Innovative policies for improving citizens' health and wellbeing addressing indoor and outdoor lighting

Deliverable D1.2
City level Lighting and Health Maps

Contractual delivery date:
M12: 28.02.2022

Actual delivery date:
M12: 28.02.2022

1st update
M23: 20.01.2023

Lead beneficiary:
P12-TEC

The ENLIGHTENme project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 945238.

Grant agreement no.	H2020 - 945238
Project full title	ENLIGHTENme - Innovative policies for improving citizens' health and wellbeing addressing indoor and outdoor lighting

Deliverable number	D1.2
Deliverable title	City level Lighting and Health Maps
Type / Nature	☐ R - Document, report (excluding the periodic and final reports) ☐ DEM - *Demonstrator, pilot, prototype, plan designs* ☐ DEC - *Websites, patents filing, press & media actions, videos, etc.* ☒ OTHER - *Software, technical diagram, etc.*
Dissemination level	☐ Public (PU) ☐ Confidential, only for members of the consortium and the Commission Services (CO)
Work package number	WP1
Work package leader	TEC
Primary Author(s) *(in alphabetical order)* **& ORCID if available**	Mauricia Benedito (TEC) Aitziber Egusquiza (TEC) Adrian Glodeanu (TEC)
Other authors *(in alphabetical order)* **& ORCID if available**	
Reviewers *(in alphabetical order)*	Elisa Conticelli, Giulia Marzani (UNIBO)
Language	English
Keywords	

The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 945238.
The author is solely responsible for its content, it does not represent the opinion of the European Commission and the Commission is not responsible for any use that might be made of data appearing therein.

HISTORY OF VERSIONS

VERSION	DATE	CHANGE (S)	SECTION
01	28/02/2022	First version submitted	
02	20/01/2023	As requested by the reviewers the following paragraph has been included: "The main common resolution for the three cities was the district scale, as it was stated in the DoA. But having in consideration that statistic information can be available in more detailed scale than district, we asked the three cities to provide the information in a more detailed scale when possible. From the three cities, the only one that provided statistic information at lower scale was Amsterdam, (wijken scale). This more detailed scale could serve to understand better the differences among district sub-areas. Any case, the common base for calculating indicators for the three cities is the district, having in mind that the study has to guarantee comparability among the considered cases study."	Pag 7

Table of contents

1 Introduction

ENLIGHTENme platform has the aim to gather and systematize existing knowledge about the impact of lighting policies and innovative interventions, both indoors and outdoors, on people's health and wellbeing. This knowledge is available on the Urban Lighting and Health multiscale Platform, a WebGIS-based platform organized into three levels (worldwide ATLAS of best practices, city level Urban Lighting and health maps and district level 3D models of the target districts). This deliverable aims to describe the second one, which consists of maps generated for the three cities to visualize indicators and correlations related to the domains identified in T1.4:

- socio-economic determinants,
- urban/lighting patterns,
- lighting detection from satellite
- population health status and mental wellbeing

These maps will allow the identification of the shortlist of districts that will be used as the base for the selection of the target districts (D1.4).

In Task 1.2 the general architecture and the main components of the ENLIGHTENme Urban Lighting and Health multiscale Platform were defined and included the upkeep of the platform during the whole duration of the project to guarantee its operability and reliability. The identified user requirements have been the baseline for the ENLIGHTENme platform. The Task 1.4 has implemented these Urban Lighting and Health maps in the platform. This deliverable describes the functionality and structure of these maps and provides the link to the platform. D1.4 ("Short list of districts") will describe the followed methodology to build the maps and the analysed results.

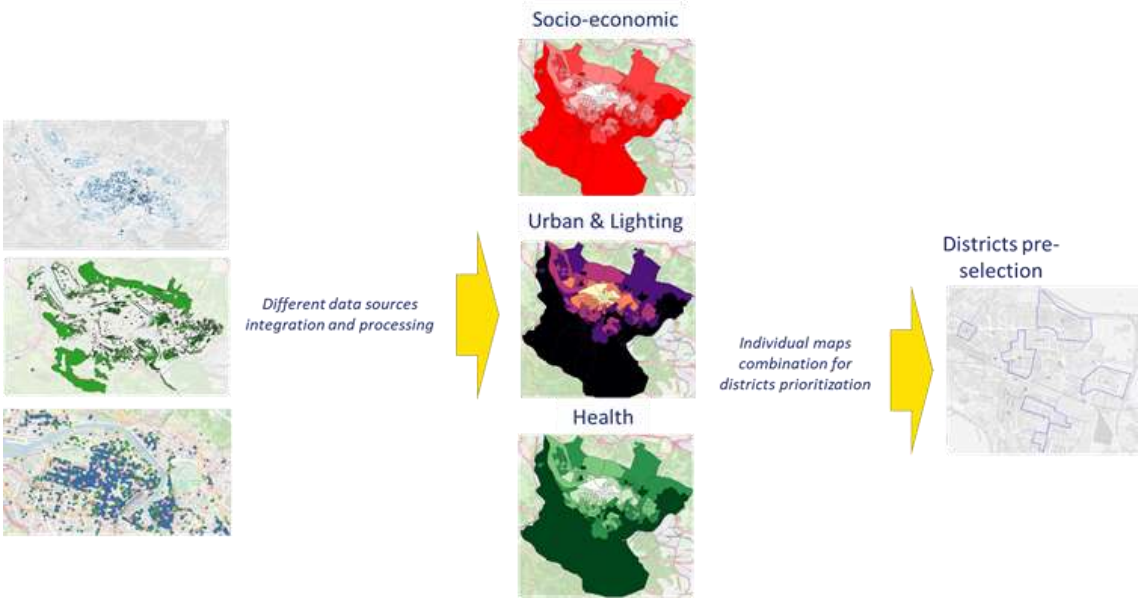

Figure 1: The three levels of the platform

2 Description of Activities

As first task, the general architecture, and the main components of the ENLIGHTENme Urban Lighting and Health multiscale Platform that were defined in task T1.2 were reviewed. The user requirements identified in that task have been the baseline for the implementation of the ENLIGHTENme platform.

In Task 1.2 it was documented that regarding the ENLIGHTENme Urban Lighting and Health multiscale Platform the researchers showed interest in the city maps regarding two aspects:

- To facilitate access to economic, health, social, urban infrastructure/lighting data, since this permits the calculations of correlations between data if possible, as well as extracting specific and often geo-located data.
- To seek aggregate and disaggregate data on urban health, lighting, and urban features (socio-economic, functional, physical, etc), which are not easily available elsewhere, in order to allow making a more efficient comparison among the different districts.

These researchers required accessible and relevant indicators. In particular, easy access to economic, health, social, urban infrastructure/lighting data. Moreover, when possible, new or relevant indicators and statistics that describe and correlate different aspects (health status, urban features, socio-demographic state) would be considered helpful.

In the case of the ENLIGHTENme cities, the interest was related to:

- urban planning and the analysis of the city,
- utilizing the work as an instrument to understand correlations and to plan the related interventions,
- raise awareness of the current situation in the field,
- have specific feedback on districts' scenarios in order, then, to plan tailor-made interventions.

In addition, cities were interested in the application of ENLIGHTENme Platform to identifying gaps and critical aspects to be considered at the participatory processes level and to improve or to have access to the monitoring of the environment.

In order to follow the user requirements of both groups it was decided to include three categories of maps:

- **Index maps**: where the final indexes for each domain (socioeconomic, urban, lighting and health) have been mapped.
- **Indicator maps:** where the selected indicators (see Table 1) are mapped.
- **Other maps:** that include diachronic maps for socioeconomic indicators (the only indicators with historical data), urban and health facilities map and lighting maps (including satellite maps and lamps maps). The list of include maps can be found in Table 2.

The mapped indicators and indexes are the key elements to identify inequalities at urban level and to select priorities in interventions (WP2). In the Table 1 below a list of indicators that can be seen in the online visor is available.

Table 1: Llist of mapped indicators for domain

SOCIOECONOMIC INDICATORS
Variable
Population over 65 years old
Population non born in the country
Income
Population density
Inhabitants per dwelling
Sex ratio
Low education
Unemployment
Not from EU27
Single persons per house
Single persons per house over 65 years old
Rent
URBAN INDICATORS
Green areas per capita
Accessibility to green areas
Mix uses
Variety of uses
Health services per capita
Education services per capita
Cultural services per capita
Accessibility to cultural services
Sports facilities per capita
Shops and restaurants per capita
Accessibility to green areas
Accessibility to public transport
Accessibility to health services
Accessibility to cultural services
Mix uses
Variety of uses
LIGHTING INDICATORS
Power of lamps
Percentage of LED
Color temperature
HEALTH INDICATORS
Parkinson
prev_parkinson
Dementia
prev_demenze

Brest cancer
prev_brest
Melanoma
prev_melanoma
Lung cancer
prev_lung
Prostate_cancer
prev_prostate
Diabetes
prev_diabete
Myocardial infarction

In the case of urban and light maps the end user can check information related to the different components of the indexes including data about facilities, public transport network or the composition of the lighting system in the city. In the Table 2 below there is more detail.

Table 2: List of other maps

URBAN AND HEALTH MAPS
Bus stops
SFM stops (Railway Service of Bolonia)
Green áreas
Sports
Shops and restaurants
Health
Education
Culture
LIGHT MAPS
nightime
color of lamps
type of lamps
power of lamps

The main common resolution for the three cities was the district scale, as it was stated in the DoA. But having in consideration that statistic information can be available in more detailed scale than district, we asked the three cities to provide the information in a more detailed scale when possible. From the three cities, the only one that provided statistic information at lower scale was Amsterdam, (wijken scale). This more detailed scale could serve to understand better the differences among district sub-areas. Any case, the common base for calculating indicators for the three cities is the district, having in mind that the study has to guarantee comparability among the considered cases study.

3 Results

These city maps are available in the following link: https://projects.hei-tecnalia.com/ENLIGHTENME/

4 Deviations

Due to lack of historic data only socio-economic domain has diachronic maps.

5 Conclusions

Following the user requirements defined in task T1.2 defined, the Urban and health Maps have been developed and deployed in the ENLIGHTENme platform, where the collected information about the three cities is structured and available. This compilation of maps makes it easier to manage the information and makes it more usable and available for the different actors involved (civil society, enterprises, or cities). Socioeconomic determinants, urban/lighting patterns, lighting detection from satellite and population health status, and mental wellbeing indicators are available for the three areas.

After taking into account cities' and researchers' criteria, interests, and regards and after doing all the calculations and taking the design decisions an online web functional viewer is ready to be used: https://projects.hei-tecnalia.com/ENLIGHTENME/

6 References

Not applicable