Interreg
CENTRAL EUROPE
Dynamic Light

WORK PACKAGE 2
D.T2.1.3

GIS-based databases for municipalities

Version 1 HRO
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GIS-BASED DATABASE FOR MUNICIPALITIES

The Hanseatic City of Rostock is located in the north-east of Germany. With 207.492 inhabitants (2016) it is the most populous city in the federal state of Mecklenburg-Western Pomerania. Rostock is classified both, cultural and economic, as a significant city in the south Baltic Sea area. The urban area stretches 16 kilometres along the river Warnow to the estuary mouth of the Baltic Sea. Rostock is characterized by its location by the sea, its harbour, a lively and cosmopolitan cultural scene and the University of Rostock.

1. DATA ACQUISITION/SURVEY AND COLLECTION OF DATA

1.1. Data sources and methodology used

The Hanseatic City of Rostock is the owner of the street lighting and responsible for the illumination of the municipality. In order to ensure a functional and comprehensive lighting, the Hanseatic City of Rostock cooperates with a communal service provider, who is responsible for the build-up and timeliness of the database, as well as the maintenance service for street lighting.

Municipalities and utilities need to be able to use network data efficiently and without restriction. With the aim of creating a complex database the municipal utility of Rostock began the digitalization of data and the development of a professional net management solution, called “sisNET”.

The project relevant GIS data were taken by the existing GIS tools of the Hanseatic City of Rostock.

1.2. Structure and naming of data

The existing GIS database provides the users all necessary information about the lighting infrastructure in the city. In addition to geographical data, organizational information also can be stored and managed.

Each lighting installation delivers information and data which are separated into five masks. Furthermore the system provides technical information about cabling under the surface.

luminaire data	pole data	arm lamp base data	switchboard data	cabling
location (coordinates, steet name, postal code)				
pole number			switchboard number	
type	pole-id	arm-id	switchboard-id	type
luminaire type	type	type	total wattage	length
manufacturer	manufacturer	manufacturer	year of installation	cross section
mirror system	date of installation	date of installation		
number of luminaires	date of renewal	number of arms		
art of luminaire	material	art of arm		
cover glass	mast height			
lamp power	nominal height			
luminaire flux	distance to pole			

Table 1: overview of the existing database

For a direct and simplified assignment of the luminaires, the pole-ids are composed as follows: 109-37-3-8

last three numbers of the postal code	109 (18109 postal code of Groß Klein)
switchboard number	37
switching circuit	3
number of luminaire	8

This unique pole-id is fixed to the pole using a metal strap, which is attached at eye height. So, in case of failure or interference attentive citizens have the possibility to inform about it.

The employees of the city as well as the municipal utility of Rostock know immediately which light is defective and can arrange the repair or exchange.

Currently no measurement of photometric data is carried out. The comparison of light power is made by comparing the technical data sheets. For an optimal use, the illumination of new plants is calculated by an external light planner. So over and under-lit areas can be excluded initially.

1.3. Software

The Hanseatic City of Rostock has entered into a long-term maintenance contract with the municipal utility. Therein the municipal utility is responsible for the maintenance of all lighting installations as well as for the data acquisition. In order to the contract the Hanseatic City of Rostock has a user license for the GIS-database “sisNET”.

In addition, the Hanseatic City of Rostock has an own database, called “Geoport.HRO”, which has an extended accessibility.

Both systems have the same data pool and are up-to-date by a weekly comparison.

1.3.1. sisNet

“sisNET” is the geographical information system, which is used for the internal documentation of technical infrastructure. The collection and maintenance of the data is in the responsibility of the municipal utility.

The data were recorded and entered gradually over several years. The geo-data were firstly taken by the general measurement plans. With help of this planning basis, the cables were located and precisely measured. The position of the corresponding lights were also measured and integrated. Within 5 years the whole inventory of about 20.000 luminaires and 800 km cable network was covered.

The data recording was governed by the initial measurement and design guidelines of the Hanseatic City of Rostock. These regulations are still in use and apply to all new installations as well as for the renewal of older facilities to ensure a uniform data processing.

Current data of renewal or repair actions are checked by the municipal utility. Following the data is manually entered and available for the users to ensure the actuality and correctness of the database.

The question of the property of the data is problematic. Currently, the data belongs to the municipal utility and is provided via individual licenses to the city.

These licenses are offering the possibility to inform about the position in cases of errors or in the context of building projects and general technical facts, like e.g. light spot number, manufacturer or luminaire type. So that arrangements can be implemented quickly.

The following figure shows which data can be taken from “sisNET”. Particularly important are besides the technical information, the date of construction and the owner.

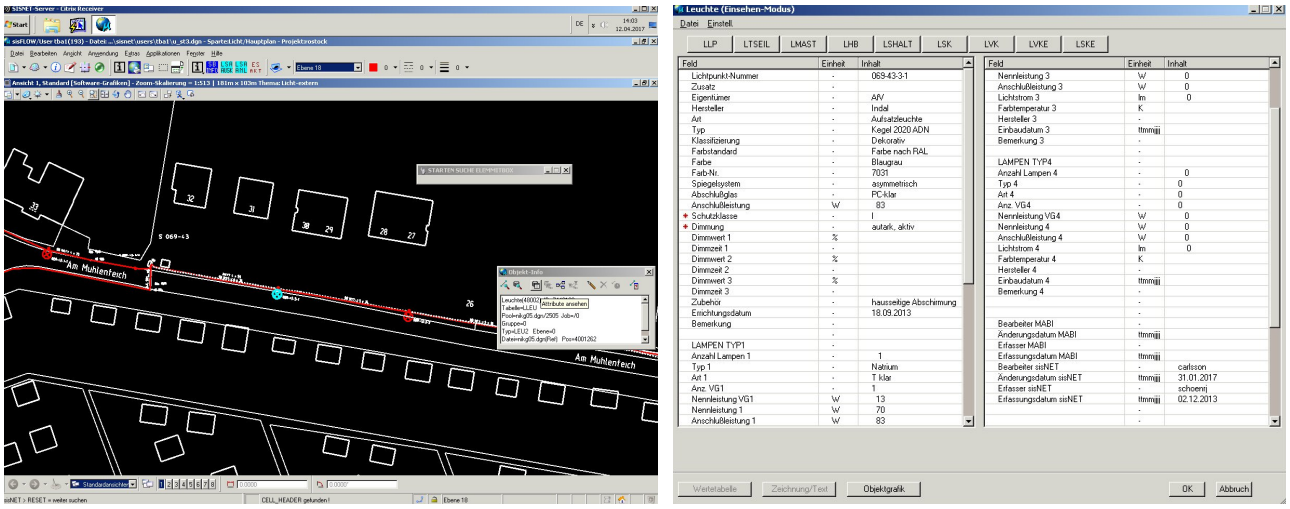

Image 4: Example of the GIS-surface and the GIS-data „sisNET“ of Rostock

1.3.2. Geoport.HRO

“Geoport.HRO” is an internal gateway for research and presentation of functional geo-data. It allows a fast access to various room-specific data, like e.g. current city maps, aerial photos, property maps and the location of urban infrastructure facilities.

In contrast to “sisNET”, this system is freely accessible for the internal staff of the Hanseatic City of Rostock. With exception of individual data, the citizens can use the system too.

In order to avoid high expenditures and to keep the data up-to-date, the data is getting a weekly update by the system of the municipal utility.

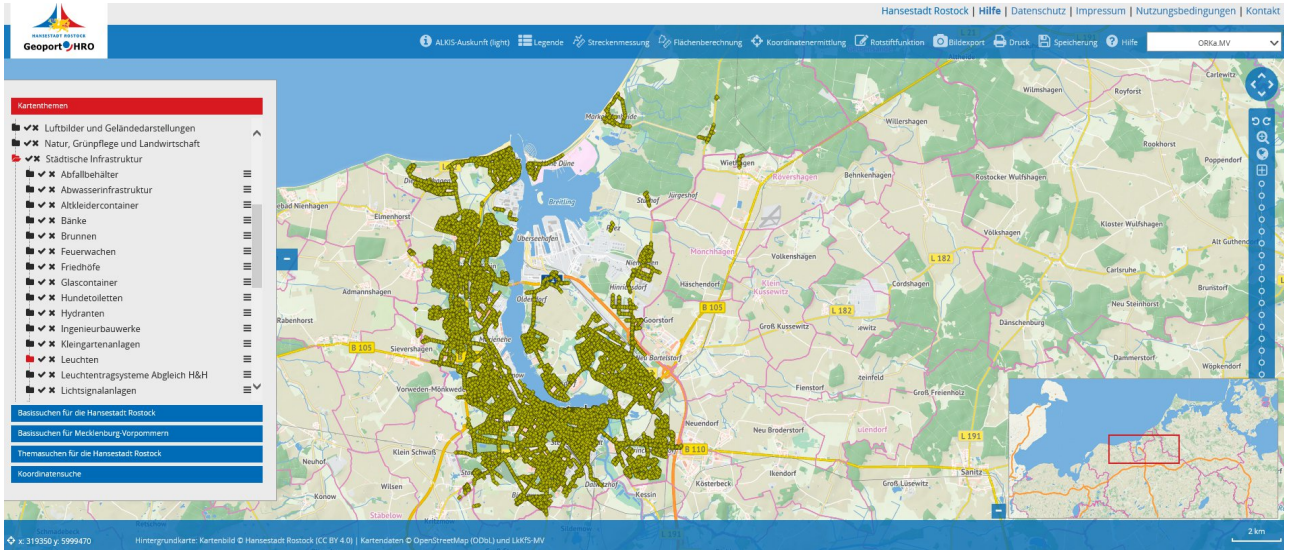

Image 5: Example of the GIS-surface and the location of luminaires in „Geoport.HRO“

2. VISUALIZATION OF THE COLLECTED DATA

The collected area of GIS database is located in the north-west of Rostock and covers parts of the two districts Groß Klein and Warnemünde. The picked data points were collected around the pilot area. Therefore it will help to identify the lighting requirements which are asked for the future pilot installation along the pedestrian and cycle track at “Werftallee”. The aim is to illuminate this path so dynamically that it fits into its surroundings.

The following figure shows the lighting locations around the pilot area. In the middle is an area which is unlit, so far.

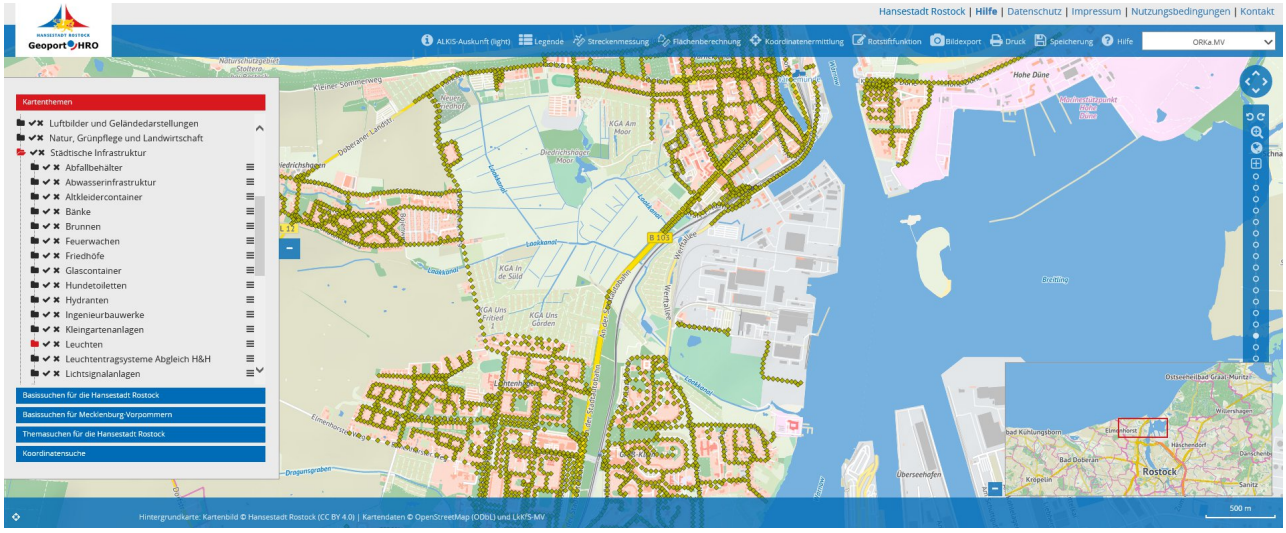

Image 5: Example of the GIS-surface „Geoport.HRO“ arround the pilot area

The collected data, luminaire, photometric and switchboard data, were summarized in an attached excel table.

3. Future use of the GIS database

The aim is to expand the collected data to a complex streetlight management system.

Currently the GIS system is maintained manually. Therefore, extended data acquisition is only possible via developing a network.

Future trends will implement the system more open. The implementation of dynamic lighting solution is the first challenge. It is necessary to integrate sensors and to build up communication between the single luminaires to link them up. Further, smart city visions need open interfaces, to extend the luminaires by a variety of modules.

In further progress of the project (D.T1.2.2 and D.T3.2.7) a dynamic lighting solution will be implemented with the use of radar sensors. Corresponding software should help to control the lamp and offers monitoring of energy consumption and user frequency.

It is to investigate how far this can be integrated into existing GIS databases and how this can be useful.

3.1. Impact and benefits of the tool for the concerned territories and target groups

The main target groups are the employees of the administration and the employees of the communal service provider, who are responsible for maintenance and service of the luminaires.

Besides “Geoport.HRO” the Hanseatic City of Rostock has a second system, called “Klarschiff.HRO”.

In “Klarschiff.HRO”, problems and ideas relating to the public space of the Hansestadt Rostock can be reported by citizens on an interactive map and can be handled by the employees of the administration as well as by the commissioned companies.

Both programs are available to citizens on the city's website. Together, they are a kind of public system to detect failures in practice and to place ideas and wishes into the urban planning of the city.

In addition, the system facilitates the collaboration between the city and its service provider. So it is possible to match the work on individual luminaires also by mail or telephone and not even on site.

3.2. Sustainability of the tool and its transferability to other territories and stakeholders

GIS databases provide an overview to the existing lighting standard. They are used to analyse the lighting situation (D.T2.2.1) and to recognize places with insufficient lighting at first glance.

In the next steps GIS databases are basically to identify energy saving potentials and to reduce costs as well as CO_2 emissions.

If GIS systems will be implements over the entire surface, characteristic lighting values can be compared and a classification as well as a valuation of different luminaire technics can be carried out.

3.3. Lessons learned from the development/implementation process of the tool and added value of transnational cooperation

The cooperation with international partners of the project has shown that the current GIS system of the Hanseatic City of Rostock is a very good base. It was helpful to see what possibilities other systems offer and which potentials can be implemented with the own system. But it has clearly shown the boundaries, too.

The further exchange will help us to improve our database, to classify which data extension is important and necessary and how to implement the communication of luminaires and systems.