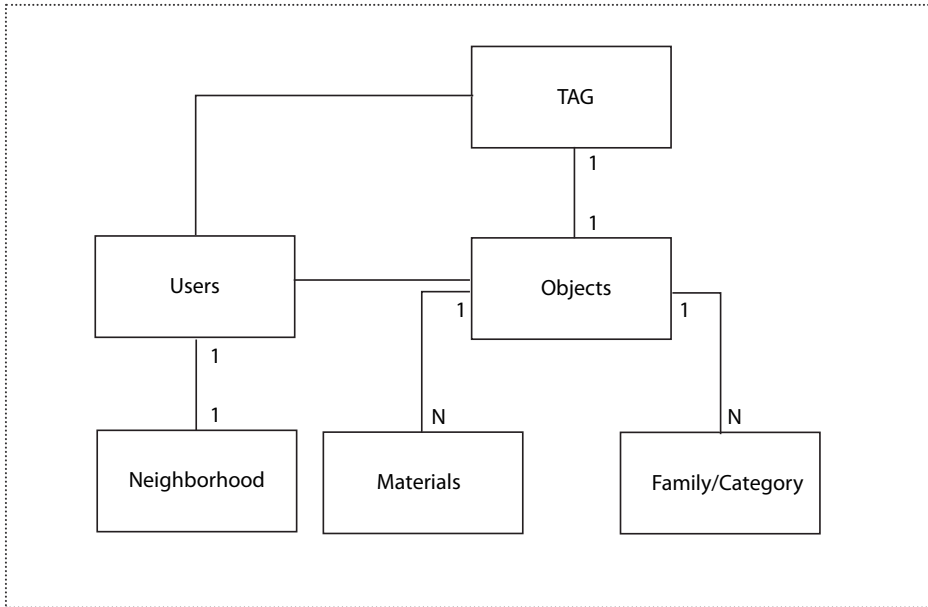**Neighborhood:** *Neighborhood Id*
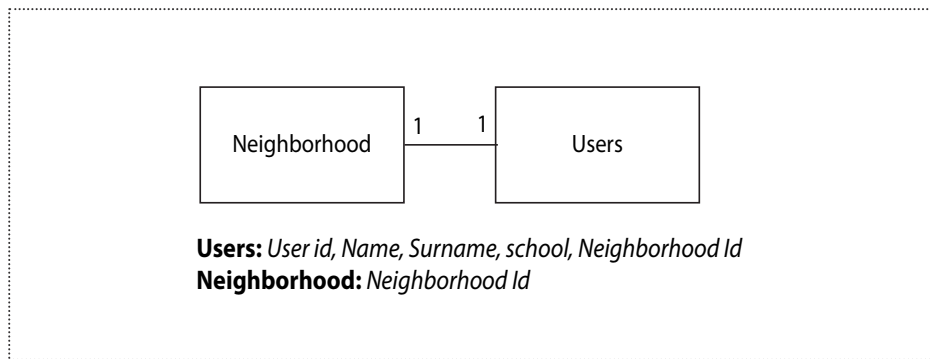
After that, it is necessary to characterize the different objects. Every user will be able to do it with the help of an ad hoc Internet form (or SMS?). The user will describe the object and tag it. An object will be memorized in a specific table with all its desired characteristics, especially the Material, Family and the associated Tag.

Here there are tree more tables in the Database, Material, Family/Category and Tag:

TAG
1
1
Objects
1
N Materials   N Family/Category

Tag: *Tag id, User Id, Object Id.*
Object: *Object Id, Tag Id, Id Material, Id neighborhood.*
Materials: *idMaterial*
Family/Category: *id Category (Elettronics, Bottles etc..)*

Plastic Bottle
Material: **Plastic**
Life Cycle impact:
20 unit

Tons Plastic are produced every years. This material...

Plastic Bottle
Material: **Plastic**
Life Cycle impact:
20 unit

Plastic Bottle
Material: **Plastic**
Life Cycle impact:
20 unit

What can be a new sustainable service to reduce the ammount of plastic bottles?

discrete resources optimization: phase-based (e.g.producer)

life cycle (system) resource optimization: product function-based

retailers

producer

designer

...the disposal process and the future scenario (4,5)

This is how the two parts of the database are related graphically:

TAG

1

1

Users — Objects

1 — 1

Neighborhood — Materials — Family/Category

1 / 1 — N — N

At this point, once the object is tagged and thrown in a garbage bin of a neighborhood, the tracking and positioning process can start.
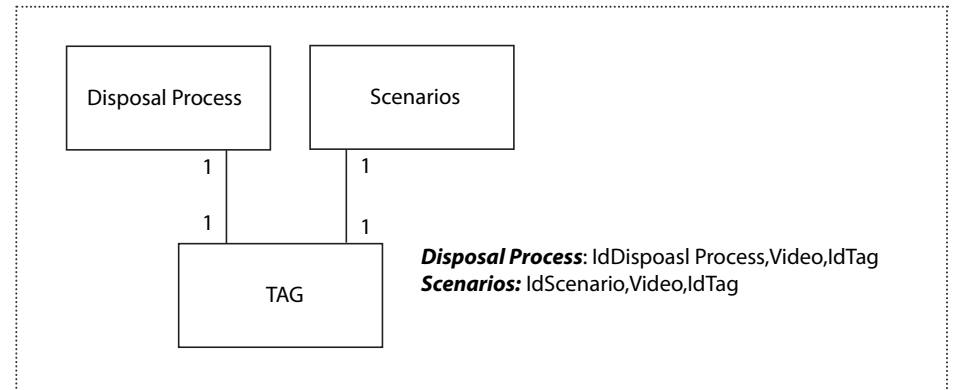
The positions can be gathered in appropriate tables:

- One table that memorize the position in different ΔT
- One archive of the positions, memorized for ΔT
- A Collecting center table with the positions of the possible end of life arrival place.

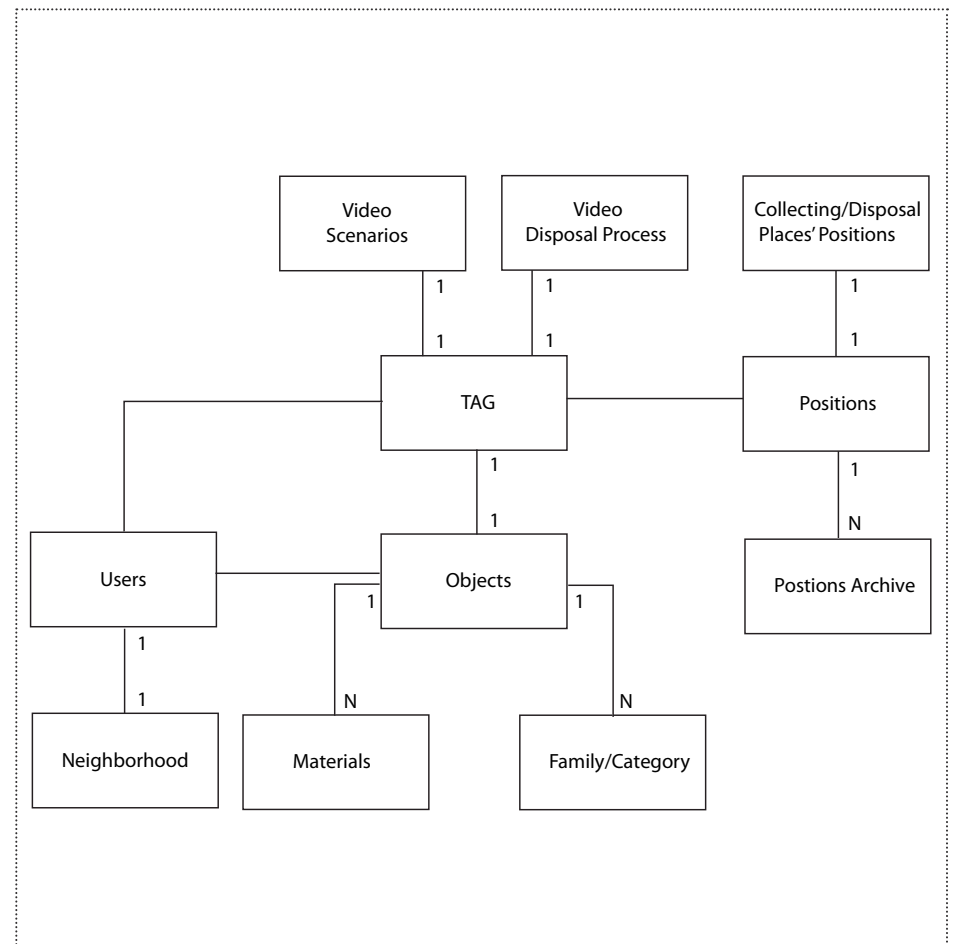Collecting/Disposal Places' Positions — 1 — 1 — Postions — 1 — N — Postions Archive
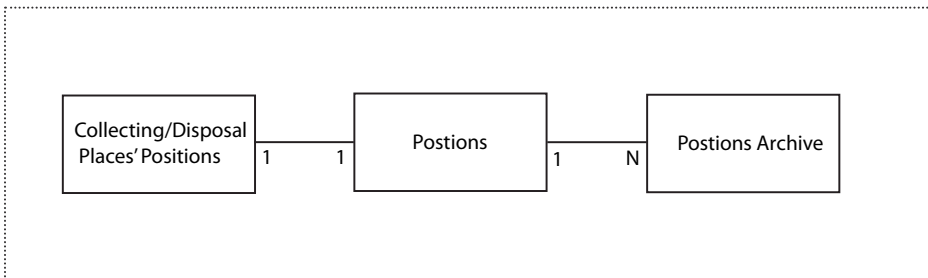
From the final positions and their coincidence with those of the collecting centers will be possible finally to link the proper final process description movie to a tagged object. Similarly a future scenario will be linked to an

object and its tag:

Disposal Process — Scenarios

1 / 1 — 1 / 1

TAG

Disposal Process: IdDispoasl Process,Video,IdTag
Scenarios: IdScenario,Video,IdTag

Adding this last two parts of the database:

Video Scenarios — Video Disposal Process — Collecting/Disposal Places' Positions

1 — 1 — 1

1 — 1 — 1

TAG — Positions

1 — 1

1 — N

Users — Objects — Postions Archive

1 — 1

Neighborhood — Materials — Family/Category

1 / 1 — N — N

With this structure it should be possible to:

- Track of all the objects' end of life paths
- Identify which neighborhood the removal chain face problems or in which it is more efficient
- Carachterize the user and their level of participation
- Monitoring the tags and their performance
- Have a detailed description of the single path of one object and identify critical points
- Evaluate the performance of the collecting centers, costs to reach them and evaluate benefits
- Develop the needed softwares