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Partner organisations

No.	Name	Short name	Country
1	Consiglio Nazionale delle Ricerche	CNR	Italy

Abbreviations

CMS:	Content Management System
DMP:	Data Management Platform
DVP:	Data Visualization Platform
GIS:	Geographic Information System
LL:	Living Lab
NBS:	Nature-Based Solutions
NDVI:	Normalized Difference Vegetation Index
ProGReg:	productive Green Infrastructure for post-industrial urban regeneration
WP:	Work Package

Executive Summary

The benefits produced by nature-based solutions (NSB) implemented during the project “productive Green Infrastructure for post-industrial urban regeneration” (proGReg) will be assessed in the framework of Work Package 4 (WP4). Data will be collected all along the project and analysed to provide readable and useful indicators. The collected data and the produced indicators will be made available through a data platform, with different user access levels and accessible on-line. This document highlights the main features of the proGReg data platform, describing both, the platform software architecture and its operation. User roles and sections containing data are also shown. Some images have been included in the document to better explain the output visualization.

1. Introduction

The proGReg data visualization platform (DVP), available under <https://www.progiregdata.eu>, was developed to allow a rapid consultation of the data collected by the project. A template was created based on the proGReg web site (<https://progireg.eu/>), using the same colours, fonts and graphics to harmonize the DVP with the guidelines provided by the project communication team.

Given the heterogeneity of the project data and any possible change of the data structure, it would have been difficult to manage a rigid data platform structure. An inflexible data platform would certainly have required more resources for development and would have subsequently generated data management problems. The integration of a complex data management platform (DMP) within a content management system (CMS) was opted for this purpose. This approach allows to obtain management flexibility and better adaptation to different data types.

2. Features of the data visualization platform

The DVP (Figure 1), directly managed by CNR, consists of two main software components, the DMP and the CMS.

The DMP is the software part that deals with the management of raw or pre-processed data. This is a complex platform that guarantees high flexibility in data management. It accepts many types of data and in our case, we opted mainly for text file formats (.csv and .xlsx) due to the data types collected during the project. Once the files have been uploaded to the platform, the administrator (CNR) sets the analysis or processing type that must be carried out on the specific loaded data (stored in a database). After this first analysis / processing step, there is the data visualization step. In this phase it is necessary to set the visualization type of the loaded or processed data. Many graph or table formats are available, to allow an easy consultation by the users. Then, the data analysis engine must be set, to fully configure the visualization of each data type. Visualizable data are then send to the CMS.

The CMS is the second software component of the DVP and it is used both for data publication on the web page and for user management and authentication.

Importantly, once a data type visualization has been set in the DMP, the administrator simply uploads the new files collected and all the data views on the web pages will be automatically updated.

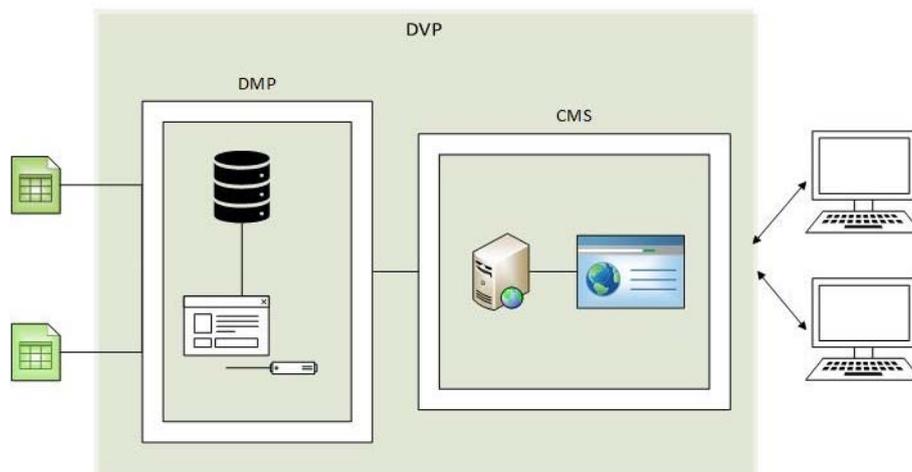


Figure 1. DVP scheme.

According to the data confidentiality levels described in the Deliverable 4.2 “**Data Management Plan**”¹, the web access has been developed in different user profiles: without authentication, registered user and administrator user.

Three different sections are therefore created:

- public area
- restricted area
- back office area

Users without authentication can connect to the DVP to consult the public data of the project (available in the public area). To consult confidential data (data that cannot be made public) it is necessary to create a user authentication to the DVP (restricted area). Registered users are all WP4 partners which determine whether the data can be made public. Registered access to raw data can be given also to other project members, under approval of the WP4 research partners. The registration on the platform via web is not allowed; all the accounts are pre-configured by the administrator of the DVP.

Once logged in, the DVP administrator can access to all its functions. The configuration of the DVP platform and the uploading of new data are directly managed by the platform administrator that collects data from the project partners.

¹ Mattioni, M. et al. (2019): Data Management Plan, Deliverable No. 4.2, proGReg. Horizon 2020 Grant Agreement No. 776528, European Commission.

Table 1 summarizes the user permissions.

User type	Views
Public user	Public pages
Registered user	Restricted pages
Administrator user	Restricted pages Back office

Table 1. User permissions.

3. Sections of the data visualization platform

The homepage (Figure 2) consists of a header containing the user menu and a body. The template of the web page reflects the proGReg website template. From the home page the users can select the data type that they want to consult, by clicking on the corresponding box. The data are divided into six sections, listed below. The corresponding data source is reported in brackets, according to the Deliverable 4.1 “**Monitoring and Assessment Plan**”². Data will be classified as

- Spatial data (*Administrative data from existing databases, GIS-derived data*)
- General Population Survey in the Living Lab Districts (*General Questionnaire*)
- Social data at nature-based solution (NBS) level (*NBS-visitor questionnaires*)
- Health and well-being data at NBS level (*SOPARC*)
- Environmental and ecological data at NBS level (*Carbon Impact, Air Temperature, Air Quality, PM biomonitoring, Environmental Footprint, Biodiversity monitoring, Water Quality*)
- Economic data at NBS level (*Economic and labour market questionnaire*)

² Baldacchini, C. et al. (2019): Monitoring and Assessment Plan, Deliverable No. 4.1, proGReg. Horizon 2020 Grant Agreement No. 776528, European Commission.



Figure 2. Platform home page.

The sections of the data visualization platform are the same for both registered and non-registered users. However, in each section, non-registered users will have access only to public and aggregated data, while also raw data will be made available for registered users.

By clicking on each box, a new page will open showing all the data for that section.

Specific views per each data type will be developed as soon as they will be made available within the project and in the platform, for both the raw and the aggregated data. Up to date, we can provide only a few examples, which are reported in the following sections, in the non-registered user configuration

Two further boxes will be available in the home page, from which users can have access to the “Indicators” assessed during the project and to the “Reports” produced. It is worth noting that the indicators will be presented in agreement with the guidelines developed in the framework of the NBS Impact Evaluation Taskforce of the European Commission³.

³ Handbook on NBS Impact Evaluation, to be published in 2021.

3.1. Example of spatial data visualization: the Normalized Difference Vegetation Index (NDVI)

Two categories of spatial data will be collected during proGReg: administrative data from existing databases and data derived from Geographic Information Systems (GIS). The first ones will be visualized as interacting table, the latter as images. Figure 3 shows a visualization example of a GIS-derived data: the NDVI change from 2018 to 2019 in the City of Dortmund and some neighbouring municipalities.

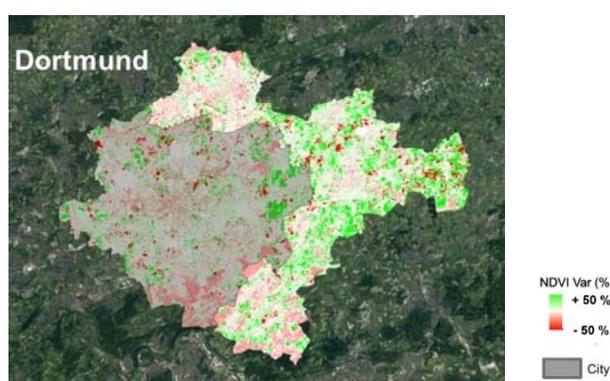


Figure 3. NDVI visualization for the City of Dortmund and some neighbouring municipalities: difference between 2018 and 2019

3.2. Example of data visualization from the general population survey

The General Questionnaire will provide several data in the social, health and economic assessment domains, at the LL district level, for the cities of Dortmund, Turin and Zagreb. It will be performed before the NBS implementation and repeated after two years (pre-post design). Thus, also the collected data will be presented for both the pre and the post session and in comparison, per single cities and in cross-city visualization. Data will be presented as tables and as graphs (Figure 4).

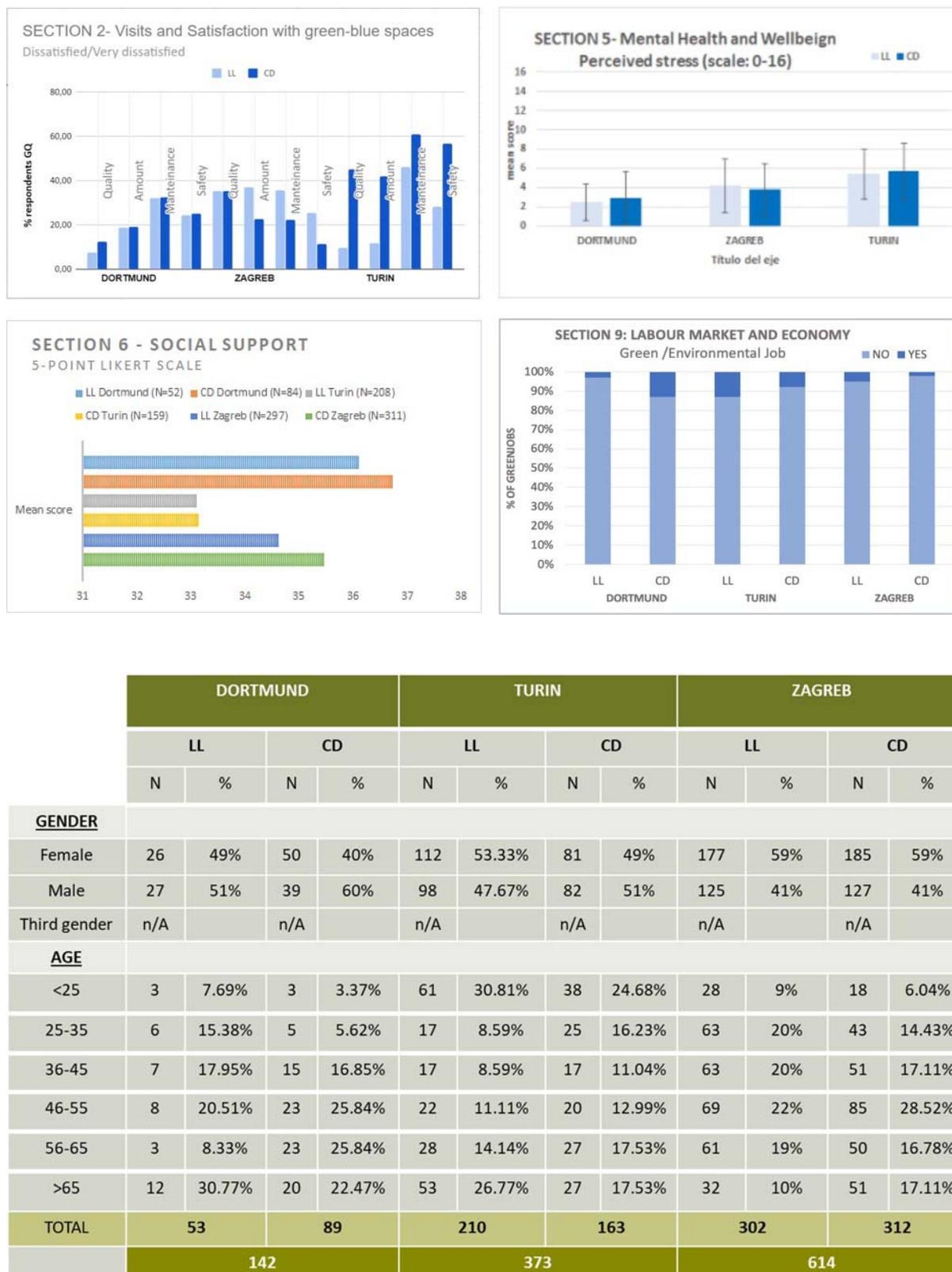


Figure 4. General Questionnaire: visualization in graphic and tabular form.

3.3. Example of environmental data visualization

Figure 5 shows an example of the visualization for temperature and relative humidity data as collected in the proximity of an NBS, by the three replicate installed sensors.

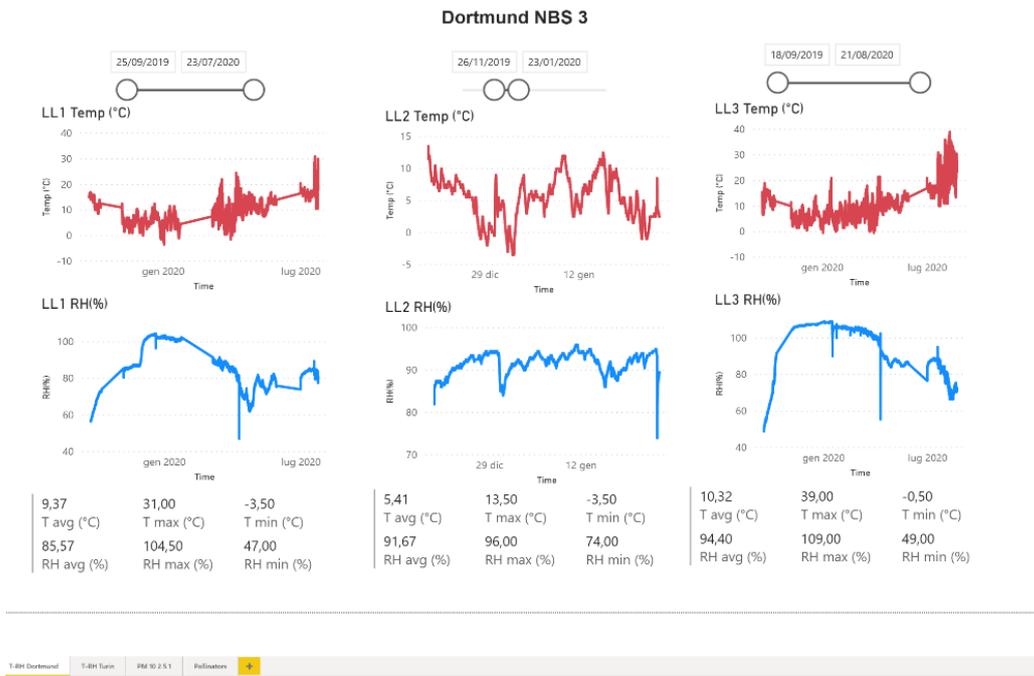


Figure 5. Data section.

At the bottom of the page (Figure 6) there is the selector of the data type relating to the specific section.



Figure 6. Data type selector.

Figure 7 shows two graphs of temperature and relative humidity. Above the graph, there is a filter which allows to change the time window of the graph. Moving the cursor changes the time window of the graph which can also be directly modified typing the date into the two date forms. The panel at the bottom of the figure shows the temperature and humidity values (average, maximum and minimum) in the selected time period. The calculation of these parameters takes place dynamically by moving the time cursors in the filter positioned in the upper section of the panel.

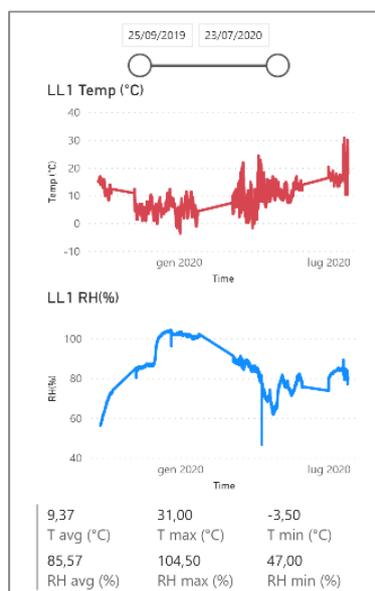


Figure 7. Graph of temperature and relative humidity as registered by a single sensor (central section), with time filter (upper section) and average, maximum and minimum values of the shown parameters in the selected time period (bottom section).

In the upper right corner of each chart there is the full screen option. This option expands the view by dividing the window into two parts. In the upper part there is the graph and in the lower part there are the related data in tabular form (Figure 8 Full screen view).

