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Smart Cities and Security – A Preventive Approach

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Abstract. According to the International CPTED Association, Crime Prevention Through Environmental Design (CPTED) is defined as a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts by affecting the built social and administrative environment. The web platform described in this paper uses information about the built and natural environment, geolocated in a map, to produce valuable information to statistical analysis and decision making. The platform will allow authorized users to input information, free text and pictures to classify geographical spots and to create different kinds of outputs. Due to the nature of the data stored, citizens, policy makers, and other stakeholders would need a clear ethical and legal framework to produce and make use of the data and of CPTED itself. This paper also discusses some of the legal issues that may arise.

Keywords. Crime Prevention, Smart cities, CPTED, Legal issues

1. Introduction

According to the International CPTED Association, Crime Prevention Through Environmental Design (CPTED) is defined as a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts by affecting the built, social and administrative environment [4][6][7]. The web platform described in this paper uses information about the built and natural environment, geolocated in a map, to produce valuable information to statistical analysis and decision making. Potential users of the web platform are law enforcement officers, criminologists, urban planners, and decision makers. The Violence and Crime Permanent Observatory (OPVC) at University Fernando Pessoa has being doing field research on environmental factors impact on violence and crime, gathering data in the geographical area of several university campuses in Porto. The web platform and a smartphone application will allow on site and on time gathering of data for immediate processing. The organization of this paper is as follows: we review the CPTED principles and how they are used in our project; then we briefly describe the functionality of a web application to be integrated in a smart city

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environment; then we highlight some of the legal issues related to the use and misuse of the CPTED data and of the CPTED framework itself; we conclude with final remarks about these issues and planned future developments.

1.1. CPTED

CPTED is a design philosophy built around a set of principles, first defined by Ray Jeffery in 1971 [8] and by Oscar Newman in 1972 [14]. Currently, these principles are presented by the National Crime Prevention Council [13] as follows:

- Natural surveillance,
- Natural access control,
- Territorial reinforcement, and
- Maintenance and management.

When correctly applied and enforced, CPTED principles aid in deterring crime and improving quality of life. Several cities and communities around the word adopted and implemented CPTED programs [5][12]. Several versions of CPTED exist and have been developed over the years. Recently the European Committee for Standardization (CEN) published a European Standard to unify the different versions and to provide a uniform approach to CPTED, referred as the CEN 14383 series [1][2]. The standard delivers guidelines on crime prevention by urban planning and design for all types of urban environments. It seeks the answer to three questions: where, giving the exact localization of the target area; what, giving the general identification of crime problems occurring in that area, as well as the propensity of that area toward attracting crime and incivilities, anti-social behavior and generating fear of crime; and who, identifying the stakeholders involved in defining the crime problems, review them and be responsible to implement the measures to avoid or reduce crime. The CEN 14383 series includes the following publications:

1. Terms and definitions (EN 14383-1:2006)
2. Urban planning (ENV 14383-2:2003 superseded by TR 14383-2:2007)
3. Dwellings (TS 14383-3:2005)
4. Shops and offices (TS 14383-4:2006
5. Petrol stations (TR 14383-5: 2010)
6. Safety in schools (not yet available)
7. Facilities for public transport (TR 14383-7:2009)
8. Protection of buildings and sites against criminal attacks with vehicles (TR 14383-8:2009)

The standard's guidelines and strategies are used as a starting point to characterize urban spaces in the web platform, giving the end user a set of choices. Besides characterization, the user can also attach pictures and observations; upon use of the mobile application, that information is readily geo-tagged.

1.2. The LookCrim application

The LookCrim application gathers geo-tagged information enriched with the CPTED characteristics. The application stores diverse kind of data about locations for further

analyses to be performed by several stakeholders. It is expected that the LookCrim application can be fully used in the future as a companion tool to enforce the standard and to help in urban design. Several scenarios and possible applications are described in [3][9][10][11]. Additional guidelines and recommendations are provided in [13][15][16]. They helped contextualize and guide the design of the web application.

The following sections describe the mock-up of the application, highlighting some of its functionalities.

2. The LookCrim application

The LookCrim application will allow a spatial-temporal study of crime based on CPTED categories. By making easier for professionals and decision makers to understand when and where crime occurs comparing to the CPTED categories, the application will be a valuable tool and can be used to inform future urban and environmental design decisions.

2.1. The web application

Figure 1 shows the landing page of the application after login. The user is shown the map of the region with markers for all CPTED registered in that area. This view can be improved by adding filters for types of events, dates, or user for example.

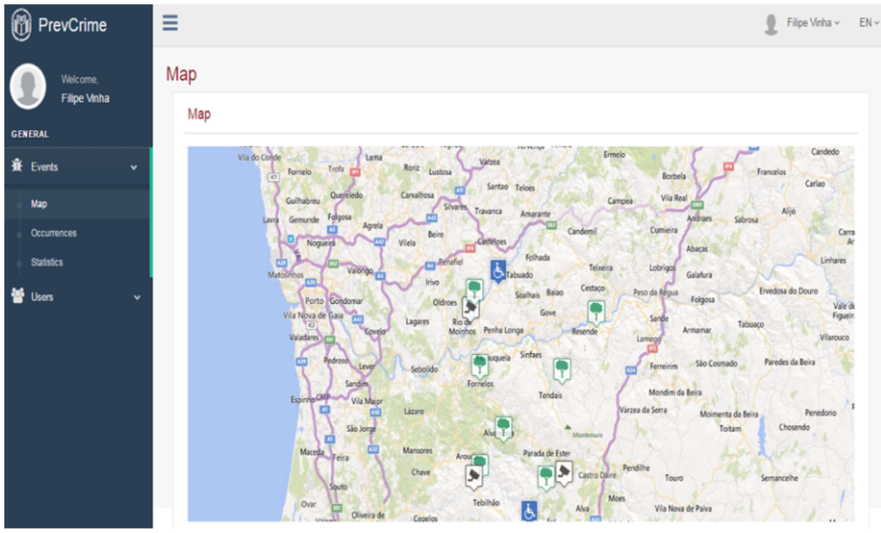

Fig. 1. The map with markers.

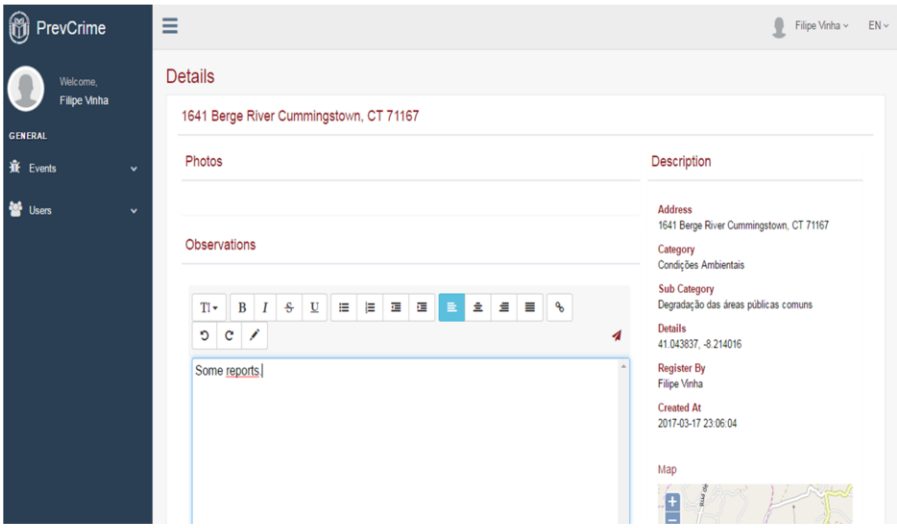

Fig. 2. Entering details for an event.

Figure 2 shows a screen with details for an occurrence. Completing the details and adding pictures is a task that can be performed at any time and helps improve the quality of information.

There will be several authorization levels in the platform, so that only some users will be able to monitor and edit the entered data. An administrator will manage permissions and users.

3. Legal issues: an overview

As CPTED has a strong connection to city planning, some of the implications for planning and policy development should be addressed. Some authors [18] discuss the "dark side" of the CPTED, by analogy to the dark side in planning and architecture. This dark side in planning refers to the vision of planning as an oppressive mechanism of social control. The authors argue that given that CPTED has close links to planning, its dark side should also be analysed.

Although we understand the concerns, we should point out that CPTED in itself, if used properly, that is, respecting the fundamental rights enshrined in legal instruments such as the Charter of Fundamental Rights of the European Union and the Portuguese constitution, could prove to be an invaluable instrument to crime prevention. The key issue here is to strike a delicate balance between security, liberty and privacy, maximizing to the extent that is possible each one of these values without denying their fundamental core. It is a difficult task, but not an impossible one.

Besides this overarching issue, others arise from the CPTED:

- Should the CPTED database be opened to all citizens? Should citizens access all CPTED information concerning their neighborhood? Could this bring some form of discrimination based on lack of or of excessive crime prevention?

- Smart cities make extensive use of open data. Should the CPTED data be open to all?

- Who is liable for wrong or biased CPTED markers? Would, in a security-based society, the CPTED be used to influence security decisions, eventually not necessary?

- How can citizens or other actors participate in the CPTED classification of the city and analyze and modify CPTED decisions?

Those and other legal issues of CPTED are central to their correct application, evaluation and assessment in a smart city context. All stakeholders should be able to participate in the process and benefit from its use. For this to be a reality the identified legal issues should be taken care of and a clear framework defined.

4. Conclusion

The LookCrim application has characteristics derived from the CPTED perspective. By gathering geo-tagged information, the application's outputs should prove to be an invaluable tool for several stakeholders, namely those involved in urban designing and law enforcement. It is a work in progress not only from a technical point of view, but also from a legal. The path to the creation of the application gave origin to some concerns of legal nature, namely privacy, security and possible discrimination, which will be addressed throughout the project.

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