BODAH STEERING COMMITTEE MEETING
Glasgow 17th and 18th November 2022

Presentation on delivery of WP5 - WP5: Data Measurement and Analysis

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Blackrock Castle Observatory

The MTU pilot site is **Blackrock Castle Observatory.** It's a castle built in 1604, on the banks of the River Lee at Cork harbor.

The castle currently houses a functioning observatory and is home an award winning visitor centre.

The annual average number of visitors to the castle is normally in excess of 25000 per annum.

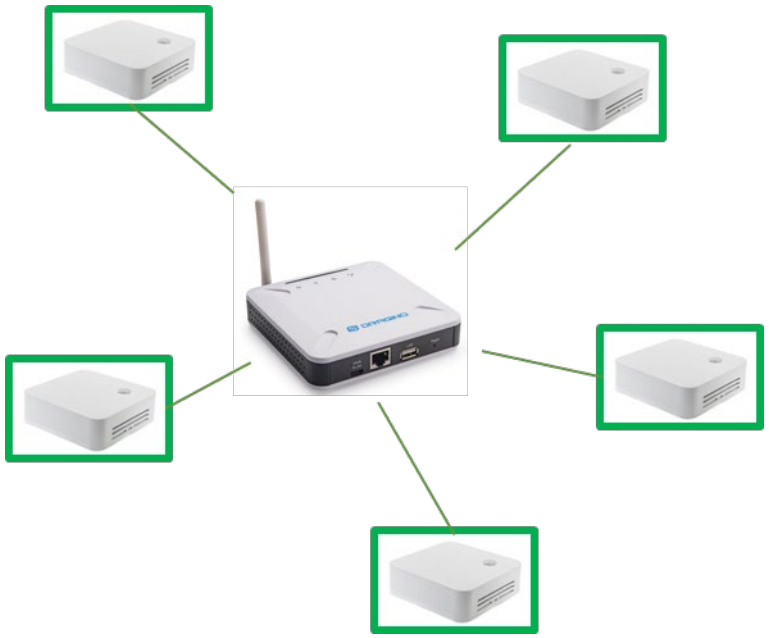
Blackrock Castle Observatory

The visitor centre aims to teach visitors about science and the universe.

Exhibitions range from details about the constellations in the night sky, to the planets in the solar system to the composition of comets.

In particular BSO were interested in a **non-intrusive method** of monitoring the popularity and level of engagement of the various exhibits in the visitor centre.

Blackrock Castle Observatory

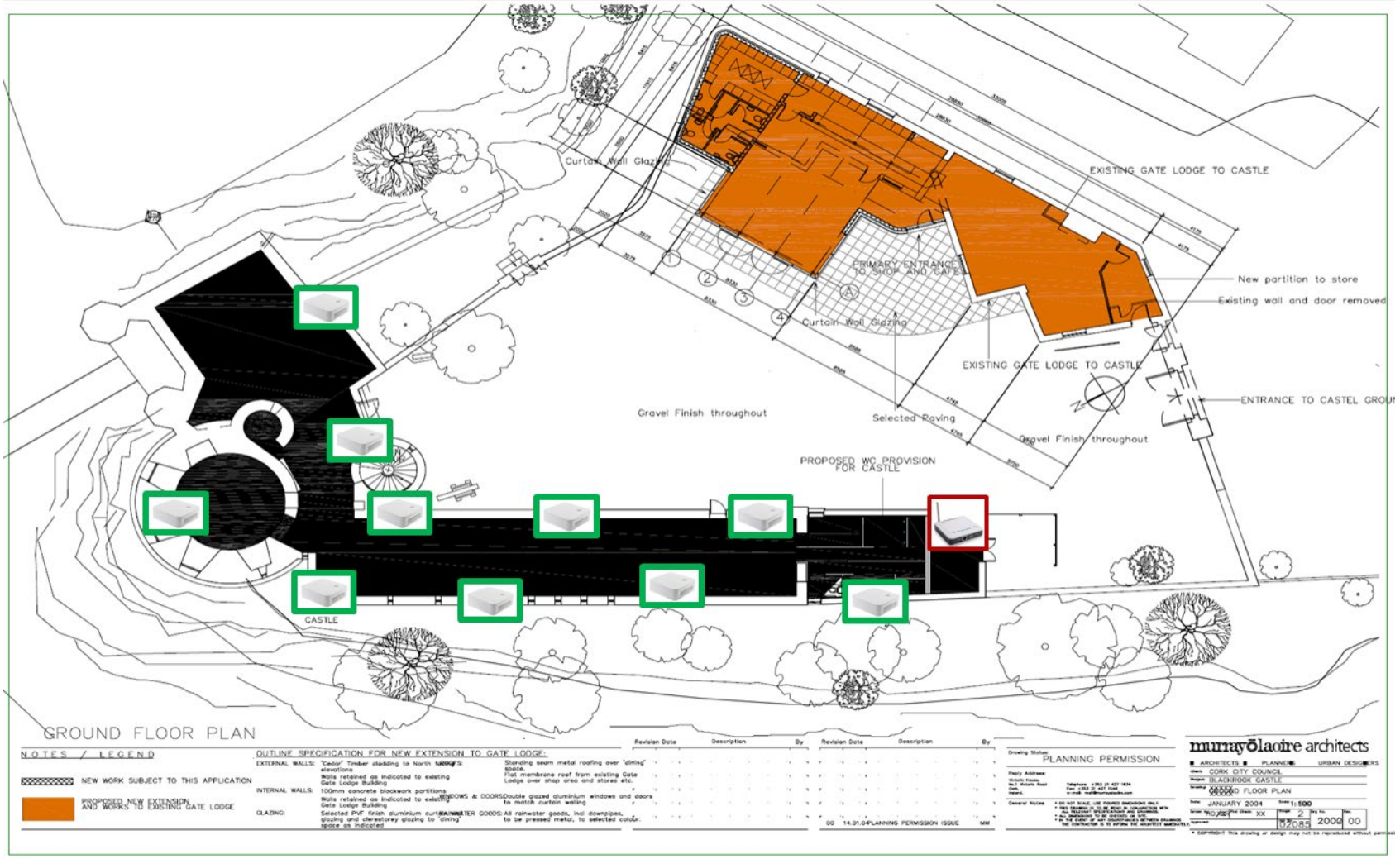


As part of the BODAH project we deployed a **LoRaWAN** wireless sensor network on the ground floor of the castle .

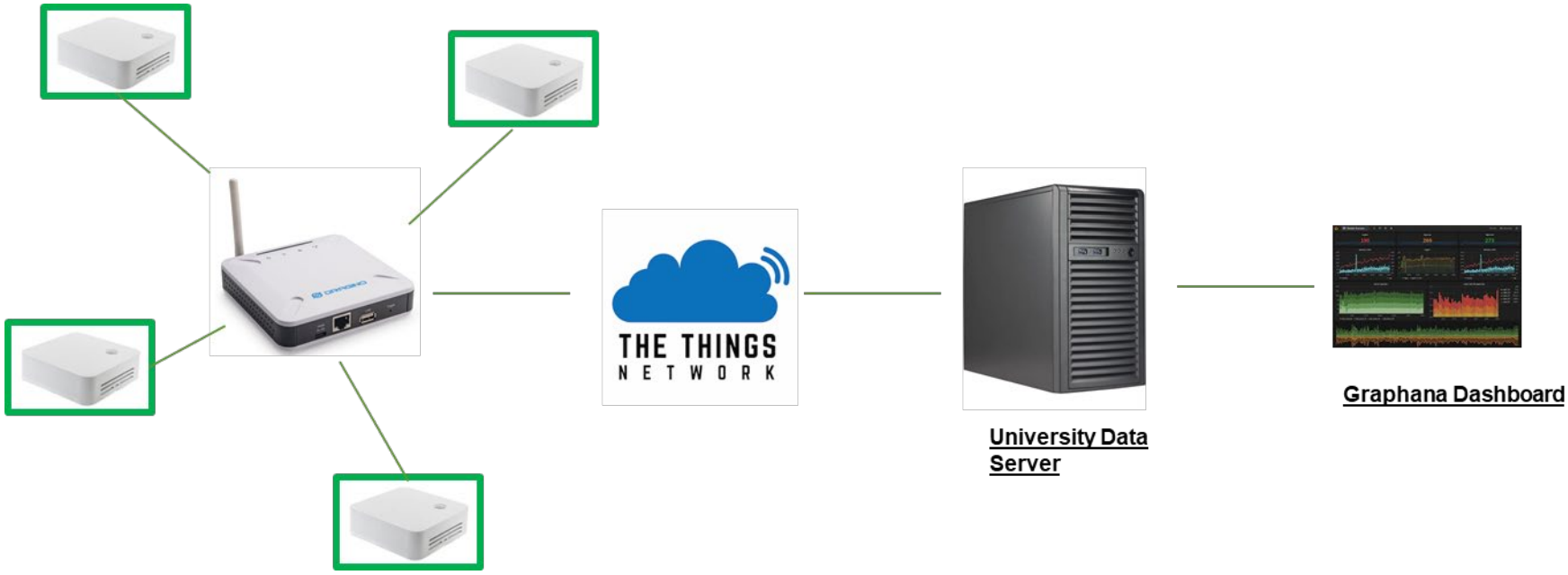
LoRaWAN is low power, wide area networking protocol.

These sensors collect and transmit data points such as location, temperature, humidity as well as sound and motion-related data.

Blackrock Castle Observatory



Blackrock Castle Observatory



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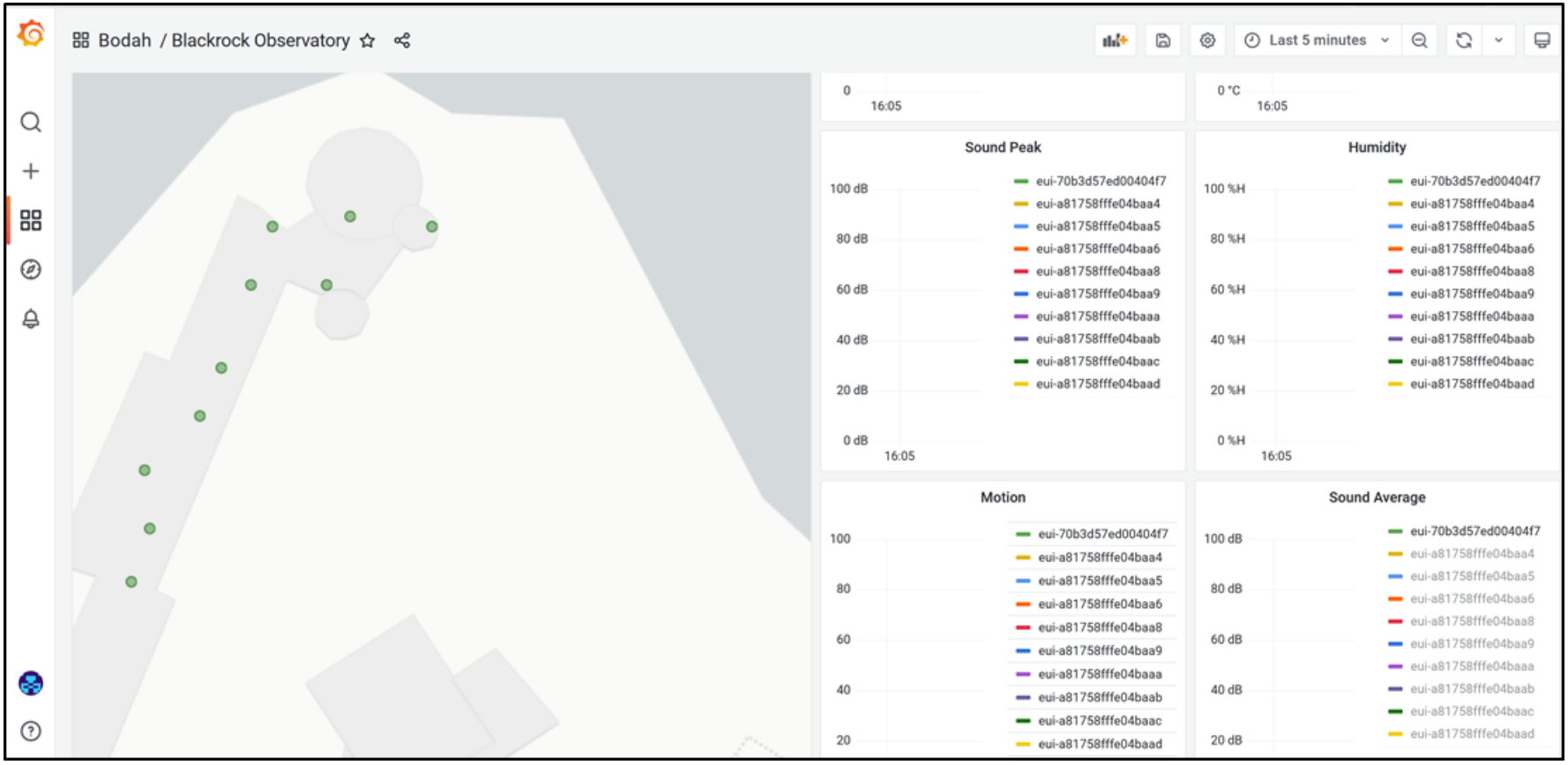

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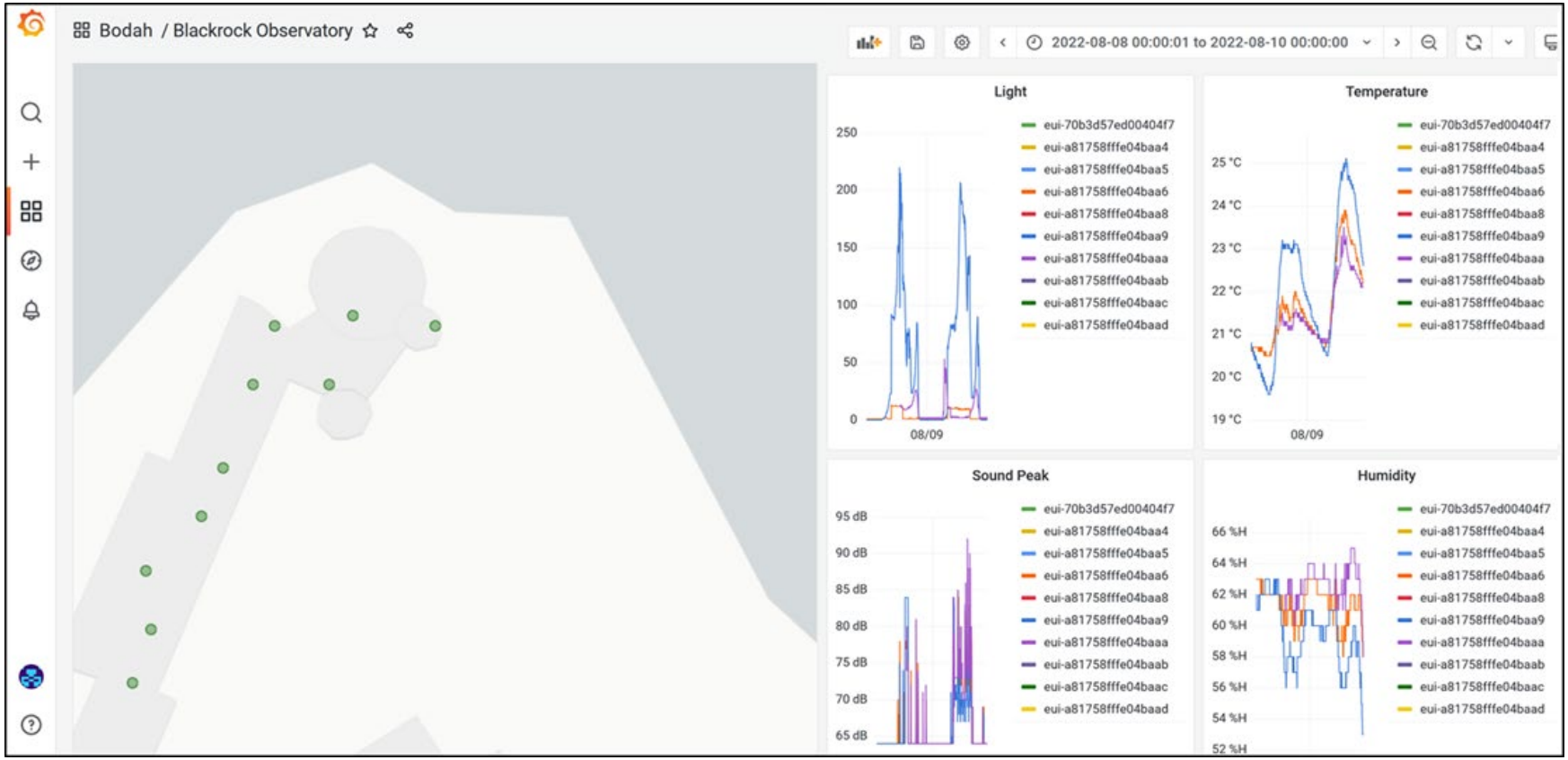
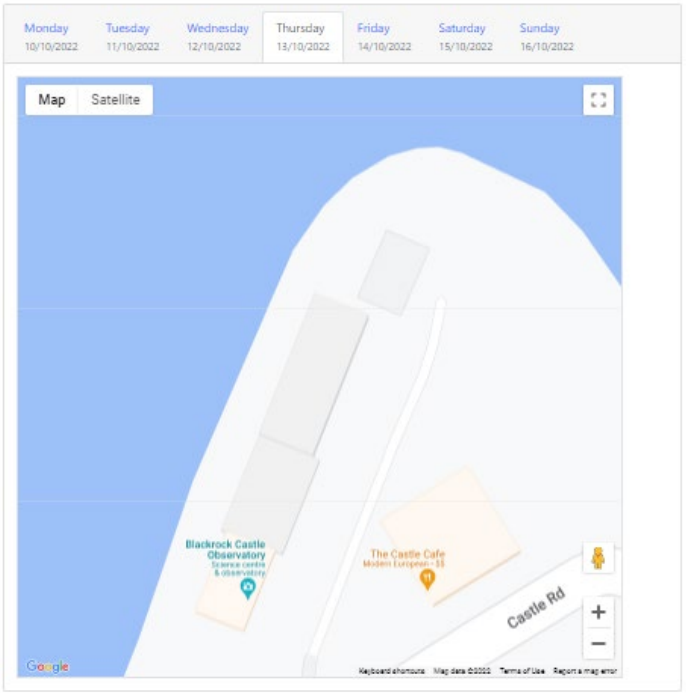
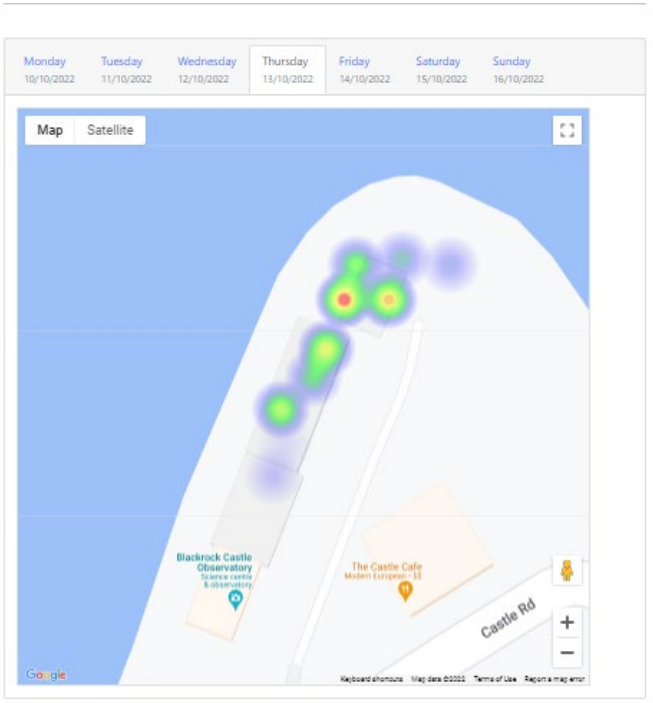


Blackrock Castle Observatory

Because BCO were interested in the activity at each of the exhibitions a heatmap is generated on top of the Graphana interface to show activity derived from the sensor data.

The heatmaps can be used to monitor the average activity over a period of time or the activity at an particular period in time.





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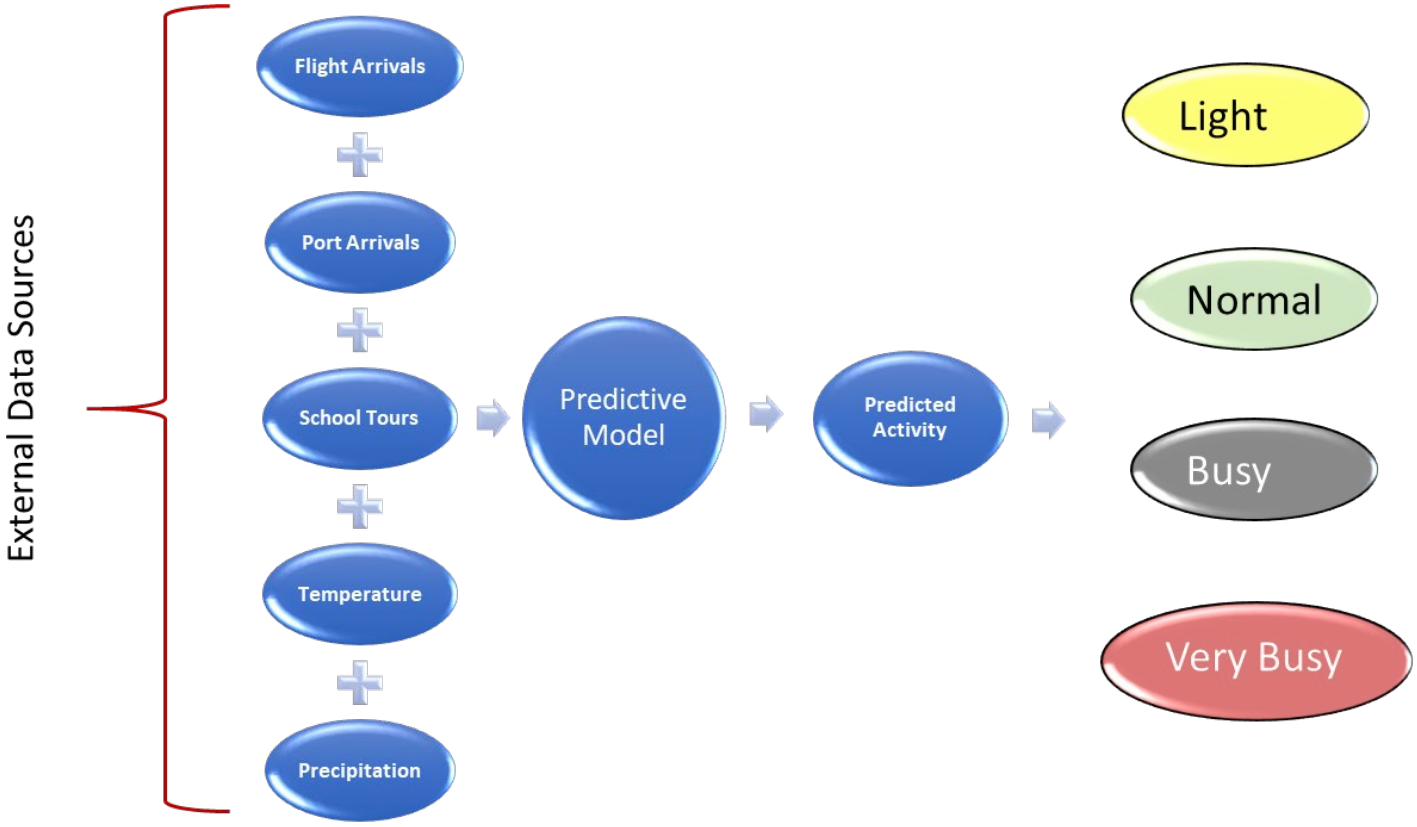
We are also interested in developing and embedding **predictive functionality** into the BCO interface.

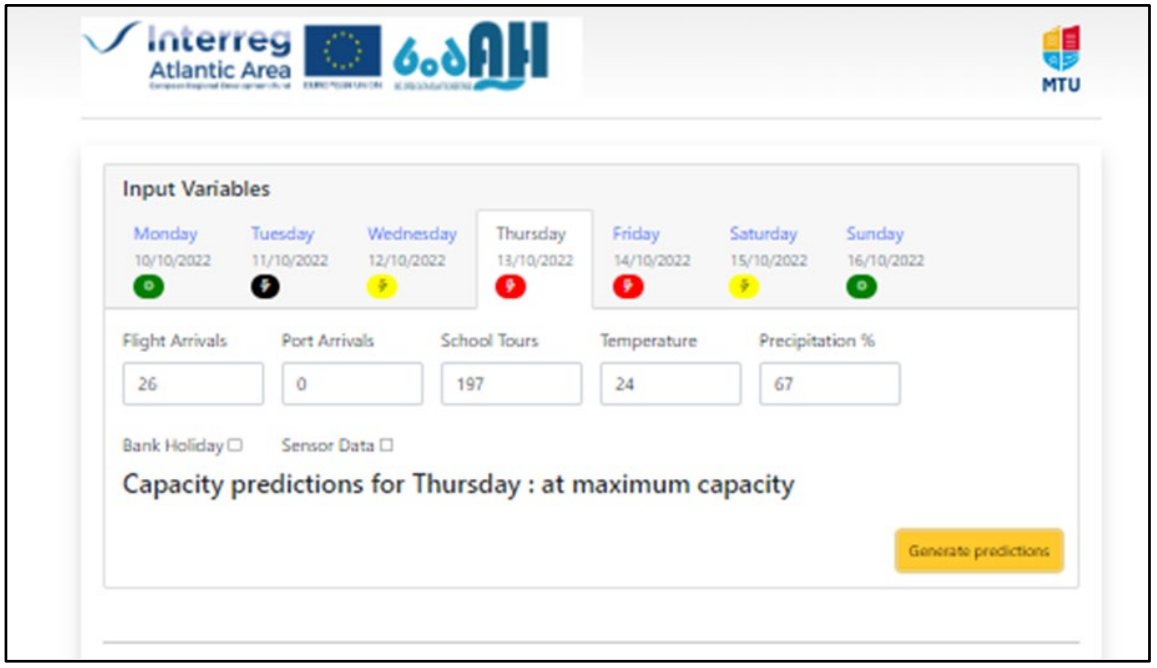
In particular we aim to take in an array of data points ranging from weather, school tours numbers, flight arrivals etc.



Blackrock Castle Observatory

To illustrate the concept we have built a basic tool to illustrate the concept.

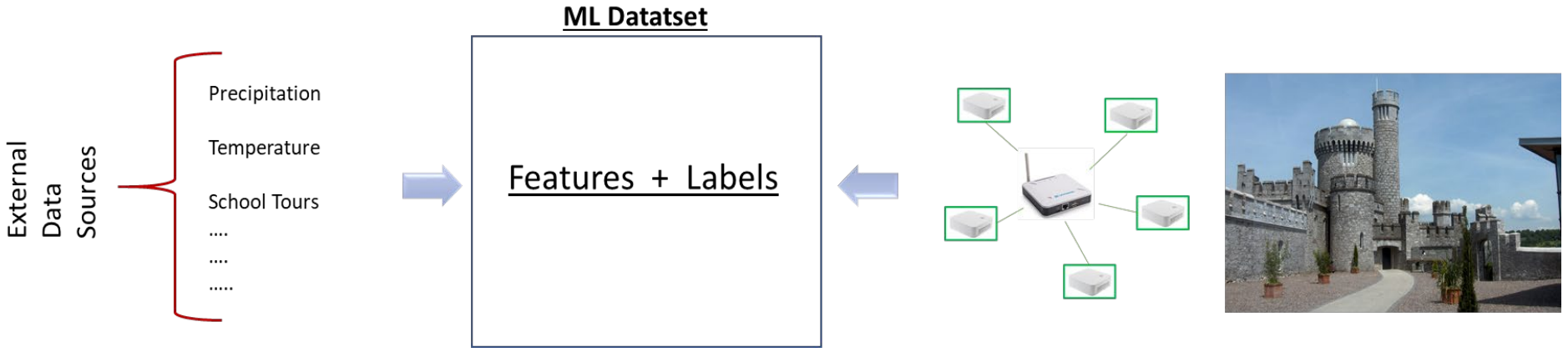
It takes in external data sources such as flight arrivals, port arrivals, school tools, temperature and precipitation levels and use this to predictive the anticipated capacity of BCO for a specific data.



Blackrock Castle Observatory

To train and build a supervised machine learning model we need to build a labelled dataset. The features in the dataset will be the external datapoints such as precipitation, temperature, flight arrivals etc. The associated label will be the daily average visitors for BCO.

In the context of predicting visitors' numbers at BCO we can merge the external data with the visitor data being generated to build a labelled dataset for a machine learning model.



Challenges

- COVID – 19 (Long shutdowns meant very significant delays in deploying our sensor network. This is a necessitated a change in the test site).
- Obtaining adequate amounts of labelled data.
- Gaining access to data from different sources.
- Ensuring privacy and a non-intrusive monitoring system was an important requirement from the offset.