

Deliverable D.4.1

AR material report

Sustainable Urban Governance through Augmented Reality
(SUGAR)

15th January, 2020

Deliverable 4.1

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Executive Summary

The Sustainable Urban Governance through Augmented Reality (SUGAR) project aims to develop innovative best-practice protocols and guidelines on Sustainable Urban Governance and specifically Public Participation through Augmented Reality. Urban Design and Planning worldwide have long been criticised for their lack of meaningful public consultation and participation in the process of the making of our cities. Currently, the existing practices of consultation and participation are within the confines of council meetings, complex form filling and survey reports that most often than not carry little weight towards the decisions made by the planning authorities. For the last decades, the concept of Participatory Planning as an approach of designing has been heavily incorporated in many disciplinary fields. This project investigates the role of participation as the process that users, and other stakeholders, are actively involved in the decision-making process through the approach of achieving Sustainable Urban Governance and utilising innovative immersive technologies (specifically AR). We argue that the application of participatory design in the design process is essential to provide economically and socially sustainable outcomes. SUGAR aims to empower both citizens that seek ways to participate in the decision-making process for the design of their cities and neighbourhoods and stakeholders that would like to involve the public actively in the process of shaping their environment creating a lasting and meaningful impact.

This deliverable D.4.1 is created in accordance with the description of work of Work Package 4 of SUGAR, particularly Tasks 4.1-4.4. WP4 utilises the framework and prototype produced in WP3 aiming to (a) create AR activities to achieve innovative, unique and imaginative approaches to public participation and (b) implement the framework with the AR activities in a workshop format in Cyprus.

Task 4.1 included extensive desk research, led by CUT, which analysed materials and approaches, reports and statistics, best-practice case studies as well as instructional practices, focusing on activities and methods for involving the public in the decision making process through Augmented Reality.

Task 4.2 entailed sourcing suitable real case studies from the Cypriot context through the municipal authorities and the national planning department.

Task 4.3 involved the design of AR activities based on the 'Sustainable Urban Governance for Participatory Planning' framework, CUT in collaboration with UCY have developed the structure of specific AR activities in a workshop format aiming to gather public opinion on the selected case study.

Task 4.4 included the preparation of the AR material. Material from the selected case-study has been converted to AR content by the partners at Harvard University to populate the activities of the Sustainable Urban Governance and Participatory Planning Framework which was implemented as described in deliverable D.4.2, Report on the implementation of the framework.

Introduction

The prototype for the SUGAR app has been developed during the Design Sprint workshop held at Harvard University in July 2019, and it was based on the ‘Sustainable Urban Governance for Participatory Planning’ framework and the selected case-study. Source material, both digital and physical, gathered from the associated municipal authority has been converted to AR content by the partners at Harvard University in order to populate the activities of the Sustainable Urban Governance and Participatory Planning Framework which will be implemented as described in deliverable 4.2, Report on the implementation of the framework.

The AR content has been developed using a tablet device employing a vision-based tracking algorithm that continuously detects and tracks fiducial marker manipulations within the visible space and translates or converts these manipulations to computer commands.

The purpose of this document is to:

- present an overview of the selected case study
- Introduce the steps taken to convert the sourced material into AR content. This includes creating a 3D model of the selected case study
- compile a series of related 3D objects that would accompany the model and serve the purposes of the proposed SUGAR framework.

Needs Assessment

Sourcing a suitable case study

The team at CUT reached out to multiple municipal authorities, across Nicosia, Larnaca and Limassol, to source real case studies, such as controversial one-off projects, or neighbourhood revitalisation projects and public squares that are procured through public design competitions. After contacting the following municipalities:

- **Nicosia:** Nicosia Municipality, Agios Dometios, Aglantzia, Geri, Egkomi, Dali, Lakatamia, Latsia, Lefkosia, Strovolos, Tseri

- **Larnaca:** Larnaca Municipality, Athienou, Aradippou, Dromolaxia - Meneou, Larnaca, Pano Lefkara, Livadia
- **Limassol:** Limassol Municipality, Agios Athanasios, Germasogeia, Kato Polemidia, Lemesos, Mesa Geitonia, Ypsonas

Only the following six municipalities (two from each planning authority) have replied and have arranged to meet with us to discuss and choose a suitable case study:

- **Nicosia:** Nicosia Municipality, Aglantzia
- **Larnaca:** Larnaca Municipality, Aradippou
- **Limassol:** Limassol Municipality, Germasogeia

On the 18th of June, SUGAR held its first Advisory Committee meeting. The Advisory Committee consists of key stakeholders, with in-depth knowledge of the Cypriot planning system and its bureaucratic processes. A lively discussion between the stakeholders revolved around the capabilities and dangers of public participation as it should be viewed positively but also critically. Examples brought to the table by stakeholders and their insights complemented the information we have received from the public and have offered a different point of view to the consortium that will reconcile the multiple complex parameters that formulate the planning system in Cyprus. The case studies that were proposed by municipal authorities in order to facilitate the implementation of the project were presented and through the discussion that ensued, while many possible projects have merits, a specific opportunity seemed stronger as it was in a manageable scale given the limited time and resources of SUGAR but also had the capability of actually instigating change and influencing the decision-making process.

Selected Case Study

The case study at hand concerns the creation of a two-lane road to cross the road of Athalassa through its forest Athalassa (adjacent to ATI) towards Platy (RIK area) and end at the roundabout that connects Akadimias Avenue with Aglantzia Avenue.

There have always been objections from the City Council to the original plans. "The City Council always disagreed with the creation of the road because the Local Plan entailed a road that would pass through the forest of the Pedagogical Academy," Mr Kortas (previous mayor) said.

The new City Council, following meetings with both the late Minister of Communications and Works, Tasos Mitsopoulos and the current Minister Mario Demetriades, gave his consent to open access under the conditions that the proposal will be: a two-lane road (not four as it was originally

planned) with a pedestrian walkway, a bike path, an over-ground or underground passage that will unite the Athalassa National Park with the wider ATI area and will prohibit the crossing of heavy vehicles. These have been accepted by the Council.

However, the mayor admits that a number of trees will inevitably be affected in the forest of Athalassa. The mayor explains that "11 trees will need to be cut where the traffic junction on the Akadimias - Aglantzias Avenue and little cypresses on the way to the campus, however, stating explicitly that the municipality will plant much more to replace the trees that will be cut.

The "Ecological Movement" has already, in its announcements, denounced the extension of the Akadimias Avenue and the creation of interchanges at the entrance of Nicosia bisecting the two unique forests of Nicosia, those of Athalassa and Akadimias. "The impact on living, movement and health of the inhabitants of the affected areas by noise and exhaust gases will be extremely negative, leading to a deterioration in the comforts of citizens. Aglantzia is a privileged area of Nicosia, precisely because it has managed to maintain its balance of time in providing its residents with a combination of good transport on both road and sidewalk and bicycle routes. Moreover, the presence of the two national parks ensured better air quality and alternative ways of recreation for the residents of Nicosia in general".

Promoting the use of private cars, according to a representative of the Ecological Movement, is in stark contrast to European and governmental policy of discouraging the use of private cars. The construction of new road projects has been proved, according to the Ecological Movement, to "encourage the use of private cars and kills every effort to boost public transportation. The government - which spends millions of euros on the promotion of mass transportation - must think about undermining its own sustainable mobility policy by promoting projects such as the Academia Avenue in residential areas."

Next steps

Due to the controversial nature of the selected case study, it is expected that the public will be encouraged to participate in the implementation of the SUGAR app workshop. The specific case study was selected due to its capability of initiating change and affecting the established decision-making process.

Based on the SUGAR Prototype app developed at Harvard University, throughout the Design Spring workshop held in July 2019, we have proceeded with creating the content required to generate the AR-based app.

AR Content creation

Introduction

Ahead of creating the AR content, we had received a PDF version of the proposed site plan, from the Municipality of Aglantzia. Using a CAD software (Vectorworks), we traced over the main elements of the proposed site plan, such as roads, pavements and building outlines, in order to generate a clean and simplified DWG file required to create the 3D model.



Image (left): Proposed site plan

Image (right): Tracing the proposed site plan on CAD

Presets

The AR content will include 3 preset options of the selected case-study. The presets were created according to the Prototype app that was developed during the Design Sprint workshops at Harvard University.

- Preset 1: As existing
- Preset 2: Two-lane road proposal
- Preset 3: Four-lane road proposal

The AR-based application will allow users to either begin with a blank version of the site model (preset 1) and add desired objects from a given list of resources, or get a kick-start by choosing one of the other two presets, which include various objects already inserted that can be modified by the users. The users are encouraged to use any area within the region outlined in red as per the images below:



Preset 1



Preset 2



Preset 3

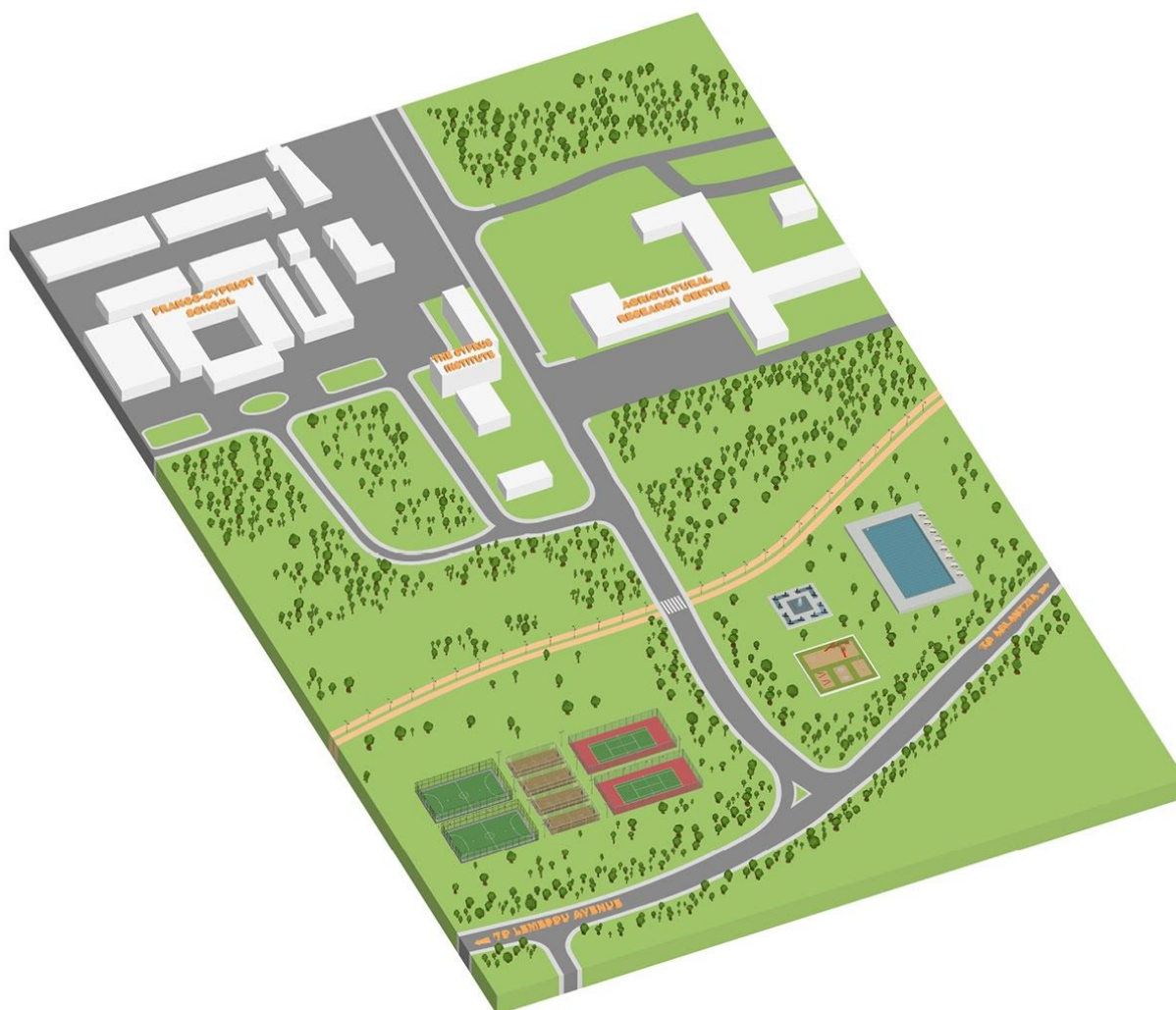
Preset 1: As existing

This preset includes a 3D model of the existing conditions on site. Users can use this as a blank version of the site model and introduce any objects from a given list of resources.



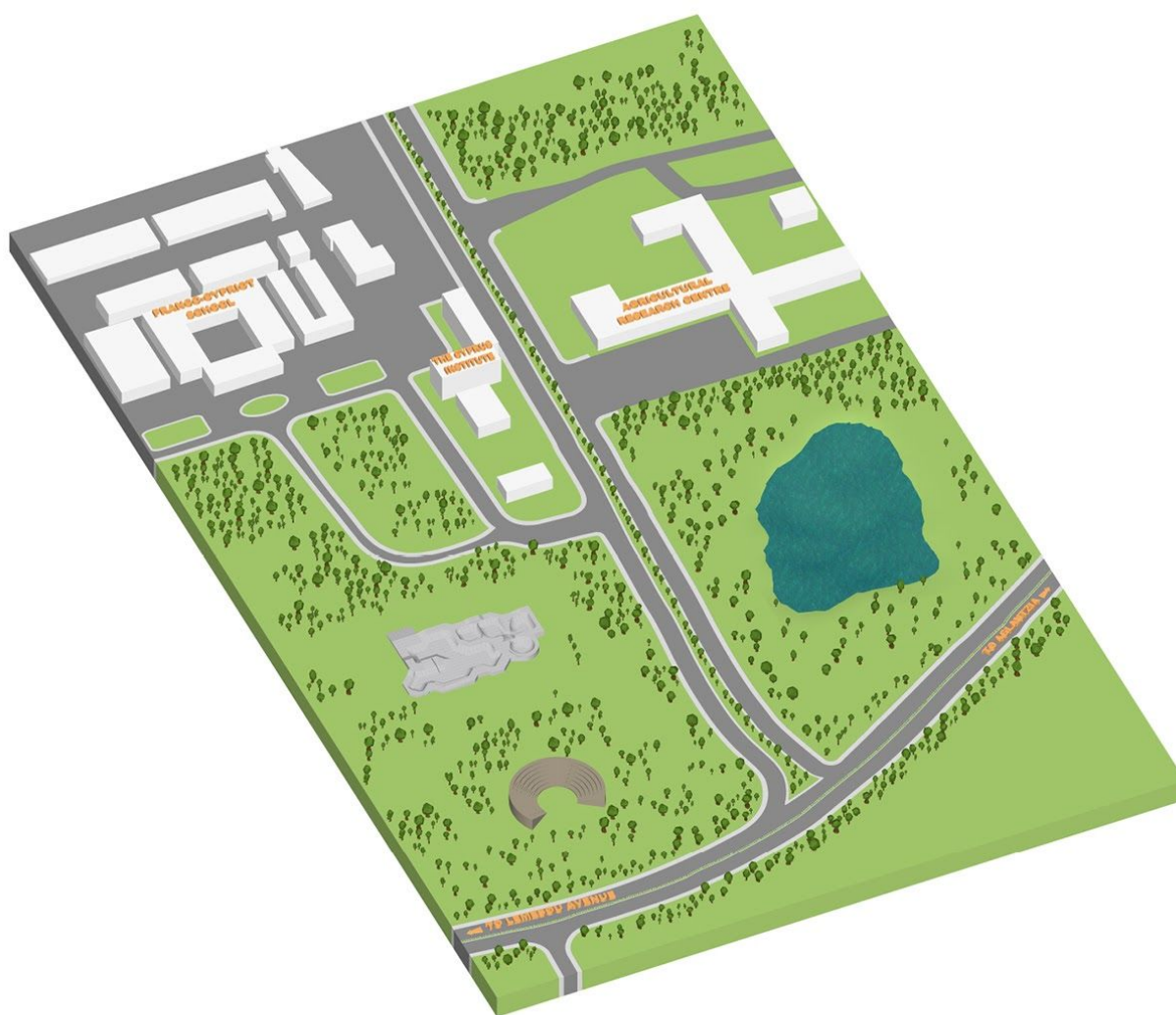
Preset 2: Two-lane road proposal

This includes the actual case study at hand which concerns the creation of a two-lane road with a pedestrian walkway and a cycling path that will unite the Athalassa National Park with the wider ATI area. In this preset, a number of recreational elements are introduced to encourage social interactions and promote a healthy and active lifestyle.

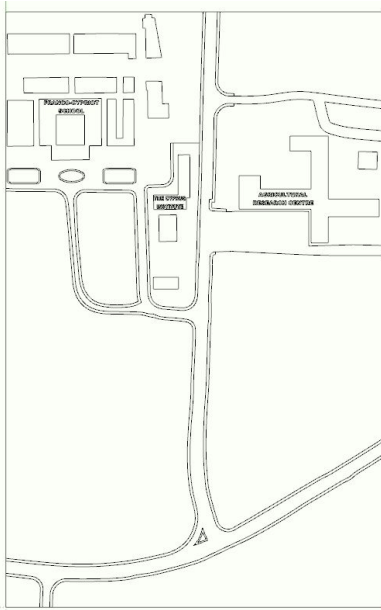


Preset 3: Four-lane road proposal

This includes the superseded version of the case study at hand which concerned the creation of a four-lane road. The elements introduced in this preset aim to support local biodiversity, cultural activities as well as leisure activities.



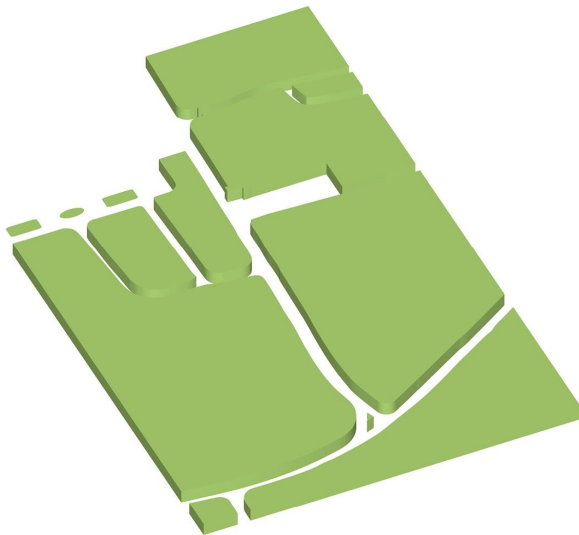
Creating the default 3D model



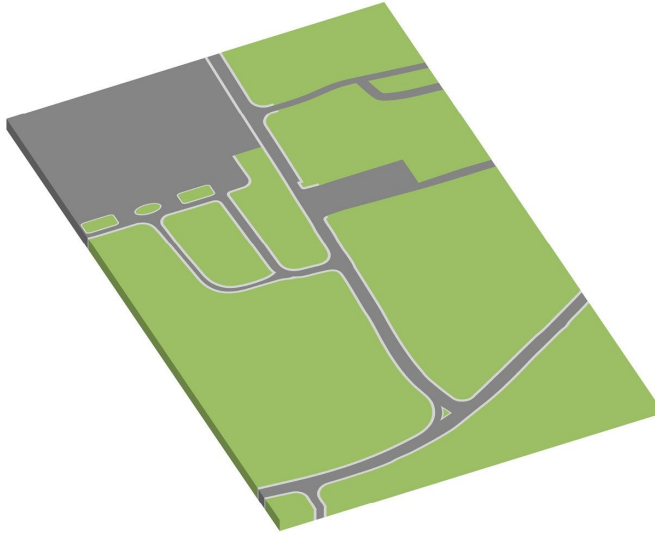
Step 1: DWG of Preset 1 imported to Sketchup

Step 2: Using DWG outlines to model the following components:

- a. Ground



b. Roads + pavements



c. Buildings + 3d text annotations





d. 3D text for navigation



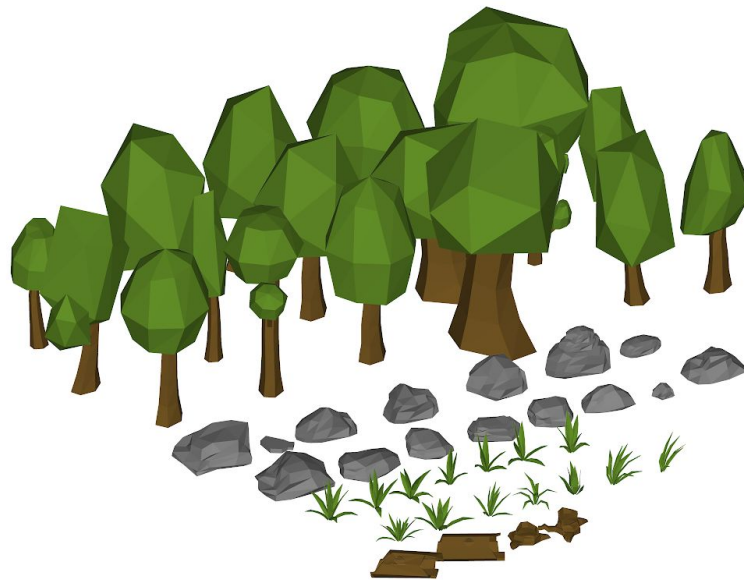
e. Populate the model with trees

List of objects

Based on the discussions from the Design Sprint workshop at Harvard University and the Prototype app that was developed, a list of relevant objects were downloaded from Sketchup 3D Warehouse and Turbosquid. Potential users of the SUGAR app will have the ability to insert these objects into the site model, anywhere within the recommended region (see Presets above).

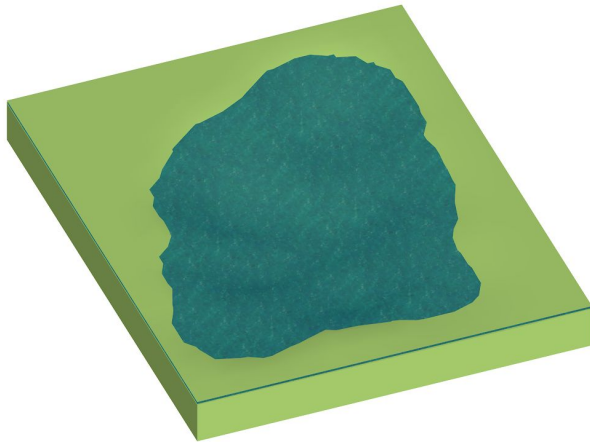
Landscape

Trees



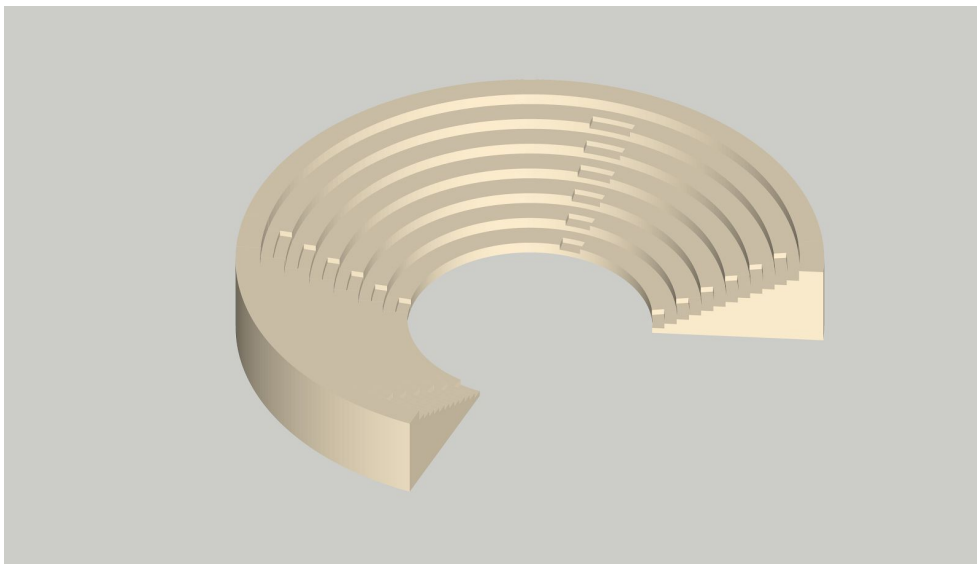


Lake

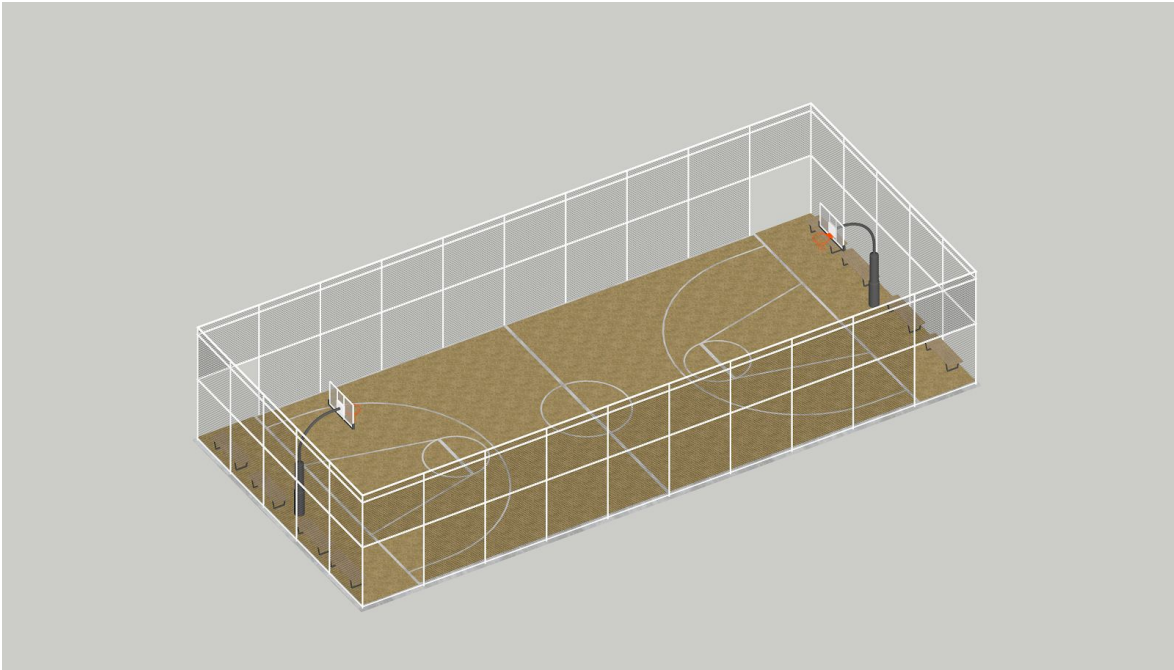


Recreation

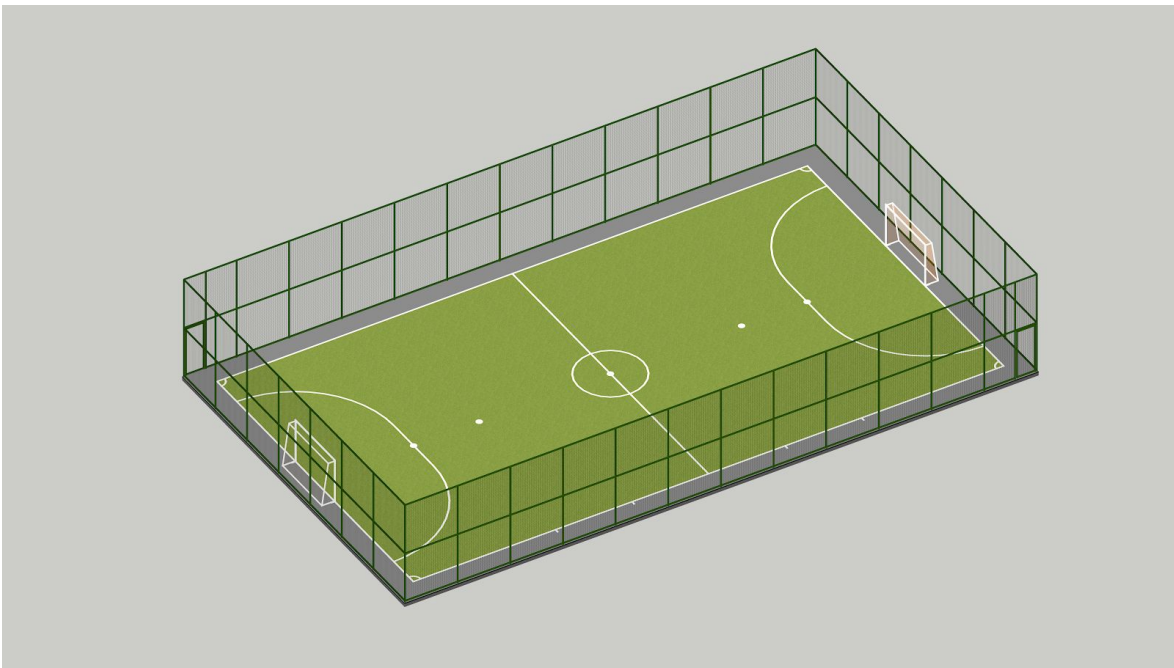
Amphitheatre




Basketball court

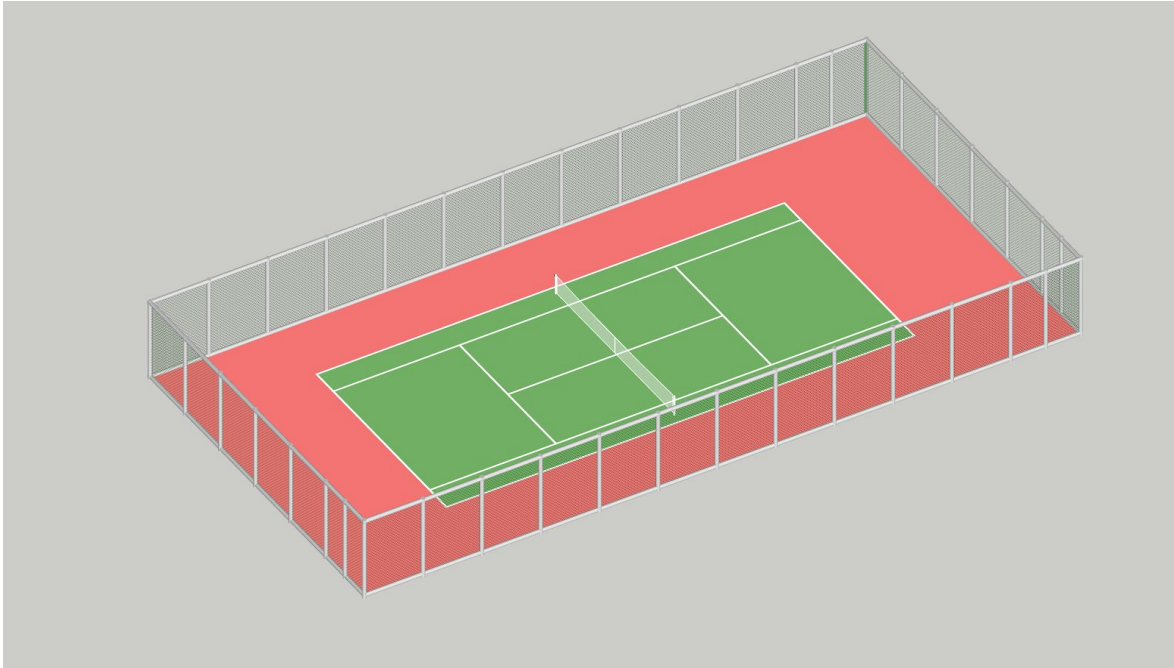


Futsal court

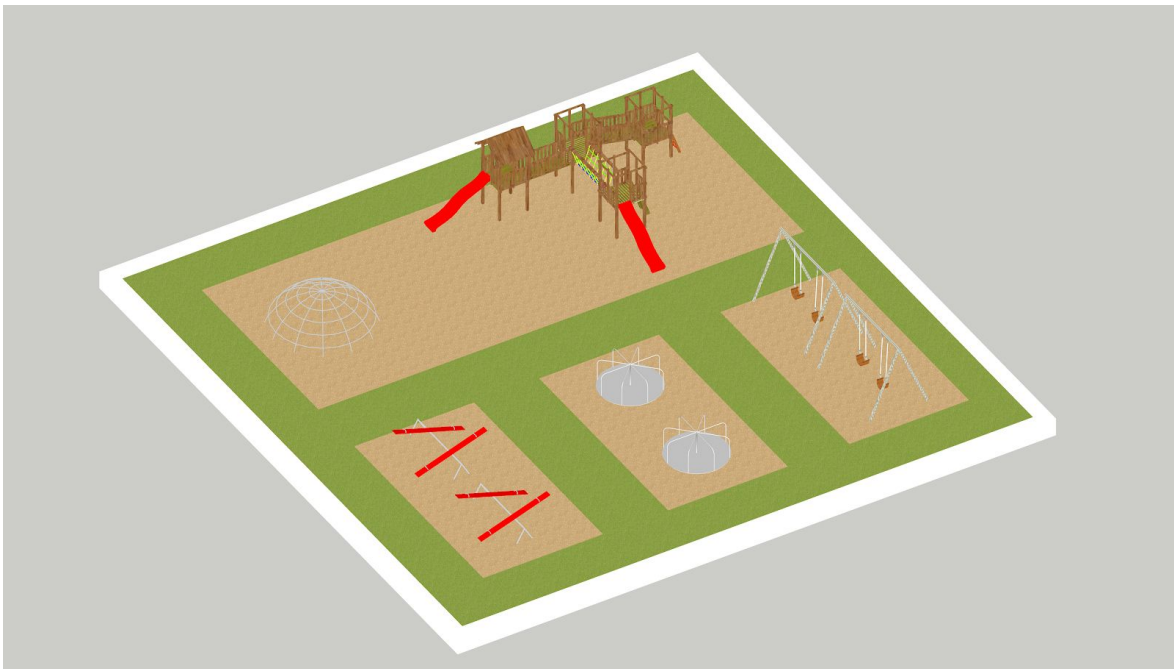




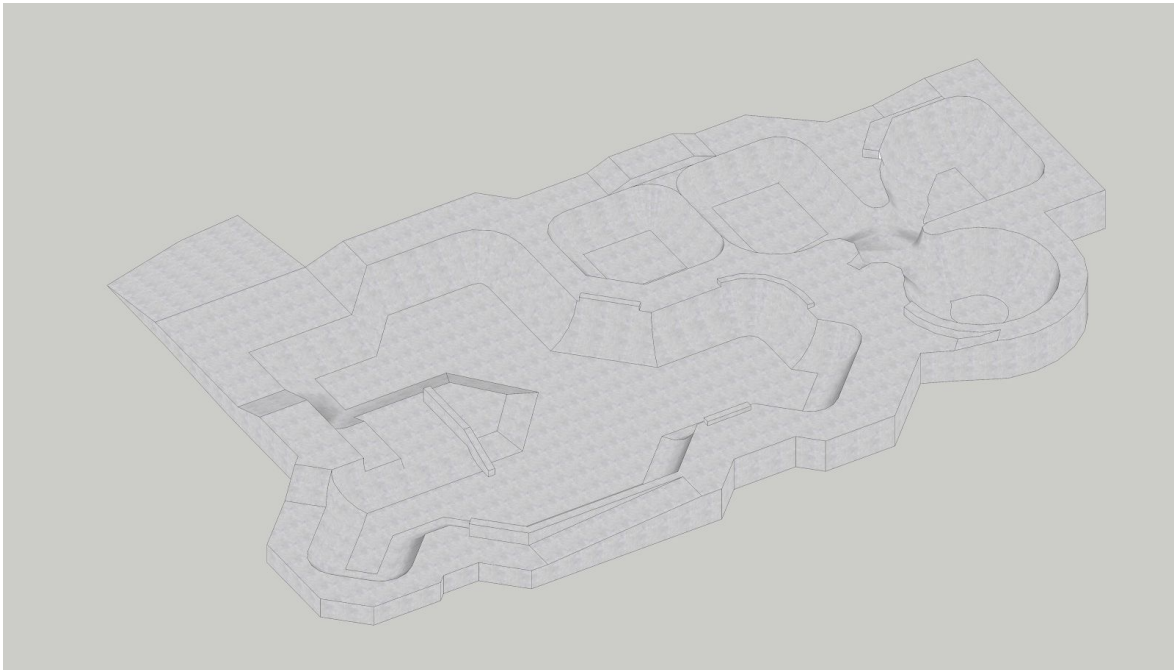
Tennis court



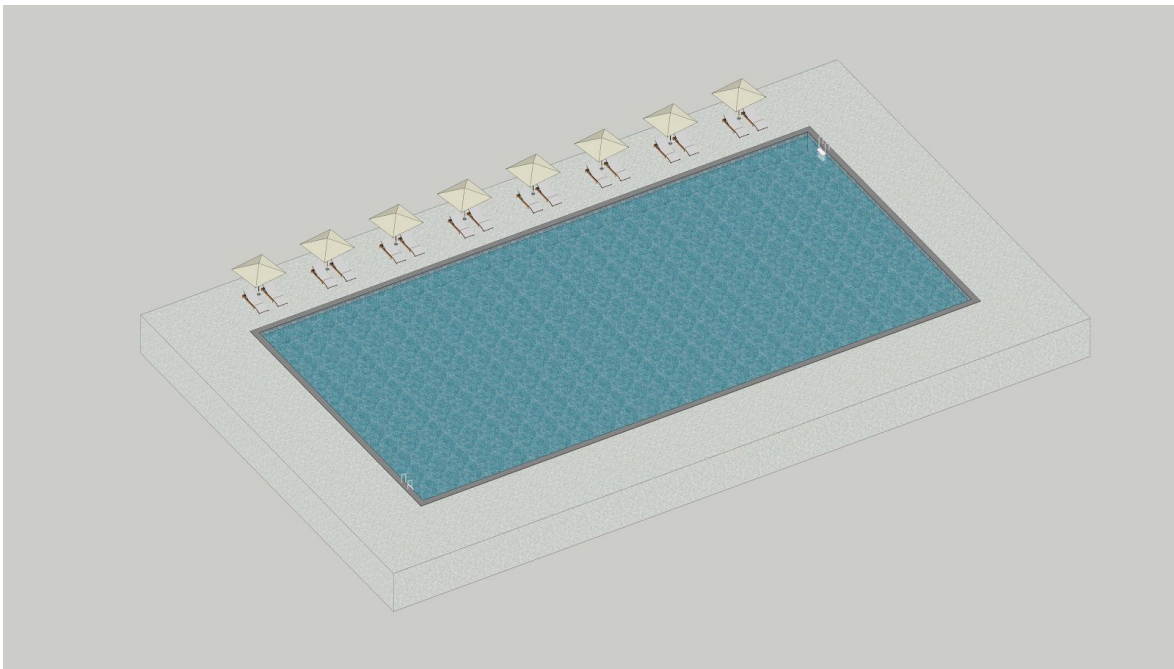
Playground



Skatepark



Swimming pool



Transportation

Cars



Bicycles



Bus



Street furniture

Benches

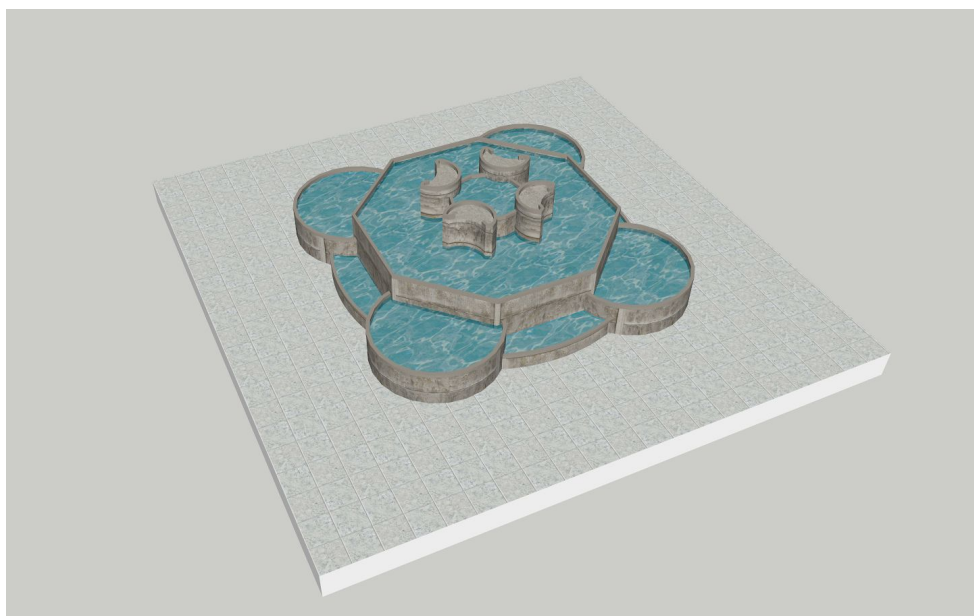
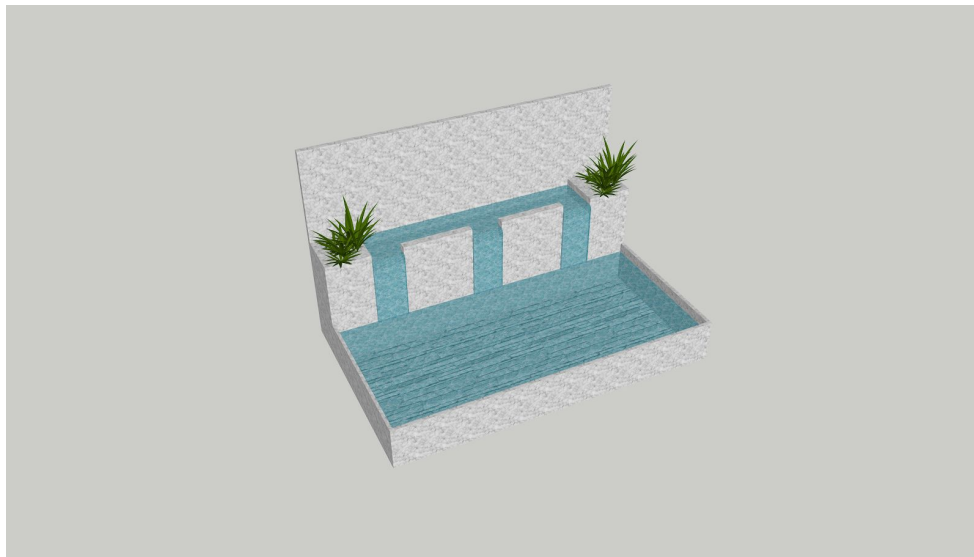


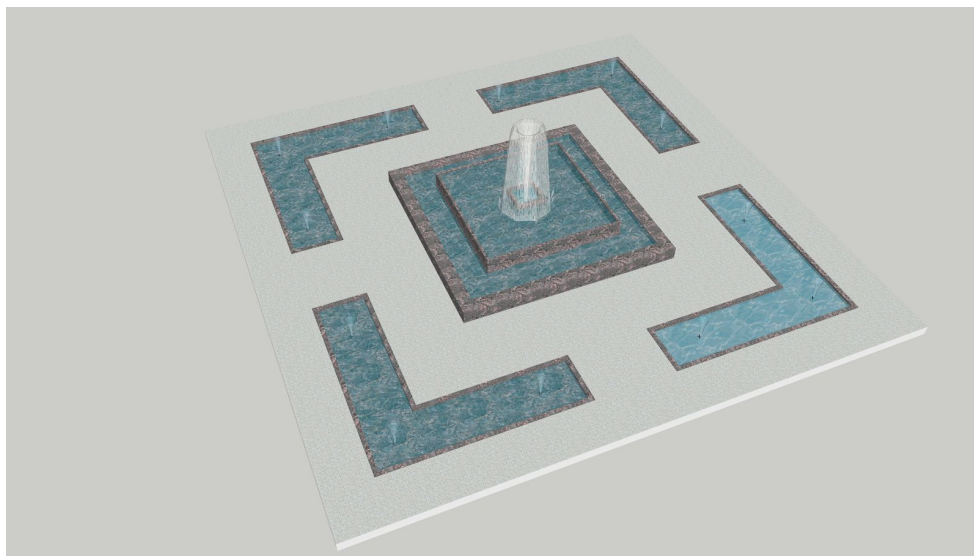
Bins



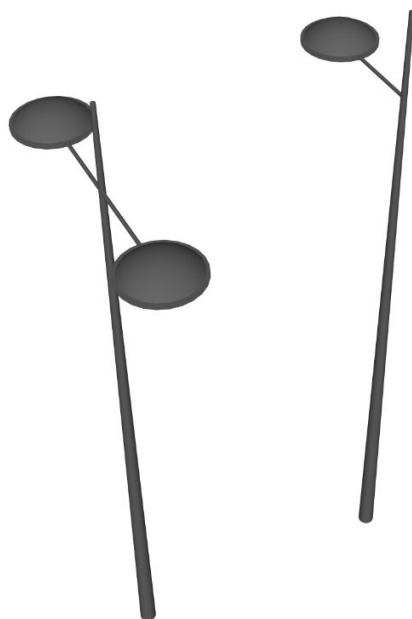


Water features





Street lights



Export formats

The Preset models and the objects are exported from Sketchup in .obj format for the Harvard team to be able to process these and generate the AR models for the SUGAR app.

Conclusions

This deliverable outlines and documents the strategy for selecting a suitable case-study through an open call at municipalities and a consultation with the key stakeholders members of the SUGAR Advisory Committee as well as the creation of the models and assets for the AR application based on that particular case study.