REBUILD

ICT-enabled integration facilitator and life rebuilding guidance

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EXECUTIVE SUMMARY

Graphical presentation of specific and validated data represents a powerful way to better understand the migration process. For this reason, a tool for creating infographics in an automated way has been included in REBUILD, where T4.5 is fully devoted to this purpose. This deliverable, as the final description of the work undertaken, presents the implemented tool, focused on creating and providing infographics not only from the data already explained in the previous version, but also from other data sources that may help in the perception of migration.

As it is going to be explained in the following sections, we have defined a solution for automatically providing visual reports based on three main data sources:

- migration data from a reliable and validated sources as Eurostat.
- REBUILD app usage data derived from the user's activity within the platform.
- Any kind of data that the LSP may like to provide to the users.

Moreover, these three kind of infographics follow a particular set of templates based on the project's graphic identity with the aim of enhancing the REBUILD community feeling, and they will be included as a new functionality in the REBUILD dashboard.

The document is organised as follows: The first section is devoted to the explanation of the different data sources considered for the task. The second presents the graphic identity that has been chosen for generating the infographics, explain which template is used according to each case. Then, the API to implement the different functionalities is described. Finally, some examples of the results are provided.



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1 Introduction

REBUILD project's objective is to provide a toolbox of ICT-based solutions that will help in the smooth integration of refugees and migrants. REBUILD refers both to the facilitation of the local authorities' management procedures and to the migrants' life quality improvement. To achieve these goals, REBUILD is designed as a user-centered application that attempts to recognize users' needs and provides them with personalized recommendations and targeted solutions. To assess this purpose, personal information for each migrant is required in order to learn profile patterns and link to needs and resources. For the gathering of those necessary data, all users will have to give consent in order to provide anonymized, GDPR-compliant information that will be used by AI-based methods. In particular, the proposed technological solutions include an AI-based profile analysis to enable the personalized support, an AI-based matching tool in order the migrants' needs and skills to be matched with services provided by local authorities in each pilot country and a set of tools such as a chatbot or audio visual communication to enable personalized two-way, effective communication between the final users, i.e. migrants and local service providers.

More specifically, this project follows a user-centered and participatory design approach, aiming at addressing properly real target users' needs, ethical and cross-cultural dimensions, and at monitoring and validating the socio-economic impact of the proposed solution. Both target groups (immigrants/refugees and local public services providers) will be part of a continuous design process; users and stakeholders' engagement is a key success factor addressed both in the Consortium composition and in its capacity to engage relevant stakeholders external to the project. Users will be engaged from the beginning of the project through interviews and focus groups; consequently, they will be part of the application design, participating in three Co-Creation Workshops organized in the three main piloting countries: Italy, Spain and Greece, chosen for their being the "access gates" to Europe for main immigration routes. Then again, in the 2nd and 3rd years of the project, users' engagement in Test and Piloting events in the three target countries, will help the Consortium fine-tuning the REBUILD ICT toolbox before the end of the project.

The key points regarding technology solutions proposed are:

- GDPR-compliant migrants' integration related background information gathering with user consent and anonymization of personal information;
- AI-based profile analysis to enable both personalized support and policy making on migrationrelated issues;
- AI-based needs matching tool, to match migrant needs and skills with services provided by local authorities in EU countries and labour market needs at local and regional level;
- a Digital Companion for migrants enabling personalized two-way communication using chatbots
 to provide them smart support for easy access to local services (training, health, employment,
 welfare, etc.) and assessment of the level of integration and understanding of the new society,
 while providing easy to use decision supporting tools for enhancing capacities and effectiveness
 in service provision to local authorities data-driven.

As it was mentioned above, this deliverable is focused on providing the details of the implementation of the tool for automatic infographics creation, as the result of T4.5.

2 DATA SOURCES CONSIDERED FOR THE INFOGRAPHIC CREATION TOOL

Following the approach of the initial version of the deliverable, the first data source to be included is Eurostat¹, the statistical office of the European Union, responsible for publishing high-quality Europewide statistics and indicators for enabling comparison between countries and regions.

A set of 20 different topics has been selected from the entire Eurostat catalogue, focusing on the most representative ones for the migration matter and also including some examples of the different domains specifically included by REBUILD (education, employment, housing and healthcare). Table 1 presents the final list of the topics and Annex 1 includes the different endpoints to be called to obtain the data.

Table 1. Eurostat data selected for being included into REBUILD infographics.

ld	Item	Title
EU_01	Immigration	Population without the citizenship of the reporting country
EU_02	Immigration	Foreign-born population
EU_03	Immigration	Immigration
EU_04	Immigration	Emigration
EU_05	Immigration	Acquisition of citizenship
EU_06	Immigration, asylum	Asylum and first time asylum applicants - annual aggregated data
EU_07	Immigration, asylum	First instance decisions on asylum applications by type of decision
EU_08	Immigration, asylum	Final decisions on asylum applications
EU_09	Immigration, asylum	Asylum applicants considered to be unaccompanied minors
EU_10	Immigration	Resettled persons
EU_11	Immigration	First permits by reason
EU_12	Immigration	All valid permits by reason on 31 December of each year
EU_13	employment	Employed recent immigrants
EU_14	education	Skills in host country language by migration status and citizenship
EU_15	employment	Employment by migration status, professional status, type of contract and full/part time (lfso_14lemp)
EU_16	employment	Methods to find current job by migration status, educational attainment level and type of contract
EU_17	employment, education	Self-declared over-qualified employees as percentage of the total employees by sex, age, migration status and educational attainment level
EU_18	housing	Households by migration status, working status and years of residence
EU_19	health	Persons reporting a chronic disease, by disease, sex, age and country of birth

¹ https://ec.europa.eu/info/departments/eurostat-european-statistics_en

EU_20	health	People having a long-standing illness or health problem, by sex, age and
		groups of country of birth

For each of these items, Eurostat includes information about all the European countries since 2009. Nevertheless, in order to be focused on the consortium partners' countries, we have only extracted the information for Spain, France, Italy and Greece from the last five years, but this can be easily changed by modifying each specific REST request as shown in Fig. 1.

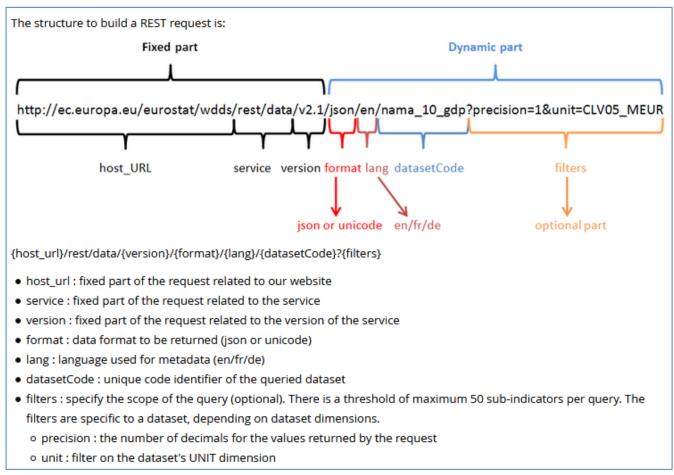


Fig. 1. Eurostat REST request creation (source Eurostat²)

The second data to be considered when creating automated infographics for REBUILD are the ones related to the usage of the different project's tools that are provided through the mobile application. The rationale behind this inclusion is to allow the different LSPs and local authorities to create graphic reports about how the solution is being used, not just for letting the migrant know about it, but also to let the service providers to have a dynamic summary of the general use, which can directly provide a view about REBUILD Toolbox impact.

² https://ec.europa.eu/eurostat/web/json-and-unicode-web-services/getting-started/rest-request

According to the application design, and considering the inn-app activity detected thanks to the inclusion of the MANTRA library for the app personalization (see *D4.9 Self-learning system for improving service personalization*), the gathered information can be divided into two main groups:

- General app use, that includes aggregated data about how the main parts of the app are used: most used services, language, most viewed vide, etc.
- Domain use, that includes data gathered from the use of each specific domain in the app: total number of visits, most used service, etc.

Table 2 shows the different elements that have been identified for each group:

Table 2. REBUILD system reports for infographics

General app use	Domain use
Most used service	Total number of visits in the domain
Most used language	Most used service in the domain
Number of different users' nationalities	Number of completed tasks per domain
Most viewed video	Number of completed questions
Most visited domain	Number of different services in the domain
Most viewed document	

Finally, the last feature that has been implemented allows the different LSPs and local authorities to create specific infographics based on their own data. For doing so, the system allows them to upload the information to be included in the graphic as a JSON file where each item is identified by a pair of components: the title and the value.

Based on this information, three different infographics can be finally created to be published within REBUILD:

- Eurostat infographics, with the info from the different selected topics from Eurostat.
- Rebuild infographics, with the info from the use of the REBUILD app.
- Custom infographics, with the info directly provided by the LSP or the local authority.

3 GRAPHIC IDENTITY OF THE INFOGRAPHICS IN REBUILD

Once the three main data sources have been identified, the next step is to present them using the different templates that have been defined. As mentioned above, one of the main priorities was to maintain a unique and coherent graphical identity for all the infographics in line with the one created for the project (see *D8.2 Dissemination plan*). The five templates that have been designed for this purpose can be seen in Annex 2. The main parts that the user can customize to adapt the infographic are the following:

- Title and subtitle (at the top), including the name of the infographic. The title should be descriptive in order to allow the receiver to understand the main concept of the document.

- Item/value (to be included into the different bubbles): these parts represent the main information to be provided. They usually include numerical data.
- Main image (usually at the middle of the design in some specific templates): it must be a figure related to the main topic to enhance the visual comprehension.
- Main graphic (usually at the middle of the design in some specific templates): it includes a graphic (in the form of bar chart mainly) visualizing the data information to be provided to the user.
- Summary of the information (at the bottom of some specific templates): this part allows the creator to provide a brief explanation about the purpose of the graphic.

Two specific examples can be seen in Fig. 2. They include the different parts according to each particular design.



Fig. 2. Main parts of the templates

Finally, it is important to note that each type of infographic uses a different template, as can be seen in the following table:

Table 3. Templates for each type of infographic

Infographic	Used template
Rebuild	Two cases: - Template No.4 for General app use (since it contains 7 main items to be included) - Template No. 5 for Domain use (since it contains 6 main items to be included)
Eurostat	Template No. 2 for including Title, a main graphic for the data and a summary of the information.
Custom	Any template, depending on the info and the way to present it.

4 INFOGRAPHIC API AND INTEGRATION INTO THE PLATFORM

For this tool a RESTFUL API has been deployed using mainly JavaScript and Docker. More specifically, JavaScript has been used for programming the infographic creation functionalities, whereas Docker has been used to virtualize the application making it easy-to-deploy by automatically creating instances of the application in a virtual environment.

Specific endpoints have been defined to retrieve the different infographics, one for each type of document as can be seen in Fig. 3. In this regard, the different APIs that have been developed and deployed in the REBUILD project will be explained via Swagger during the next subsections.

The complete development of the service is stored in the Official Gitlab Repository of the REBUILD project at: https://gitlab.com/rebuild-eu/rebuild-infographics-api

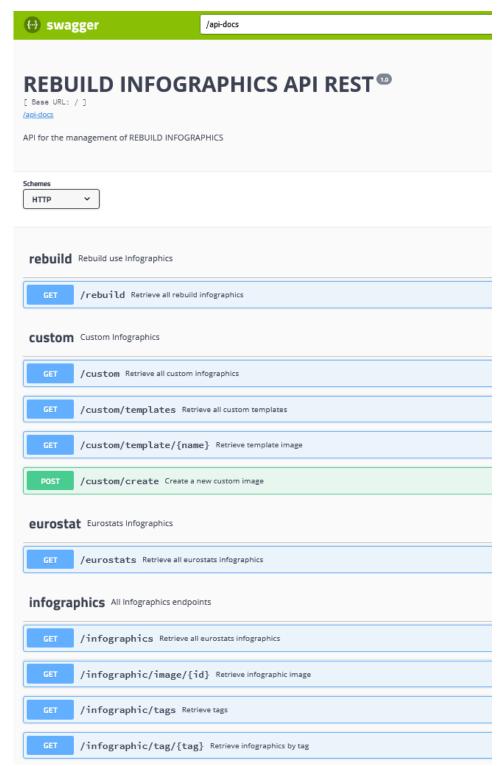


Fig. 3. REBUILD infographics API REST main info. More details can be found at https://gitlab.com/rebuild-eu/rebuild-infographics-api/-/blob/master/api/controllers

4.1 REBUILD INFOGRAPHIC SERVICE

Fig. 4 shows the Swagger with the corresponding endpoint that can be called to retrieve the created infographics with the data of the use of the app:

• *GET /rebuild* which retrieves the Rebuild app use infographics. No input parameter is needed.

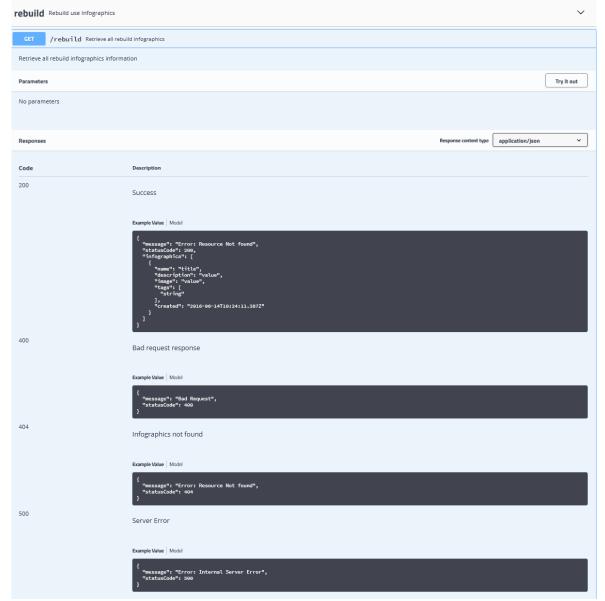


Fig. 4. Swagger documentation regarding the REBUILD infographic API: GET/rebuild.

4.2 CUSTOM INFOGRAPHIC SERVICE

In this case, the service provides a procedure to:

- Retrieve all custom infographics (no input needed): **GET/custom** (Fig. 5)
- Retrieve all custom templates (no input needed): **GET/custom/templates** (Fig. 6)

- Retrieve template's images, with the name of the template: GET/custom/templates/{name} (Fig. 7)
- Create a new custom infographic by providing as input the template, the title, subtitle, info for the bubbles, image, save it and the associated tags: **POST/custom/create.** (Fig. 8).

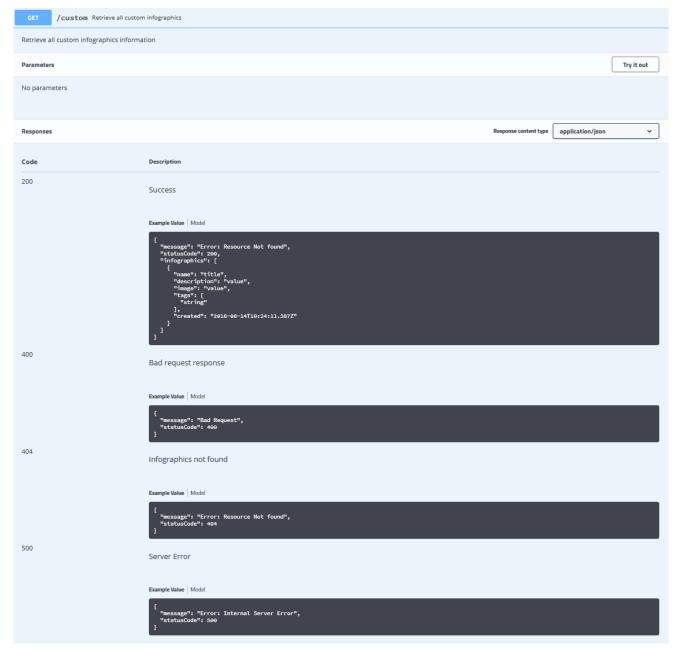


Fig. 5. Swagger documentation regarding GET/custom from Custom infographic service

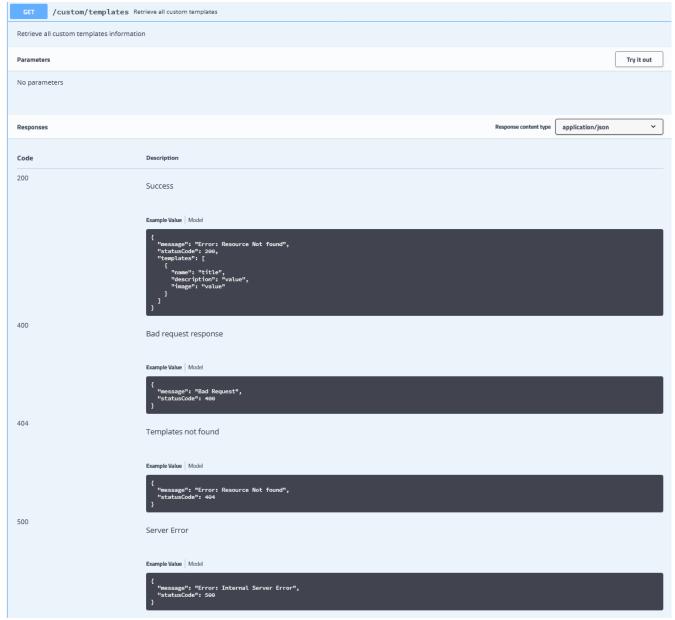


Fig. 6. Swagger documentation regarding GET/custom/templates from Custom infographic service

Re_Build

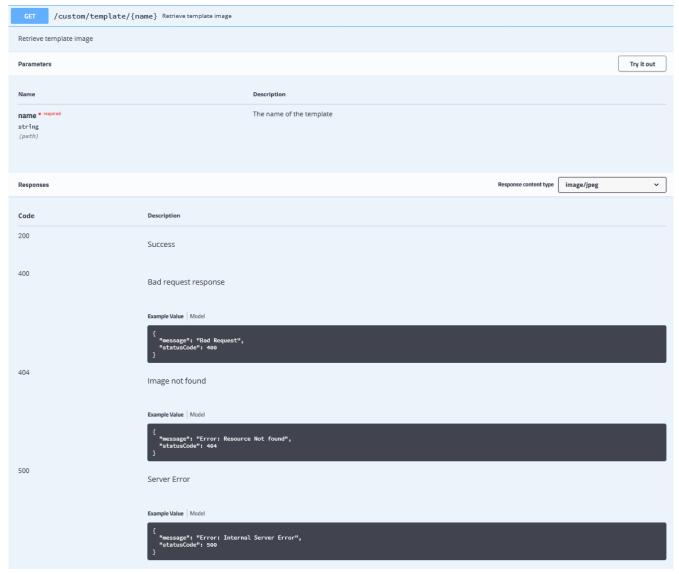


Fig. 7. Swagger documentation regarding GET/custom/template/{name} from Custom infographic service

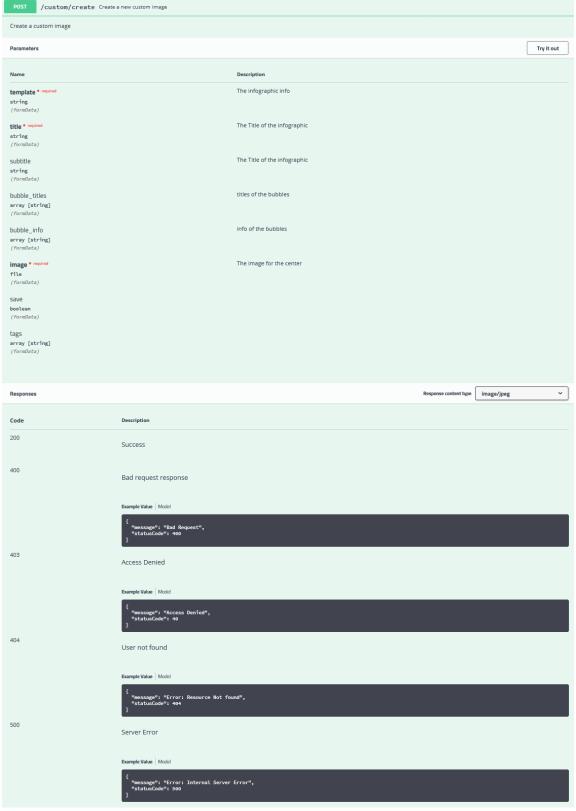


Fig. 8. Swagger documentation regarding POST/custom/create from Custom infographic service

4.3 EUROSTAT INFOGRAPHIC SERVICE

Similar to the first one, Fig. 9 shows the Swagger with the corresponding endpoint that can be used to call Eurostat infographics that retrieves the created infographics with the selected different migration topics:

• **GET /eurostat** which retrieves the selected Eurostat infographics. No input parameter is needed.

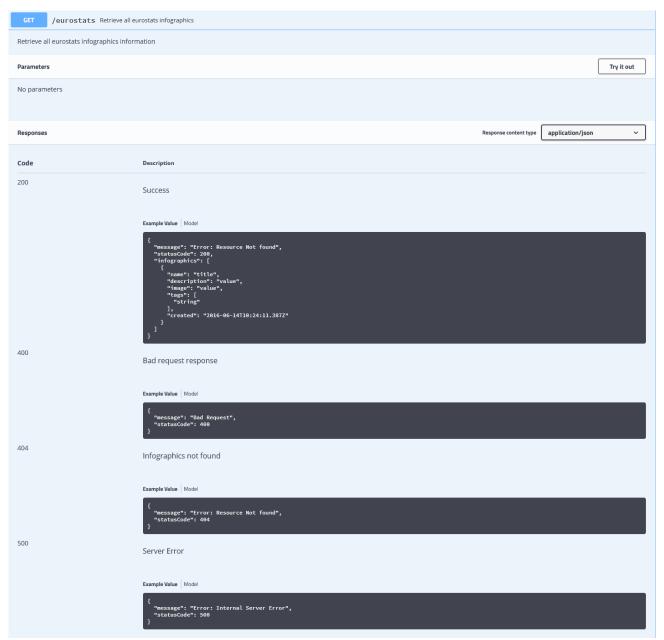


Fig. 9. Swagger documentation regarding the Eurostat infographic API: GET/eurostat.

4.4 INFOGRAPHICS SERVICE

This endpoint was created to facilitate the access to all the created infographics in just one call. For main calls have been defined:

- To retrieve all the infographics (no input needed): GET/infographics (Fig. 10)
- To retrieve all infographics' image by id: **GET/infographics/image/{id}** (Fig. 11)
- To retrieve all the tags in the database: **GET/infographics/tags** (Fig. 12)
- To retrieve a specific infographic by tag: GET/infographic/tag/{tag}. (Fig. 13).

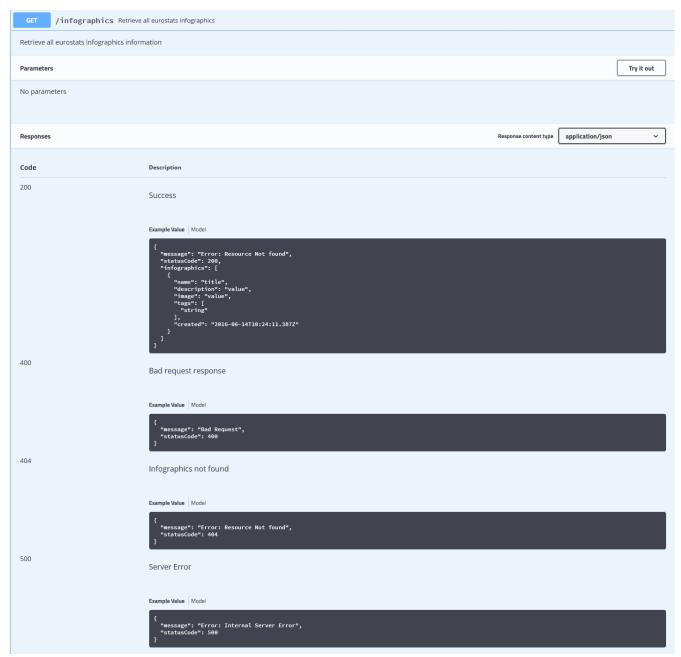


Fig. 10. Swagger documentation regarding GET/infographics from Infographic service

Re_Build

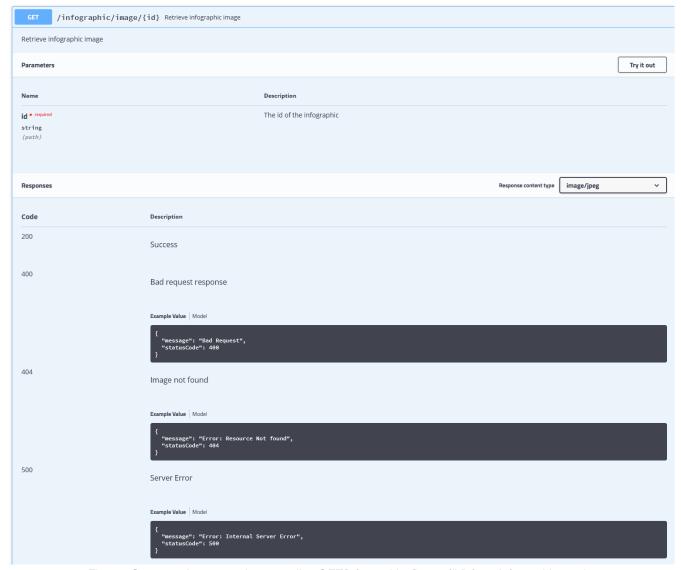


Fig. 11. Swagger documentation regarding GET/infographics/image/{id} from Infographic service

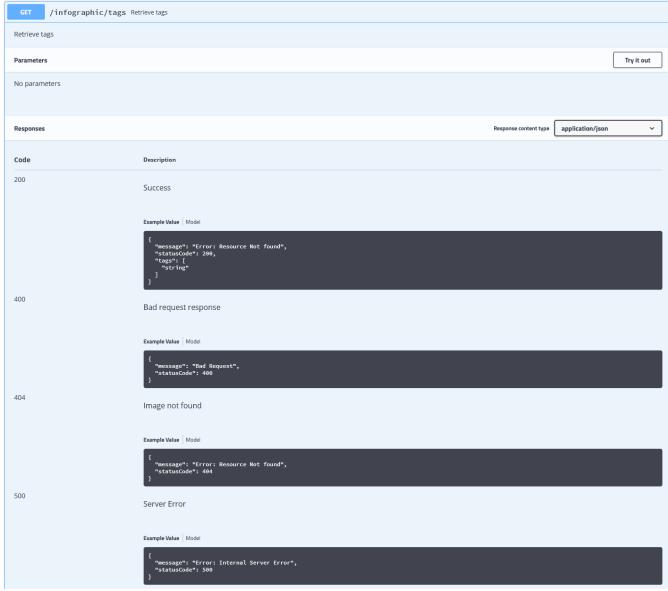


Fig. 12. Swagger documentation regarding GET/infographics/tags from Infographic service

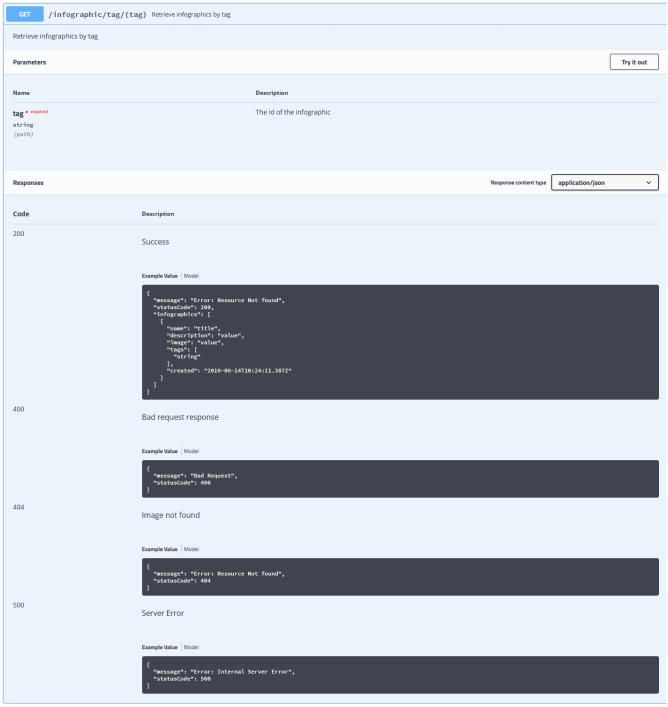


Fig. 13. Swagger documentation regarding GET/infographics/tag/{tag} from Infographic service

5 SOME INFOGRAPHICS EXAMPLES

Once the generation process has been defined, the final step consists of presenting some examples of the infographics that can be created. According to the matching in Table 3, Fig. 14, Fig. 15 and Fig. 16 show different examples for REBUILD and Eurostat infographics.

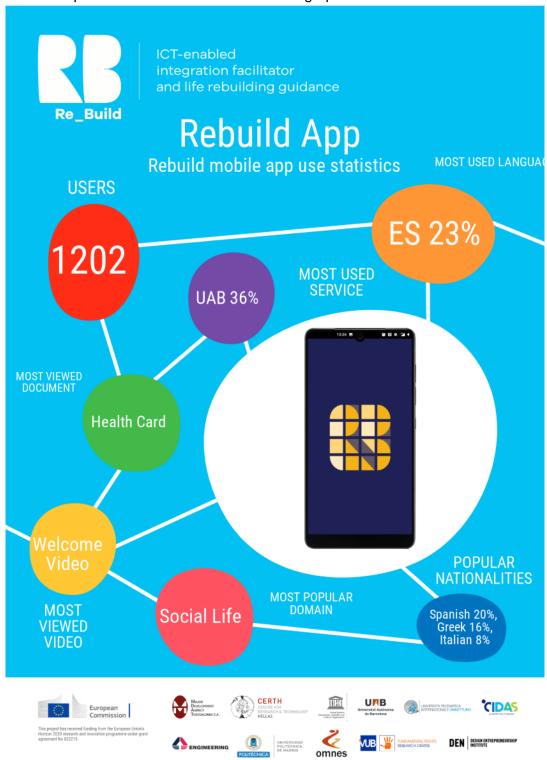


Fig. 14. Example of infographic about REBUILD general use



Fig. 15. Example of infographic about REBUILD domain use

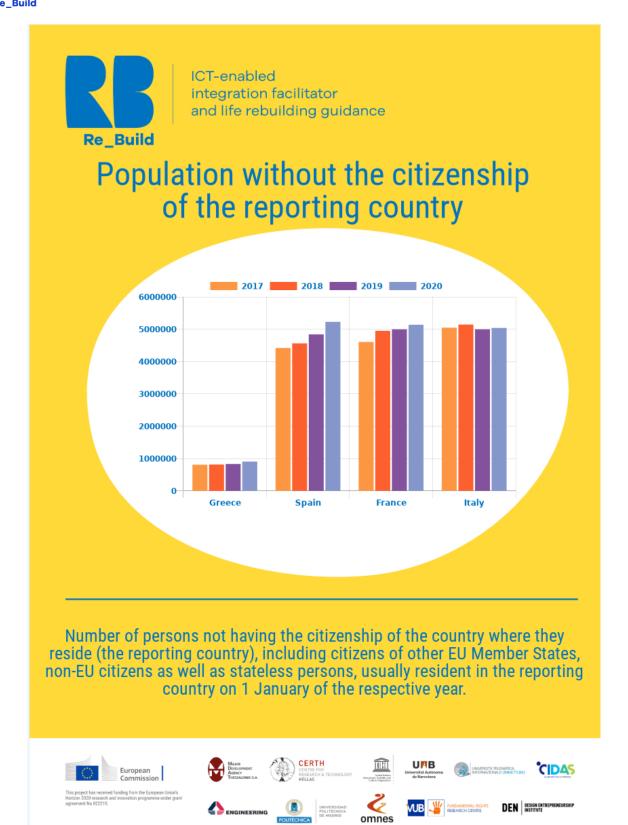


Fig. 16. Example of infographic about specific Eurostat information

6 CONCLUSIONS

This deliverable includes a wide description of the final implementation of the infographics creation tool, which was the main objective of T4.5 from WP4. In fact, while D4.5 was devoted to present the data gathering phase from a validated data source as Eurostat, this document presents the final approach that has been followed to obtain the entire tool for the Digital Companion of the REBUILD Toolbox.

For doing so, the deliverable describes the three final data sources that have been considered to automatically create an infographic, the graphical layout used for their creation according to the project visual identity and finally the API provided to the developers for the infographic management. Finally, a set of different examples have been provided in section 5.

ANNEX 1: EUROSTATS ENDPOINTS

Table 4. List of Eurostat endpoints considered for REBUILD infographics

ld	Url
EU_01	https://ec.europa.eu/eurostat/databrowser/view/tps00157/default/table?lang=en
EU_02	https://ec.europa.eu/eurostat/databrowser/view/tps00178/default/table?lang=en
EU_03	https://ec.europa.eu/eurostat/web/main/data/database?p_p_id=NavTreeportletprod_WAR
EU_04	https://ec.europa.eu/eurostat/databrowser/view/tps00177/default/table?lang=en
EU_05	https://ec.europa.eu/eurostat/databrowser/view/tps00024/default/table?lang=en
EU_06	https://ec.europa.eu/eurostat/databrowser/view/tps00191/default/table?lang=en
EU_07	https://ec.europa.eu/eurostat/databrowser/view/tps00190/default/table?lang=en
EU_08	https://ec.europa.eu/eurostat/databrowser/view/tps00193/default/table?lang=en
EU_09	https://ec.europa.eu/eurostat/databrowser/view/tps00194/default/table?lang=en
EU_10	https://ec.europa.eu/eurostat/databrowser/view/tps00195/default/table?lang=en
EU_11	https://ec.europa.eu/eurostat/databrowser/view/tps00170/default/table?lang=en
EU_12	https://ec.europa.eu/eurostat/databrowser/view/tps00171/default/table?lang=en
EU_13	https://ec.europa.eu/eurostat/databrowser/view/lfst_rimgenga/default/table?lang=en
EU_14	https://ec.europa.eu/eurostat/databrowser/view/lfso_14blang/default/table?lang=en
EU_15	https://ec.europa.eu/eurostat/databrowser/view/lfso_14lemp/default/table?lang=en
EU_16	https://ec.europa.eu/eurostat/databrowser/view/lfso_14leecm/default/table?lang=en
EU_17	https://ec.europa.eu/eurostat/databrowser/view/lfso_14loq/default/table?lang=en
EU_18	https://ec.europa.eu/eurostat/databrowser/view/lfso_14hhwkmg/default/table?lang=en
EU_19	https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_cd1b/default/table?lang=en
EU_20	https://ec.europa.eu/eurostat/databrowser/view/hlth_silc_25/default/table?lang=en



ANNEX 2: TEMPLATES FOR THE INFOGRAPHICS

The different templates that have been created can be seen in the following figures:

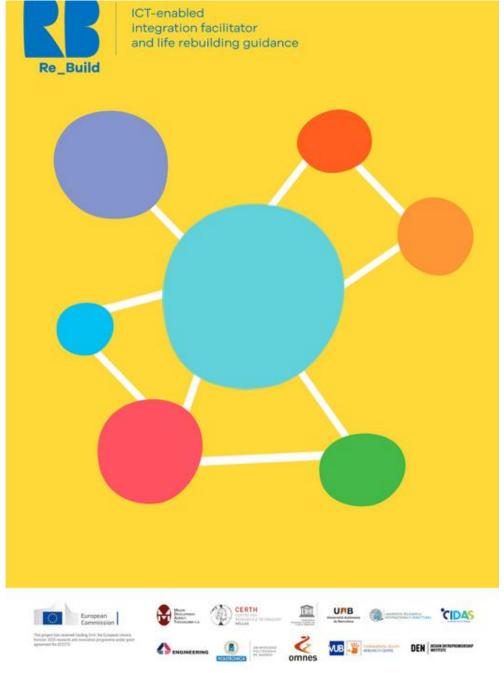


Fig. 17. Template No. 1 for REBUILD infographics

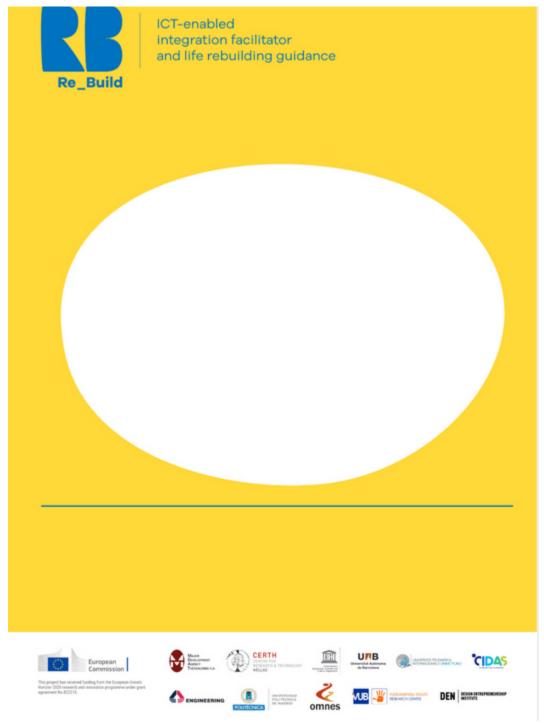


Fig. 18. Template No. 2 for REBUILD infographics

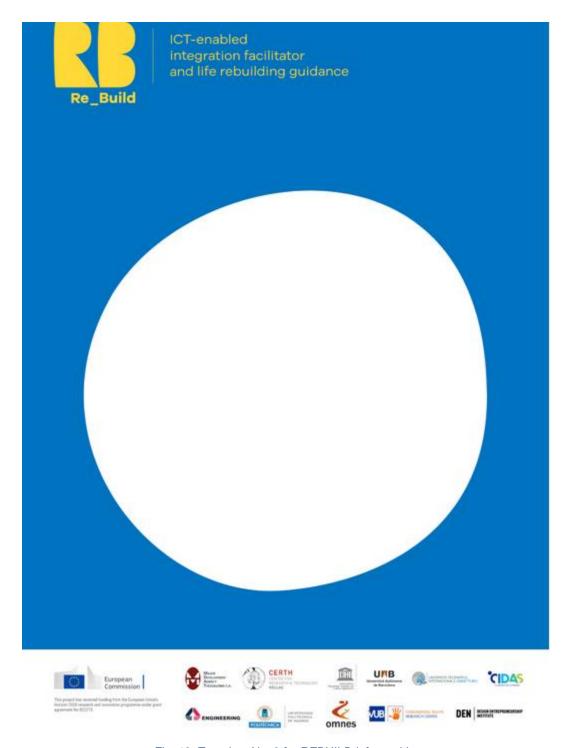


Fig. 19. Template No. 3 for REBUILD infographics

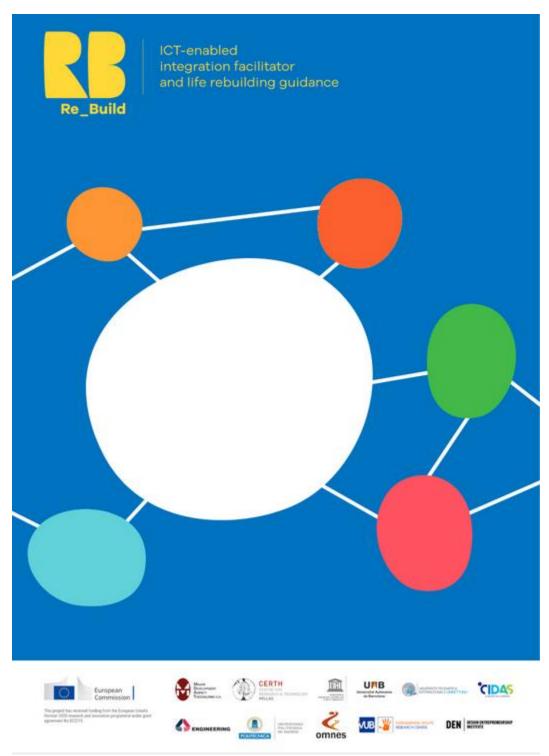


Fig. 20. Template No. 4 for REBUILD infographics

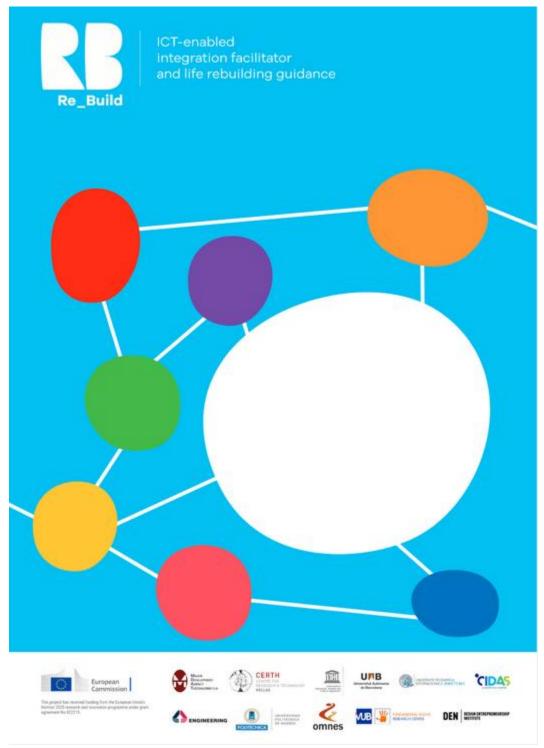


Fig. 21. Template No. 5 for REBUILD infographics

REBUILD

ICT-enabled integration facilitator and life rebuilding guidance

Deliverable: D4.7 Fact-based information sharing prototype



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