Web Cartography Tool for Road Safety | Pedestrian crossings in focus

Author: Charalampia Lagou | lagouc@student.ethz.ch
Advisors: MSc. Charalampos Gkonos | gkonosc@ethz.ch
Dr. Lekshmi Sasidharan | lekshmi.sasidharan@ivt.baug.ethz.ch

Supervisors: Prof. Dr. Lorenz Hurni | lhurni@ethz.ch
Prof. Dr. Monica Menendez | monica.menendez@ivt.baug.ethz.ch

Introduction

A human loss is recorded every 30 sec. on the world's roads [1]. In Switzerland, fatalities increased by 4% in 2015, comparing with 2014, while 1/3 of the pedestrian victims were killed on pedestrian crossings [2]. As far as the city of Zurich is concerned, the number of injury accidents increased by 10.9% between 2014 and 2015 [3]. According to the Police Department of the city of Zurich, there is a rise in the accidents involving pedestrians, bicyclists and e-bikers. Last year, out of the 6 citizens that were fatally injured there were 4 pedestrians, a cyclist and a public transport user [4]. Regarding safety on pedestrian crossings, there exist records of injuries and even **fatalities of pedestrians on pedestrian crossings** also in Zurich [5].

Sensibilised by the aforementioned road safety issues and within the spirit of the campaigns run by the Swiss Federal Roads Office (*Via Sicura*) and the city of Zurich (*Zebra Safari*), the objective of this Interdisciplinary Project is to **examine the aptness of the existing pedestrian crossings** in district 1 of the city of Zurich and consequently contribute towards the safety of vulnerable road users.

Methodological Approach

The assessment of the pedestrian crossings is based on the **comparison** of their geometric design, the surroundings and the prevailing traffic conditions **with a standard, that is considered as the ideal pedestrian crossing**. The main definition of such a standard is given in the Swiss Norm 640241 [6]. The rules described in the above-mentioned norm could be classified as related to the:

- Equipment (e.g. traffic signs, artificial lighting)
- Geometry (e.g. width and depth of waiting rooms)
- Location (e.g. distance from closest traffic light)
- Traffic conditions (e.g. signal controlled, speed limit)
- Visibility (e.g. visibleness of pedestrian crossing marking)

Additionally, the present evaluation takes into account the **road accidents record** as well. The reason is that the detection of pedestrian crossings that answer the description given in the norm but are related to a considerable number of accidents, could probably reveal parameters that are not accounted in these rules.

For the implementation of the rules a toolbox has been developed. Furthermore, a website was created, as well as a web map application where the results of the project are presented.

Implementation of SN 640241 Rules in ArcPy

For the implementation of the SN 640241 rules a **toolbox**, entitled *Pedestrian Crossings Assessor*, consisting of five tools has been **developed in ArcPy**. Three of these tools, namely *Geometry*, *Location* and *Traffic Conditions* are fully operational, whereas the rest are still in development.
In order to follow potential changes on the parameter thresholds set in the norm, the dialog box allows the user to change the default parameter values.

Figure 1: Snapshots of the toolbox

At the moment, the toolbox works locally, however, the goal is to embed it in the web map application as a *Geoprocessing Widget*.

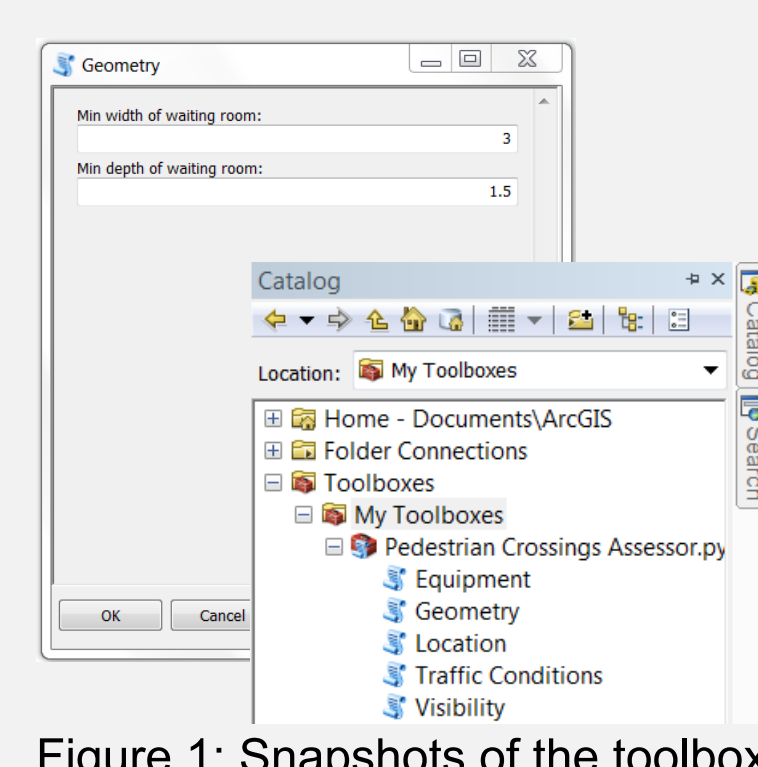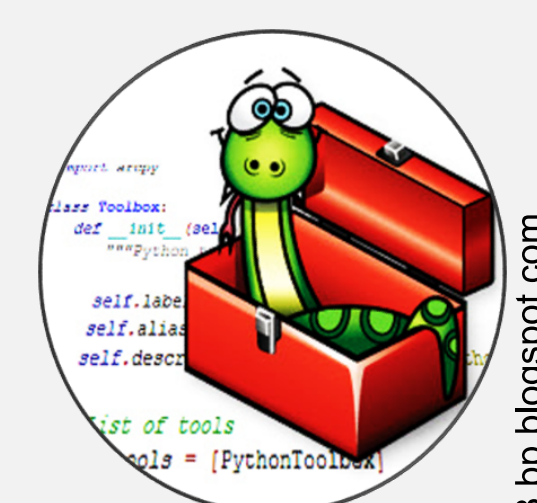## Website | Information medium for the public

In the framework of this project a **website** is created for to serve as **information medium** for the general public. The **Bootstrap** framework, supported by the main pillars of web design, namely **HTML5, CSS3, JavaScript** and mostly the **JQuery** library, are applied for the development of this page.
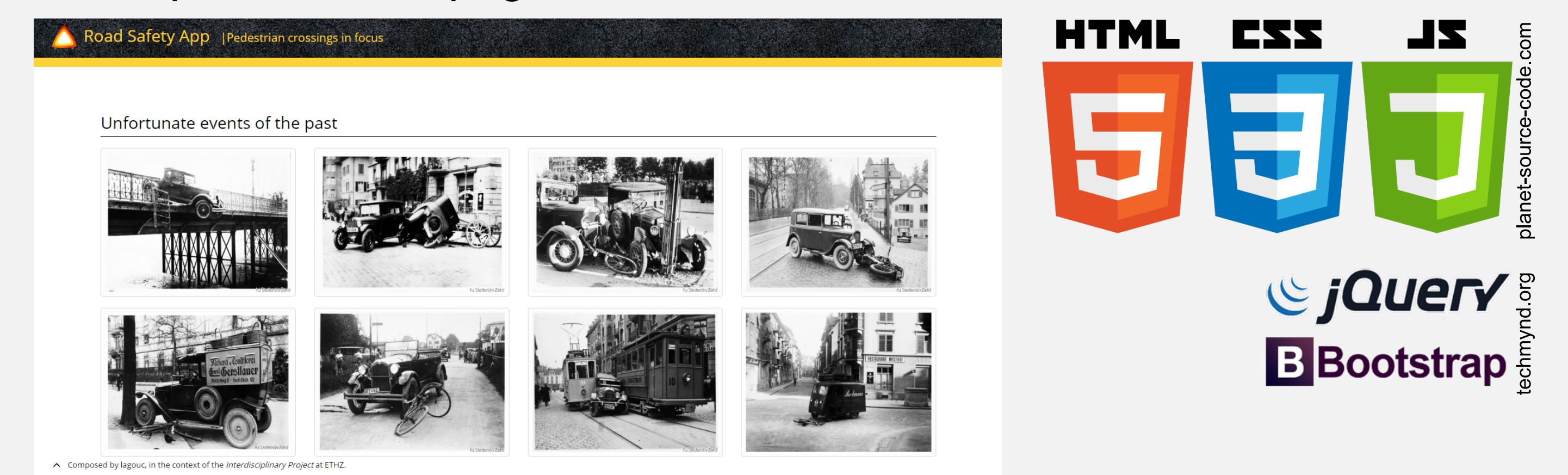

Figure 2: Snapshot of the website

Web Map Application

The **Developer's edition of the Web AppBuilder for ArcGIS** was used for the development of the **web map application**. The design of the application is responsive and its use could exceed the visualisation purposes, as tools such as measuring and buffering are added on.
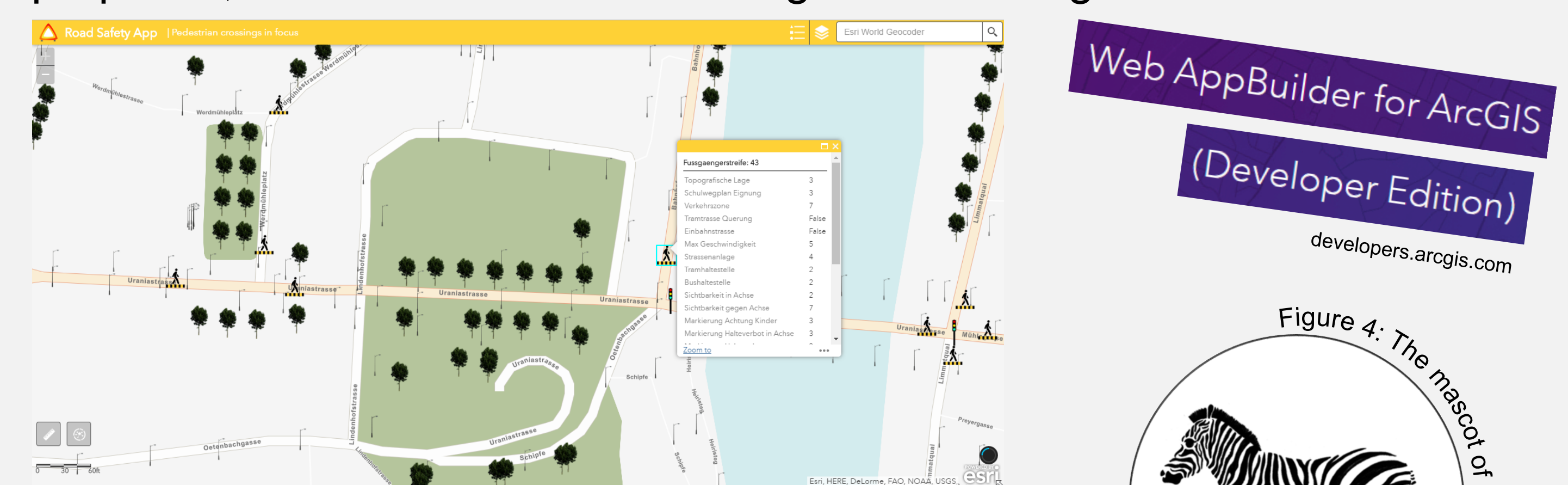

Figure 3: Snapshot of the web map application

Web AppBuilder for ArcGIS (Developer Edition)
developers.arcgis.com

Figure 4: The mascot of the app

Findings

Based on the present analysis **discrepancies** between the ideal and the actual design of the pedestrian crossings are **spotted**. **Some** of these problematic pedestrian crossings are **close to blackspots**. However, in order to argue about the spatial relation between the blackspots and the pedestrian crossings, information about the injured persons is required.
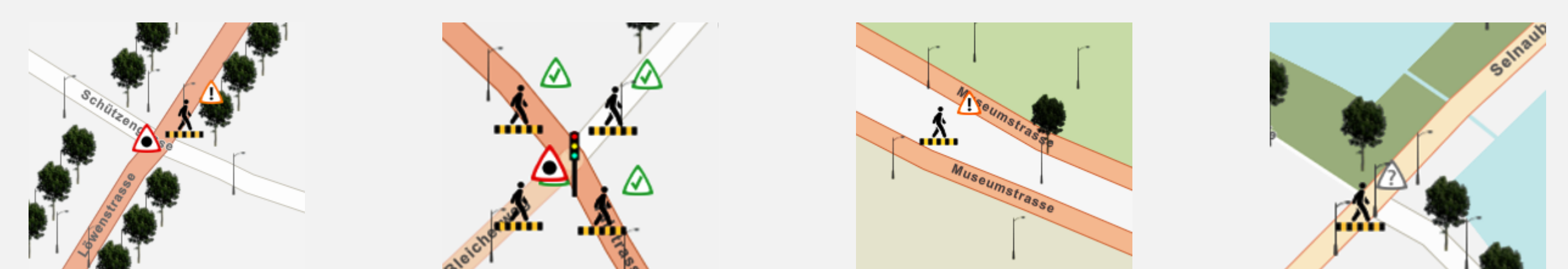

Figure 5: Snapshots of representative results

Conclusions and Future Work

The results of the present project could assist the road authorities in the detection of pedestrian crossings deviating from the norm. In the future, the implementation of all the rules given in the norm, as well as the focus on the spatial relation between the problematic pedestrian crossings and the existence of accidents would potentially uncover parameters that so far, have not been taken into account.

References

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