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Creating a holistic view on the situation of historic parks and gardens

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Extreme weather events due to climate change not only affect nature, but can also impact historical buildings, collections, and historic parks and gardens. Assessing the extent to which cultural heritage is threatened by such weather and climate events is an interdisciplinary task that requires the collaboration of experts from heritage preservation and restoration, climate research, natural and engineering sciences, social and economic sciences, landscape architecture, informatics, and more.

Due to this complexity and the abundance of available information, modern IT tools are crucial in explaining the condition of cultural heritage sites to decision-makers and providing insights into future developments. To get a better understanding of the situation of historic parks and gardens, a knowledge platform can offer map-based visualization of data. The biggest challenge in developing such a platform was the integration and processing of relevant data. Due to the interdisciplinary nature of the field and the heterogeneity of the data, it was designed to be able to flexibly integrate and process various types of data. For example, the platform incorporates:

- (Live) sensor data,

- Severe weather risk maps,

- Climate projections and models,

- Expert knowledge incl. tree cadasters,

- Image and video materials, and

- Unstructured documents

This integration aims to provide users with a comprehensive view of their properties.

As part of the project, soil moisture sensors were deployed in Sanssouci Park in Potsdam Germany to monitor soil moisture levels over an extended period of time. These sensors allow for the measurement of soil moisture and temperature at a depth of one meter. A total of 10 sensors were placed at representative locations to provide insights into the irrigation needs of the

property. The sensors transmit their data using LoRaWAN (Long Range Wide Area Network), a wireless communication technology that can reliably transmit smaller amounts of data over long distances with low energy consumption. Given the vastness of the Sanssouci Park case study, this approach is suitable as it allows the sensors to be placed in relevant locations without having to consider technical constraints.

The collected data is stored using a FROST server, which is an open-source software project that enables the capture of time series data, including their metadata. The FROST server implements the SensorThings API, a standard of the Open Geospatial Consortium, which aims to standardize the description of sensor data and simplify their reuse. For the visualization of the captured sensor data, a map view has been developed that allows for the positioning of the sensors and the display of their measured data.