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REBUILD
ICT-enabled integration facilitator and life rebuilding guidance
Project start date: 01/01/2019 | Duration: 36 months

Deliverable: D5.1 REBUILD Reference Architecture

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EXECUTIVE SUMMARY

The deliverable "*D5.1 - REBUILD Reference Architecture* " aims at defining the REBUILD Technical Architecture. The goal is to build a technical platform in order to be **modular** for integrating and using specific technical components according to the specific requested service. This structure allows to extend the platform with new features and services adapting or easily integrating existing technologies, with a reduced effort, fostering the **interoperability** and **scalability**. To build the REBUILD Reference Architecture collecting initial requirements is needed. The first step to collect them is defining the **Use Case Scenarios** (UCS) coming from the pilot needs and services.

In the *First Chapter*, the pilot partners describe the UCSs that is possible to build in their cities, (Bologna (IT), Barcelona (ES) and Thessaloniki/Kilkis (GR), according to the services offered by Local Service Providers and the needs of migrants in those cities the pilot teams (CIDAS, OMNES, UAB, UNINETTUNO) known from their past experience in interacting with migrants. The UCSs are the description of the stories, non from technical point of view, that describe what could happen when migrants interact with the REBUILD solution. In this document all the UCSs will be described and prioritized, then only a subset of them will be included in the final version of the D2.5 [1] (M12), integrating the feedback coming from the migrants and Local Service Providers during the **co-creation workshops** [2] (M12) held in Greece, Italy and Spain (since the WP2 " Codesign processes" is more related with the output of the co-creation and co-design process). So, the process used building the UCS is the following: initial conception in WP5, consolidation through the co-creation workshops and selection of the UCSs that will be implemented by the REBUILD project in WP2, definition of architectural requirements from UCSs and implementation in the WP5.

Starting from the Use Case Scenarios, in the *Second Chapter*, the functional and non-functional **Architectural Requirements** were collected maintaining the definition of the platform quite general in particular in this first stage of the project. In month 20 (from August 2020) there will be a series of test prior to the pilots. Besides contributing validating initial technical developments, it is expected that these phase might provide new requirements. Project partners will evaluate the feasibility and relevance of such inputs before the pilots, and in case they are relevant, the architecture will be updated accordingly and reported in D5.3 [3] (M32).

The definition of the requirements leads to the definition of the **high-level reference REBUILD Architecture**, in *Third Chapter*, to show how the technical component interact among them and what kind of data they exchange. A detailed description of each **technical component** is provided to define their functionalities, input/output and the interaction with the other platform components.

In the *Fourth Chapter*, the technologies used to implement each technical component are defined, highlighting **the current state of the art** and how REBUILD project wants to go beyond it, innovating.

Before going deeply in the document, it is worth to define some recurrent terms:

- **REBUILD Architecture**: the high-level logic view on how the REBUILD technical components interact among them and with the users
- **REBUILD Platform**: the real implementation of the REBUILD Architecture, that is the set of back-end and front-end elements.
- **REBUILD App**: the mobile application used by the REBUILD final users (e.g. migrants), that is one of the output of the whole project. The REBUILD App is developed upon the functionalities made available by the REBUILD Platform.
- **REBUILD Services**: those services made available by or co-developed with Local Service Providers in the three country involved in the project and on which the REBUILD App is based.

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1 INTRODUCTION

The project REBUILD aims at improving migrants and refugees' inclusion through the provision of a toolbox of ICT-based solutions to enhance both the effectiveness of the services provided by local public administration and organizations, and the adaption, integration and Quality of Life QoL of the migrants.

This project follows a user-centered and participated 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 since the beginning of the project through interviews and focus groups; then 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 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 migration-related 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 to local authorities data-driven, easy to use decision supporting tools for enhancing capacities and effectiveness in service provision.

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2 REBUILD USE CASE SCENARIOS

Before starting to define the **REBUILD Architecture**, it is important to better understand in which context the REBUILD Platform (see Executive Summary for definition) has to be developed. This is the reason why this chapter deals with the Use Case Scenarios (UCS) foreseen in the three pilots (Italy, Spain, Greece) where the REBUILD will deploy and evaluate its services with real-users.

UCSs are short non-technical stories describing how REBUILD services are used. For that purpose, it is necessary to describe the actors involved, what are their roles and what actions they perform. It is really important to provide proper detail on how the interaction between the users and REBUILD takes place, and what is expected REBUILD to deliver. UCSs provide technical partners with the basic information to translate actions into user needs (i.e. user requirements) and technical specifications to define the overall platform and services architecture.

In REBUILD, the main actors in the three scenarios selected are migrants and refugees. REBUILD has focused, based on the inputs provided by D1.2 [4] and D2.1 [5], that the priority context in which migrants might need help or looking for information is harder, are: education, health, social integration, job seeking, just to name a few. The second actors are the **Local Service Providers,** defined as those entities offering support services to migrants. REBUILD seeks to integrate already existing digital services, or helping them digitalising processes, or part of them, that are part of their daily work with migrants.

It is important to remember that this is the **first version of Use Case Scenarios**, which is the result of the first interaction between partners of the consortium, migrants and LSPs foresee the scenarios. After the feedback received from the migrants and Local Service Providers during the co-creation workshops held in Bologna, Barcelona and Thessaloniki in October-November 2019 and the elaboration carried out during the Technical meeting held in November 2019 in Thessaloniki among all partners, the **final version** of the UCSs will be reported **in the D2.5** [1]. This means that the conception of the UCSs were done in the first stage of the project in WP5 to collect the architectural requirements, then the UCSs were elaborated and finalised in WP2 selecting only those ones to be developed in WP5.

All the UCSs collected will contribute to define the architectural requirements in order to take into account the possibility to extend the services provided by REBUILD in the future as well as include all the UCSs. The following version of the REBUILD architecture (Section 4) will narrow its scope containing more UCSs than the first one, due to the real needs and interest on some specific UCS shown by migrants and LSPs.

In the section below the description of UCSs taken from the past experience of the pilot team with had with the migrants and LSPs. The **methodology to gather information** to describe the UCSs takes into account several aspects. The description focuses on the interaction among the **actors** involved in the **main scenario**. The UCS starts with an actor need that will be requested to the system. The scenario ends with all the possible answers to that request. The point of view of the description is that one of the actors (avoiding describing internal system activities and the GUI in detail).

Finally, the scenario has to be clear, concise and readable by all and not only by the technical people. It is important to consider also the possible extensions to the main scenario.

Below an explanation of each parameter requested to be filled in.

Table 1: Use Case Scenario table example

ID:	[Unique ID of this use case, e.g. UC_01]
Title:	[Enter the goal of the use case scenario - preferably as a short, active verb phrase]
Description:	[Describe the goal and context of this use case scenario. This is usually an expanded version of what you entered in the "Title" field.]

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Primary Actor:	[A person or a software/hardware system that interacts with your system to achieve the goal of this use case scenario.]
Preconditions:	[Describe the state the system is in before the first event in this use case scenario.]
Postconditions:	[Describe the state the system is in after all the events in this use case scenario have taken place.]
Main Success Scenario:	[Describe the flow of events from preconditions to postconditions, when nothing goes wrong. This is the meat of the use case scenario.]
Frequency of Use:	[How often will this use case scenario be used?]
Status:	[Development status]
Owner:	[Who owns this use case scenario, in your project team?]
Priority:	[Priority of this use case scenario]

In the following sub-sections, a detailed description of the Use Case Scenarios collected in the three countries takes place. Below a list of them country by country

- Italy
  - Access to the national health system
  - Converting the type of permit of stay
  - Access to LGBTQI services
  - Access to housing
  - Access to Higher Education
  - Language training
  - Information about Residency Permit
  - Student Counseling Support
- Spain
  - Social mentoring
  - Support accessing academic scholarships
  - Access to tertiary education
- Greece
  - Tax office
  - Social Security Number
  - Unemployment Card
  - Access to Health
  - Access to Education
  - Bank Account
  - Access to Housing

2.1 Italian Use Case Scenarios

2.1.1 Access to the national health system

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ID:	UC_01_CIDAS
Title:	Access to the national health system (health card)
Description:	Mamadou, as migrant, wants to obtain the health card in order to have access to medical services and assistance.
Primary Actor:	1. Mamadou, as migrant 2. REBUILD Chatbot 3. REBUILD App 4. Operator of CUP (Unified Reservation Centers)
Preconditions:	1. Mamadou arrived in Italy and apply for international protection 2. Mamadou got sick and heis in need of health assistance 3. Mamadou must have a currently valid permission of stay 4. Mamadou's friends tell him about the existence of REBUILD app 5. He decides to download and use REBUILD App
Postconditions:	1. Mamadou is going to use again REBULD App and he decides to register 2. Mamadou has access to national health system
Main Success Scenario:	Mamadou **downloads** the REBUILD App, and navigates through the free content provided by APP. He wants to receive information about the way to obtain the health card: to do this the APP asks him to register and provide some personal information in order to be provided with a better service. Mamadou doesn't accept to register and so he navigates through free contents of the APP, searching the section about ACCESS TO HEALTH SERVICES. In this section, the App indicates that he should go to the Unified Reservation Centers (CUP) of the city and ask there for the required documents he has to fill and provide and to the CUP in order to obtain the health card. The day after, he goes to a CUP and with the help of an operator, he obtains the replacement sheet. After that, he will receive at his home the health card necessary to take appointments and get visited by a doctor. He decides to **log in** the APP To be provided with a better service, that he didn't found at the CUP, he must register in the APP He finds through the REBUILD App the way to fill in the forms required on the basis of his profile and also the possibility to go to "Auser Points", available in only two CUP of the city, aimed to support people in dealing with the matter.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user

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Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	CIDAS
Priority:	High level

2.1.2 Converting the type of permit of stay

ID:	UC_02_CIDAS
Title:	Converting the type of permit of stay
Description:	Souleyman's job contract expired so he must convert his permit of stay related to a current job in the one for "waiting job" (attesa occupazione in Italian)
Primary Actor:	1. Souleyman, as unemployed migrants 2. REBUILD App 3. REBUILD Chatbot 4. Worker of International Protection Service
Preconditions:	1. Souleyman has been resident in Italy for 6 years and has a residence permit for work 2. Souleyman lost his job and must convert his permit for waiting for employment 3. Souleyman accepted to provide REBUILD App with some personal information in order to be profiled 4. S. was registered in REBUILD App
Postconditions:	1. Souleyman is part of REBULD community 2. Souleyman continue to be regular on the Italian territory.
Main Success Scenario:	S. **downloads** the REBUILD App and surfs through the free content provided by APP. He wants to understand the way to convert a permit of stay (in another kind of permit of stay, in this case the one for "waiting job"), and in the Legal Area of the app he finds the documents he needs to provide to Police Headquarters *(Questura)* in order to achieve a new kind of permit of stay. Among them, there is the DID but he doesn't understand what does it mean. For this reason, he decides to register and **log in** the APP, in order to be profiled and be offered with a better service. The Digital Companion explain him that the DID is the Immediate declaration of availability for work, and after asking Souleyman where does he live, the

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	APP show him the map of his city and where is the Employment Centre that can issue this document to him. The chatbot also explain to him that in order to achieve the DID, he must present at the Employment Centre his currently permit of stay, his Identity Card and Tax code. Furthermore, the DC advice Souleyman that he doesn't need to fix an appointment because the Employment Centre is a direct access office.
Frequency of Use:	The scenario will be used many times from both different users and the same user.
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	CIDAS
Priority:	Medium level

2.1.3 Access to LGBTQI services

ID:	UC_03_CIDAS
Title:	Access to LGBTQI services
Description:	Amina, as transgender migrant woman and asylum seekers, wants to have access to specific gender-oriented services.
Primary Actor:	1. Amina, as transgender irregular migrant woman and asylum seekers 2. REBUILD Chatbot 3. REBUILD App
Preconditions:	1. Amina escaped from her country because of stigmas, discrimination and hate crimes against LGBTI people. 2. Amina apply for international protection but no one supports her in basing the request for protection on gender orientation.
Postconditions:	1. Amina found specific services and expands her community of people in which she doesn't feel discriminated. 2. Amina achieve the status of refugee.
Main Success Scenario:	Amina **downloads** the REBUILD App and surfs through the free content provided by APP because she wants to have access to specific gender-oriented services. She founds in the APP a dedicated section where is provided the contacts of LGBTQI association, since Amina doesn't want to go physically in the city in order to looking for these services.

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	She goes to MIT (Movimento Identità Transessuale) where she meets also operators who freely produce documentation to be submitted to the Territorial Commission certifying that her application for international protection is based on gender orientation.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	CIDAS
Priority:	Low level

2.1.4 Access to housing

ID:	UC_04_CIDAS
Title:	Access to housing
Description:	Nobel, as refugee, wants to find a house
Primary Actor:	1. Nobel, as migrant 2. REBUILD Chatbot 3. REBUILD App 4. Facebook group
Preconditions:	1. Nobel is a refugee that now is going to leave the reception system. 2. Nobel accepted to provide REBUILD App with some personal information in order to be profiled 3. Nobel was registered in REBUILD App
Postconditions:	1. Nobel is part of REBUILD community 2. Nobel finds a home
Main Success Scenario:	Nobel **downloads** the REBUILD App (suggested by his friends or the operators of the reception program he's leaving), and navigates through the free content provided by APP. He needs/wants to find a home and he finds the suggestion of a national web site in the free area of the APP, where there are offers of houses for rent. The offers are quite general but he would like to find a room in an apartment with other young people and he would be provided with more information about how works the rent of a home/room, so he decides to **register** and provide some personal information in order to be profiled and offered with a better service. Nobel accepts to register and **logs in** the APP.

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	The Digital Companion asks him for the city where he lives and knowing other issues about his personal profile (student/worker, age, if he's looking for a home/room), lists all the possible offers and provides him also with Facebook groups where virtual community organize itself to share the need about a home/room rental. Furthermore, the Chatbot indicates him that is very important to ask when the contract lasts and if there is a deposit to be paid in advance, and explain to him the differences between refer to an individual or an agency.
Frequency of Use:	The scenario will be used many times from different users and not so much times from the same user.
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	CIDAS
Priority:	High level

2.1.5 Access to Higher Education

ID:	UC_UNINETTUNO_01
Title:	Access to Higher Education
Description:	Ahmed, arrived in Italy and is entitled of international protection, wants to continue his previous higher education path.
Primary Actor:	1. Ahmed, as a refugee 2. REBUILD Chatbot 3. REBUILD mobile app 4. UNINETTUNO "University for Refugees" web portal 5. UNINETTUNO students secretariat
Preconditions:	1. Ahmed has a refugee status, or is entitled with humanitarian protection 2. Ahmed downloaded and registered to REBUILD app 3. Ahmed, after navigating the Welcome screen as anonymous user, decided to use the "access to higher education" services of REBUILD app; he therefore accepted to provide REBUILD app with some personal information in order to be profiled 4. Ahmed is a former Higher Education students, or completed the schooling years needed to be enrolled in Higher Education programs in Italy. He is able to demonstrate his study career, or to apply for a background credential evaluation (https://www.enic-naric.net/recognise-qualifications-held-by-refugees.aspx) as

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	implemented in https://www.universitaperrifugiati.it/en/linee-guida-riconoscimento-titoli-rifugiati.aspx 5. Ahmed is Arab mother tongue, and speaks a B2-level of English
Postconditions:	1. Ahmed is part of REBUILD community 2. Ahmed received a first provisional evaluation of his career as a student stating if he can enroll to a University program; 3. Ahmed received responses from REBUILD "orientation services" about which kind of study path at University level he can attend, according to his study titles, previous academic career, and personal objectives
Main Success Scenario:	1. Ahmed downloads the REBUILD mobile app, and navigate through the various options as anonymous user. 2. "Access to higher education" is something very interesting for him. Accessing that service, REBUILD app asks him to register, and then to provide the information needed for evaluating his student's career and to provide him with information and support about what he can do and which steps he need to go through. Ahmed gives his consent. 3. Ahmed registers and logs in the app. The app starts guiding Ahmed in providing the needed information about his study credentials. The app asks if he is able to provide evidences/documents about his upper secondary school diploma; he is able to do it. 4. Then, moving to higher education, Ahmed fills in a form about his previous academic career. The **system asks which kind of program he was enrolled in, and what exams he already took and passed.** 5. Ahmed was enrolled in Electronic Engineering, and already passed 6 exams. REBUILD app **matched his career with UNINETTUNO didactic offer** (provided through UNINETTUNO University for Refugees initiative) and **suggests to Ahmed** that **the best matching** is with UNINETTUNO's ICT Engineering program, which allows him to have all the 6 exams recognized, and is provided by UNINETTUNO as an online program also in English and Arabic, allowing him to attend the course effectively. 6. REBUILD app also **suggest Ahmed to contact UNINETTUNO Secretariat** to move on the process if he is interested in accessing this course. 7. Ahmed launch the REBUILD Chatbot asking how he can contact UNINETTUNO Secretariat. The **chatbot informs** him about office openings, telephone numbers to be contacted, specific phone numbers for international students (non-Italian speakers). REBUILD chatbot **proposes to make the phone call**. Finally, the chatbot informs Ahmed that some scholarships are available for refugee students. 8. He contacts the Secretariat, receiving the information needed for applying for the scholarship and for the admission to the program. 9. When the call ends, back to REBUILD app, the Chatbot informs Ahmed that, if admitted and once enrolled in a program, UNINETTUNO can provide him access to its "Technological Poles", physical learning centers distributed in Italy and abroad. UNINETTUNO Technological Poles are equipped with all the technologies needed to follow distance-

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	learning courses, to participate in didactic activities via videoconference, and acts as physical meeting points with other students and professors, hosting final exams for UNINETTUNO courses. 10. REBUILD Chatbot provide a preview and **a shortcut to a map showing the nearest UNINETTUNO Technological Pole**
Frequency of Use:	The scenario will be used several times by different users. Few – or just one – times by a single user.
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	UNINETTUNO
Priority:	High priority

2.1.6 Language training

ID:	UC_UNINETTUNO_02
Title:	Language training
Description:	Sahid, as a migrant, needs to learn Italian for a faster and effective access to other opportunities in his new country
Primary Actor:	1. Sahid, as a migrant 2. REBUILD Chatbot 3. REBUILD mobile app 4. UNINETTUNO "I Learn Italian" mobile app 5. UNINETTUNO "University for Refugees" web portal
Preconditions:	1. Sahid downloaded and registered to REBUILD app 2. Sahid accepted to provide REBUILD app with some personal information in order to be profiled
Postconditions:	1. Sahid is part of REBUILD community 2. Sahid completed the "I Learn Italian" course provided, reaching a B1 level ; 3. Sahid passed a certification exam for A2 level;
Main Success Scenario:	1. Sahid downloads the REBUILD app, and navigate through the various options. 2. 2A (Case 1) **"Italian Language Training" is one of the options** displayed since he is located in Italy. Sahid is really interested in learning the basics of Italian. OR

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	2B (Case 2) He is interested in some of the opportunities provided by the REBUILD app, but for some of the services provided, a basic knowledge of Italian language is necessary for completing the process (for example, a A2 level Italian language knowledge is among the requirements for long term residency permit). **REBUILD app suggest him to access to the "Italian Language Training"** option. 3. For accessing that service, he consents to provide some personal information and to do a quick **initial test about his Italian language skills.** He knows some very basics of the language (the alphabet, the "to be" verb in present tense). 4. REBUILD app suggests him to join the UNINETTUNO "University for Refugee" through its web portal, where he can find **free language training**; and to download the free app "I Learn Italian" available on his smartphone online store. 5. **REBUILD app also suggests to skip the first 10 lectures**, focused on pre-writing and basic literacy in Italian, and to start from lesson number 11. 6. At regular time intervals *(for example, once a week; this will be designed carefully in the Scenario development phase)*, REBUILD asks Sahid if he is attending the course regularly. After 4 weeks, REBUILD chatbot asks him how it is going with the Italian language course. Sahid answers that he is keeping attending the online course. **REBUILD chatbot challenges Sahid: do you want me to switch to Italian language for some chatting**? Sahid is happy about that: he can try some basic written conversation in Italian. 7. Four weeks later, while Sahid is using the chatbot for other purposes and before ending the conversation, REBUILD chatbot asks if Sahid advanced in the course. Sahid answers: yes, that he now completed more than 75% of the course and things are getting better and better with the Italian. **REBUILD chatbot propose to look for an examination center in order to be certified** at Sahid level of Italian: that will be great, since a language certification opens several doors in accessing to other opportunities in the country. 8. Sahid accepts the suggestion, and the **chatbot shows the 2 closest examination centers for Italian language for migrants**, showing the closest route with public transportation, the phone number to call, and information about the process and the costs to take the exam and get the certification. 9. REBUILD chatbot, using REBUILD Service map module, also suggests to Sahid other Italian language learning related initiatives in the nearby, that can help Sahid practicing conversation face to face.
Frequency of Use:	The scenario will be used several times by different users. Few – or just one – times by a single user.
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	UNINETTUNO
Priority:	Medium priority

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2.1.7 Information about Residency Permit

ID:	UC_UNINETTUNO_03
Title:	Information about Residency Permit
Description:	Reham, as a migrant, wants to issue a Residency Permit certificate.
Primary Actor:	1. Reham, as a migrant 2. REBUILD Chatbot 3. REBUILD mobile app 4. UNINETTUNO "University for Refugees" web portal
Preconditions:	1. Reham downloaded and registered to REBUILD app 2. Reham accepted to provide REBUILD app with some personal information in order to be profiled 3. Reham speaks Italian fluently, she is a certified A2 level 4. Reham has a job in Italy
Postconditions:	1. Reham is part of REBUILD community 2. Reham completed the process for issuing the Residency Permit
Main Success Scenario:	1. Reham downloads the REBUILD app, and navigate through the various options. 2. She asks the REBUILD Chatbot if it can **provide information about how to issue a Residency Permit.** 3. REBUILD app address **her to the video about "Fixed-term residency permit" on the basis of the information already available about her** on REBUILD app. 4. The video explains, in clear Italian language, and with the support of slides presentation listing the main relevant points, what are the preconditions for issuing the certificate, and what documents are needed to complete the procedure. 5. After watching the video, Reham comes back to the REBUILD app. **REBUILD app asks Reham to check which documents she is able to produce.** 6. She is ready to complete the documentation, so the REBUILD Chatbot propose to Reham **the two nearest places where to present the documentation** and issue the request for the permit, displaying also the opening hours of the offices. 7. Once Reham selects one of the two suggested places, REBUILD Chatbot informs Reham that an appointment is needed, providing the telephone number and proposing to make the phone call.
Frequency of Use:	The scenario will be used several times by different users. Few – or just one – times by a single user.

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Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	UNINETTUNO
Priority:	Medium priority

2.1.8 Student Counseling Support

ID:	UC_UNINETTUNO_04
Title:	Student Counseling Support
Description:	Lamis, as a migrant, is attending educational programs. She needs some support since she is experiencing difficulties and she didn't attend the last two weeks.
Primary Actor:	1. Lamis, as a migrant 2. REBUILD Chatbot 3. REBUILD mobile app 4. UNINETTUNO University Students Counselling Center 5. UNINETTUNO University web portal
Preconditions:	1. Lamis downloaded and registered to REBUILD app 2. Lamis accepted to provide REBUILD app with some personal information in order to be profiled 3. Lamis is enrolled to a UNINETTUNO University program
Postconditions:	1. Lamis is part of REBUILD community 2. Reham will successfully complete her study path
Main Success Scenario:	1. Lamis already downloaded the REBUILD app, succeeded in enrolling in a Higher Education program provided by UNINETTUNO. She provided the consent for interacting with the app, providing some information, in order to be supported by the Companion. 2. REBUILD chatbot asks at regular time intervals *(to be carefully designed. For example, once a week)* about the study activity of Lamis. 3. **Lamis replies she is not attending the course activities in the last three weeks**. 4. **REBUILD chatbot asks Lamis if she wants an appointment with UNINETTUNO students Orientation and Counseling centers** (https://www.uninettunouniversity.net/en/orientamento-universita.aspx). UNINETTUNO Orientation center is currently providing support to tackle students' problems related to the use of the computer-based system, to the creation of web-based learning groups and to organising study work as regard the different disciplines. The

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	Counselling center is provides psychological counselling for the students of all Faculties that are facing emotional stressing situations arising from personal and/or relational difficulties. 5. Lamis accepts and REBUILD app **set a phone meeting** with UNINETTUNO professors/counsellors. 6. After the support of the counselling center, she is able to start again her study path, completing successfully the courses.
Frequency of Use:	The scenario will be used several times by different users. Few – or just one, or never – times by a single user.
Status:	The scenario is the embryonic phase of the description. The technical development is still not started.
Owner:	UNINETTUNO
Priority:	Low priority

2.2 SPANISH USE CASE SCENARIOS

2.2.1 Social mentoring

ID:	UCS_UAB_01
Title:	Social mentoring
Description:	Rashid is proposed to take part in the social mentoring programme with volunteers from FAS. This will help him to better understand local culture, but also having someone to help him in his daily life.
Primary Actor:	1. Rashid, as migrant from Iran 2. REBUILD Chatbot 3. REBUILD App 4. FAS volunteers (from now on, identified as FV) 5. FAS technicians
Preconditions:	1. Rashid wants to take part in the mentoring program. 2. Rashid accepted to provide REBUILD App with some basic personal data in order to be profiled 3. Rashid was registered in REBUILD App 1. FV wants to take part in the mentoring program.

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	2. FV accepted to provide REBUILD App with some basic personal data in order to be profiled 3. FV was registered in REBUILD App
Postconditions:	1. Rashid is part of REBUILD community 2. Rashid takes part in the mentoring programme. 1. FV is mentor 2. FV provides an historical report contained in the App - All processes must be GDRP and ethically compliant.
Main Success Scenario:	Rashid spent one month living at UAB's residence and he now willing to know more about the country and start his integration process. Thus, he is assessed by CEAR personnel to take part in the mentoring process. He will use the REBUILD App to get some more information and see some testimonials from previous participants in the program where they explain their experience. Rashid feels more motivated in taking part. He has now to follow a process explained in the App, with the support of the chatbot. There, he will introduce some profile data to help managers find a suitable matching mentor. After this, he will receive a message telling him that the process finished properly and that he will be later contacted and informed on how to proceed. FV has been told about becoming part of the mentoring program with migrants at UAB. FV only needs to get into the App and fill a form (GDPR compliant) to help creating a profile with his/her interests. After filling it, a message will thank her/him for participating. After a couple days, FV will receive an email inviting her/him to a meeting informing in-deep on what means becoming a volunteer and what the next steps are. After this, FV will be asked to take part in 2 training sessions through the App. FV will select the most suitable dates for him/her to attend. 1 day before, and the same day a couple hours in advance, FV will be reminded to attend the event. Once these steps are fulfilled, FV will finally be invited to a f2f interview to meet FAS & CEAR staff. The invitation will be sent through the App via email (FAS will schedule meetings with all volunteers using the backend, with personalised messaging, or massive messaging to groups). Now the App will suggest to FAS potential matchmaking couples based on the info provided in the profiling form. FAS and other staff will meet to check it and organise f2f matchmaking events to create the mentor-mentee couples. Once couples are done, FAS will introduce this info in the backend. Now, the App will merely be used tracking and reporting of activities performed by the couple. The mentor (FV) will be in charge of introducing this information and to provide the most relevant information to the FAS to assess that the whole process is correct. FV can send complains to FAS in case it is necessary.

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	The App sends reminder to FV in case there are missing reports, or long periods without activities (alert system). FAS can contactteams, propose meetings or complementary activities to each one separately, as a team, or larger groups. Rashid and FV can interact through the App if they want.
Frequency of Use:	Rashid and FV will be using the App sporadically at the beginning. It might get more frequent once the program starts, if they feel comfortable with the system it could be every 7 to 10 days, or more if messaging through the app is enabled.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	UAB
Priority:	High priority

2.2.2 Support accessing academic scholarships

ID:	UCS_UAB_02
Title:	Support accessing academic scholarships
Description:	Mina is a refugee student from Damascus University now living in Barcelona. Wishes to pursue her degree at UAB and she is a good candidate for accessing a scholarship.
Primary Actor:	1. Mina, as migrant from Syria 2. REBUILD Chatbot 3. REBUILD App 4. FAS staff receiving candidatures
Preconditions:	1. Mina is hosted at UAB campus 2. Mina just arrived from Syria and she is in the process to get international asylum (or not) 3. Mina started or finished a college degree and can demonstrate it. 4. Mina wants to study a degree funded by UAB 5. Mina accepted to provide REBUILD App with some basic personal data in order to be profiled 6. Mina is registered in REBUILD App
Postconditions:	1. Mina is part of REBUILD community 2. Mina got her candidature submitted and is waiting for evaluation.

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Main Success Scenario:	Mina **downloads** the REBUILD App, and surfs through the free content provided by App. She finds that FAS[1] manages the access to 10 scholarships at UAB. She started her studies in English philology before escaping from her country. She navigates through the App and reads what the conditions to be a candidate to this scholarship are, what process (i.e. necessary documentation to justify that she already started the degree) needs to be followed, and what is funded under this scholarship. She believes that she can be a good candidate and start the submission process. First, she accepts all GDPR related questions to ensure that her information will be safely stored by FAS, and after that, she starts filling a questionnaire with basic information on her (including contact information), previous education, etc. After that, she has to navigate through interactive menus to select the degree she wants to take at UAB. She can also apply some filters to ease the search, because she has a very clear idea on what she wants to do. The chatbot helps her through the process. At the end, she can submit and close the process and message informs her of the expected timings before getting an answer (via email from FAS), complemented with a contact email in case she needs some help (and the chatbot can't help her). On the other side, Anne from FAS receives all candidatures within a deadline well structured. She can download all files, with all documentation in personal files, 1 per user, (that she later saves in a private and safe repository). She can also see who started the process but where not candidates. All documentation is processed in a way that Anne has not to worry of GDPR compliance, despite she is responsible of keeping it safe. To make her life easier, she can handle all this via a web platform on her PC.
Frequency of Use:	Different users access several times, but Mina just a few.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	UAB
Priority:	Low priority

2.2.3 Access to tertiary education

ID:	UCS_UAB_03
Title:	Access to tertiary education
Description:	Maia, as migrant, wants to apply for a PhD at a Spanish University
Primary Actor:	1. Maia, as migrant from Iran 2. REBUILD Chatbot 3. REBUILD App

[1] Fundació Autònoma Solidaria is the NGO operating in the UAB providing support to migrants and refugees.

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Preconditions:	1. Maia has all the certificates from previous studies 2. Maia accepted to provide REBUILD App with some personal information in order to be profiled 3. Maia was registered in REBUILD App
Postconditions:	1. Maia is part of REBUILD community 2. Maia was admitted and registered 3. Maia found a scholarship
Main Success Scenario:	Maia **downloads** the REBUILD App, and surfs through the open content provided by the App. She wants to enrol as a **PhD student** and to do this the App asks her to register and provide some personal information in order to be profiled and offer a better service. Maia accepts to register and then she **logs in** the APP. Maia uses the **Chatbot** to ask for some information regarding the requirements for applying for a PhD in Engineering in a Spanish university The Chatbot informs her about the requirements to access a PhD degree. After the log in, Maia goes to the access education area. The REBUILD App, knowing her **specialisation** through her personal profile, proposes some universities. Among the proposed universities there is the Communication Engineering. The REBUILD App lists all the possible offers, according to her profile. Maia asks to the App to list them starting from those ones closer to city where she lives in this moment. The App shows the possible universities on the **map**, specifying where her house is. The REBUILD App provides Maia with all the needed information to **contact the universities** and she starts to send emails or call directly. In addition, Maia has not all the needed requirements to be a PhD student in Europe(e.g. 300 ECTS). She asks to the Chatbot how she can obtain them, and the Chatbot tells her to attend an MA. Maia goes to the educational section to understand what the best way to enrol for an MA. Maia needs the resident certificate to be accepted at the university. She finds through the REBUILD App the way to obtain this certificate. Maia also needs a scholarship to pay for her studies. She goes to the **education funding section.** She finds through the REBUILD App the way to apply to some scholarships.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	UAB

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Priority:	Low priority

2.3 GREEK USE CASE SCENARIOS

2.3.1 Tax office

ID:	UC_OMNES_01
Title:	Tax office
Description:	Mohamad, an asylum seeker in Greece, wants to issue a Tax Registration Number
Primary Actor:	1. Mohamad as asylum seeker 2. Rebuild Chatbot 3. Rebuild App
Preconditions:	1. Mohamad has his asylum seeker Applicant card or his residence permit card as a recognized refugee 2. Mohamad accepted to provide Rebuild App with some personal information in order to be profiled 3. Mohamad was registered in the Rebuild App
Postconditions:	1. Mohamad is part of the Rebuild community 2. Mohamad knows the address of the Tax Office he has to visit 3. Mohamad knows which documents he has to provide to the Tax Office 4. Mohamad issued a Tax Number
Main Success Scenario:	Mohamad **downloads** the REBUILD App, and surfs through the free content provided by the App. He wants to issue a Tax Registration Number and to do this, the App asks him to register and provide some personal information in order to be profiled and offer a better service. Mohamad accepts to register and then he **logs in** the App. Mohamad uses the Chabot to ask some information regarding the requirements in order to issue a Tax Registration Number. The Chatbot informs him about the requirements in order to issue a Tax Registration number. After the login, Mohamad goes to the access to the social welfare/access to labour/access to housing area. The App knowing his legal status and location, indicates the exact Tax Office he should visit and the required documents he should provide to the Tax Office. The Chatbot **tips** Mohamad before proceeding that all public documents must be in good condition/readable. The Chatbot also informs him that he should have a photocopy of his asylum seeker Applicant card or his residence permit card as a recognized refugee, which he should hand in to the Tax Office clerk. The Chatbot suggest him also to be accompanied with someone that knows the Greek language, because at the

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	Tax Office he should fill a form called M1 that is in Greek, with no alternative translation. The Chatbot also informs Mohamad that the Tax Office does not provide any Greek interpretation. Additionally, the Chatbot informs him that he should go to the Registry Office, that is located on the 3rd floor. The Chabot informs him about the working hours of the Tax Office and that there is not an Appointment system. Finally, the Chatbot informs Mohamad that his Tax Number will be issued to him in the next 2weeks to 7months because the Tax Office has to cross check Mohamad's personal data with the Asylum Office. When the Tax Number is ready, the Tax Office will inform him through phone to visit again the Tax Office to receive his Tax Registration Number.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	Low priority

2.3.2 Social Security Number

ID:	UC_OMNES_02
Title:	Social Security Number
Description:	Mohamad, his wife Fatima and their 2 underage children, all asylum seekers in Greece, want to issue a Social Security Number
Primary Actor:	1. Mohamad as asylum seeker 2. Rebuild Chatbot 3. Rebuild App
Preconditions:	1. Mohamad, Fatima and their children have their asylum seeker Applicant card or their residence permit card as a recognized refugee 2. Mohamad and Fatima are Tax Registration Number holders 3. Mohamad accepted to provide Rebuild App with some personal information in order to be profiled 4. Mohamad was registered in the Rebuild App
Postconditions:	1. Mohamad is part of the Rebuild community 2. Mohamad has all the required information that is Applied to all his family members 3. Mohamad knows the address of the Citizen Service Centre nearby his location

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	4. Mohamad knows which documents he has to provide to the Citizen Service Centre 5. Mohamad and his family issued a Social Security Number
Main Success Scenario:	Mohamad **downloads** the REBUILD App, and surfs through the free content provided by the App. He wants to issue a Social Security Number and to do this the App asks him to register and provide some personal information in order to be profiled and offer a better service. Mohamad accepts to register and then he **logs in** the App. Mohamad uses the Chabot to ask some information regarding the requirements in order to issue a Social Security Number. The Chatbot informs him about the requirements in order to issue a Social Security number. After the login, Mohamad goes to the access to the social welfare/access to labour area. The App knowing his legal status and location, indicates the exact Citizen Service Centre he can visit and the required documents he should provide. The Chatbot **tips** Mohamad before proceed, that all public documents must be in good condition/readable and that only the physical presence of the adult family members is required. The Chatbot also informs him that he should have photocopies of the asylum seeker Applicant card or residence permit card as a recognized refugee of all the family members, which he should hand in to the Citizens Service Centre officer. Additionally, all the adult members of his family must have an individual Tax Registration Number. The Chatbot informs him that they should have their names written on the photocopies, with **Greek characters**. The Chabot informs him about the working hours of the Citizen Service Centre and that there is not an Appointment system. Finally, the Chatbot informs Mohamad that their individual Social Security Numbers will be issued during their visit.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	High priority

2.3.3 Unemployment Card

ID:	UC_OMNES_03
Title:	Unemployment Card
Description:	Mohamad, an asylum seeker in Greece, wants to issue an Unemployment Card
Primary Actor:	1. Mohamad as asylum seeker 2. Rebuild Chatbot 3. Rebuild App

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Preconditions:	1. Mohamad has his asylum seeker applicant card or his residence permit card as a recognized refugee 2. Mohamad is a Tax Registration Number holder 3. Mohammad has a Social Security Number 4. Mohamad has a document that proves his current residing address (telephone bill or rent contract or residing proof document signed provided by the NGO that hosts him) 5. Mohamad accepted to provide Rebuild App with some personal information in order to be profiled 6. Mohamad was registered in the Rebuild App
Postconditions:	1. Mohamad is part of the Rebuild community 2. Mohamad knows the address of the DOLE office nearby his location 3. Mohamad knows which documents he has to provide to the Employment Office (DOLE) 4. Mohamad issued an Unemployment Card
Main Success Scenario:	Mohamad **downloads** the REBUILD App, and surfs through the free content provided by the APP. He wants to issue an Unemployment Card and to do this the APP asks him to register and provide some personal information in order to be profiled and offer a better service. Mohamad accepts to register and then he **logs in** the App. Mohamad uses the Chabot to ask some information regarding the requirements in order to issue an Unemployment Card. The Chatbot informs him about the requirements in order to issue an Unemployment Card. After the login, Mohamad goes to the access to the social welfare/or the access to labour area. The App knowing his legal status and location, indicates the exact DOLE office he can visit and the required documents he should provide. The Chatbot **tips** Mohamad before proceed, that all public documents must be in good condition/readable. The Chatbot also informs him that he should have the asylum seeker applicant card or residence permit card as a recognized refugee, a Tax Registration Number, a Social Security Number and a document that proves his current residing address (telephone bill or rent contract or residing proof document signed provided by the NGO that hosts him). The Chabot informs him about the working hours of the DOLE office and that there is not an appointment system. The Chatbot informs Mohamad that his unemployment card will be issued during his visit. The Chatbot also informs him that after he issued his unemployment card, he should renew it every 3 months online by his own or through a visit to the Citizens Service Centre. Additionally, the Chatbot informs Mohamad that if he does not renew his Unemployment card upon the predetermined date, it will be canceled and he potentially will lose all possible benefits and he will have to repeat the same procedure in order to issue a new one. Furthermore, the Chatbot informs him that after he obtain the Unemployment card, the DOLE officer will book him an appointment for a skills interview, in order to be registered in the DOLE system as a job seeker, so as to increase his chances of finding a job.

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Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	Medium priority

2.3.4 Access to Health

ID:	UC_OMNES_04
Title:	Access to Health
Description:	Fatima, an asylum seeker in Greece, wants to book an appointment to the Gynaecologist at the nearest possible Hospital
Primary Actor:	1. Fatima as asylum seeker 2. Rebuild Chatbot 3. Rebuild app 4. Public Hospital
Preconditions:	1. Fatima has her asylum seeker applicant card or her residence permit card as a recognized refugee 2. Fatima accepted to provide Rebuild app with some personal information in order to be profiled 3. Fatima was registered in the Rebuild app 4. Fatima wants to book an appointment to the Gynaecologist 5. Fatima knows that the Public Hospital tactical infirmaries are accessible only through appointment. 6. Fatima has a working mobile phone 7. Fatima does not speak Greek
Postconditions:	1. Fatima is part of the Rebuild community 2. Fatima knows the address of the public hospital she has to visit 3. Fatima knows which procedure she will follow to book the appointment 4. Fatima booked the appointment
Main Success Scenario:	Fatima **downloads** the REBUILD App, and surfs through the free content provided by App. She wants to book an appointment to the public hospital and to do that the App asks her to register and provide some personal information in order to be profiled and offer a better service. Fatima accepts to register and then she **logs in** the APP. Fatima uses the Chabot to ask some information

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	regarding the requirements and availability of medical specialists in order to book the appointment. The Chatbot informs her about the requirements and the available medical specialists to the public hospital nearby her residing area in order to book the appointment. After the login, Fatima goes to the access to health area of the Chatbot. The app knowing her location, indicates her the exact Health Unit she should visit and the required documents she should provide to the hospital. The Chatbot **tips** Fatima before proceeding that there is not an e-appointments service available for the specific hospital, so she has to book it by visiting the appointments department, or through phone. Fatima who does not speak Greek, choose to visit the appointments department of the hospital. The Chatbot informs her that she should have a Social Security Number or her asylum seeker applicant card or her residence permit card as a recognized refugee, which she should hand in to the appointment department clerk in order to book the appointment. The Chatbot also informs Fatima that the Public Hospital of the area does provide Arabic interpretation. The Chatbot informs her that she should go to the appointments department building, that is accessible for people with disabilities, and provides the exact address. The Chabot informs her about the working hours of the appointments department. The Chatbot informs Fatima that the Appointments Officer will provide her with a ticket with the exact date and time of the appointment, and that Fatima should provide to the Hospital her personal data and a valid phone number. The Chatbot also informs her that the services of the Public Hospital are free of charge.
Frequency of Use:	The scenario will be used many times from the same user and from different users also.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	High priority

2.3.5 Access to Education

ID:	UC_OMNES_05
Title:	Access to Education
Description:	Tawfik, an asylum seeker in Greece, wants to register his children (Mahmoud, Sirin, Walid, and Lara) at school: the first two at a Public Kindergarten, the third at a Public Primary School, and the fourth at a High School (i.e. F.E.).
Primary Actor:	1. Mohamad as asylum seeker 2. Rebuild Chatbot 3. Rebuild App

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Preconditions:

1. Tawfik as asylum seeker
2. Rebuild Chatbot
3. Rebuild app
4. Public Kindergarten
5. Public Primary School
6. Public High School App

A.D.Y.M.	*in Greek:* Atomiko Deltio Ygeias Mathiti *in English:* Individual Student Health Report
AUTH	Aristotle University of Thessaloniki
Edu F.P.	Education F.P.
EFA	Education for All
ZEP	Educational Priority Zones
F.E.	Formal Education
I.D.	Identity card (*in this case:* a three-fold document provided by the Asylum Service)
MoE	Ministry of Education
ODL	Open and Distance Learning
PoC	People of Concern
REC	Refugee Education Coordinator
S.W.	Social Worker
T.E.	Tertiary Education
UNHCR	United Nations High Commissioner for Refugees

Postconditions:

1. Tawfik has his asylum seeker applicant card or his residence permit card as a recognized refugee
2. Tawfik accepted to provide Rebuild app with some personal information in order to be profiled
3. Tawfik was registered in the Rebuild app
4. Tawfik wants to register his children at the Kindergarten, Primary School, and High School.
5. Tawfik knows that all levels of Formal Education require the provision of a certain number of documents to make/finalize the registration
6. Tawfik has a working mobile phone
7. Tawfik does not speak Greek
8. Tawfik enrolled his children in the schools

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Main Success Scenario:	Tawfik **downloads** the REBUILD App, and surfs through the free content provided by App. He wants to register his children at various levels of Formal Education and to do that the App asks him to register and provide some personal information in order to be profiled and offer a better service. Tawfik accepts to register and then he **logs in** the APP. Tawfik uses the Chabot to ask some information regarding the required documents and the address of the school in order to proceed with the registration of his child at the public Formal Education schools. The Chatbot: 1) shares primary links to the addresses and telephone numbers of the Directorate of Primary and Secondary Education in case Tawfik needs to visit personally and ask for clarifications or call the Directorate, 2) provides secondary links to the addresses and telephone numbers of the existing Primary Schools in close proximity to the area where Tawfik lives, as well information regarding the school's office/registration hours, capacity and available vacancies in each class/level, 3) informs him about all the required documents, 4) has links to printing shops for Tawfik to copy all the I.Ds., 5) includes links to medical services for the completion of vaccinations and A.D.Y.M, 6) has links that offer access to a copy of ZEP 1, 7) has links to a copy of a Solemn Declaration (article 8 L. 1599/1986), and 8) explains ways for Tawfik to state and provide his home address. After the login, Tawfik chooses to access the Directorates of the Chatbot in turn. Tawfik speaks neither Greek nor English and thus the information can be offered in his mother tongue. Due to the fact that Tawfik is not able to read in his mother tongue, the app provides an audio navigation to all the information (i.e. in a speaking manner). The app knowing his location, indicates the exact school(s) he should visit and the required documents he should provide to the school(s). The Chatbot informs Tawfik -before moving on- that there is not a way to make an online registration, so he must make the registrations by going to the respective school(s) in person. The Chatbot also communicates to Tawfik that the Directorates and the Schools of the area do not provide Arabic interpretation. The Chatbot also informs him that registrations at public schools are free of charge.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	High priority

2.3.6 Bank Account

ID:	UC_OMNES_06
Title:	Bank account

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Description:	Mohamad, a recognized refugee in Greece, wants to issue a bank account
Primary Actor:	1. Mohamad as recognized refugee 2. Rebuild Chatbot 3. Rebuild app
Preconditions:	1. Mohamad has his asylum seeker Applicant card or his residence permit card as a recognized refugee 2. Mohamad is a Social Security and Tax Registration Number holder 3. Mohamad has a certification of his mobile phone provider 4. Mohamad document that proves his current residing address (telephone bill or rent contract or residing proof document signed provided by the NGO that hosts him) 5. Mohamad accepted to provide Rebuild app with some personal information in order to be profiled 6. Mohamad was registered in the Rebuild app
Postconditions:	1. Mohamad is part of the Rebuild community 2. Mohamad knows the Bank Branch he has to visit 3. Mohamad knows which documents he has to provide to the bank 4. Mohamad issued a bank account
Main Success Scenario:	Mohamad **downloads** the REBUILD App, and surfs through the free content provided by App. He wants to open a bank account and to do this the App asks him to register and provide some personal information in order to be profiled and offer a better service. Mohamad accepts to register and then he **logs in** the App. Mohamad uses the Chabot to ask some information regarding the requirements in order to open a bank account. The Chatbot informs him about the requirements in order to open a bank account. After the login, Mohamad goes to the access to the social welfare/access to labour area. The app knowing his legal status and location, suggests him the exact available Bank Branches he can visit in the area he is residing and the required documents he should have with him. The Chatbot **tips** Mohamad before proceed that all public documents must be in good condition/readable. The Chatbot informs him that he can visit one of the four available banks in the area. It also informs him that every bank requires different type of documents and that he should choose first the bank he prefers to visit, in order for the Chatbot to provide him with the correct information. Mohamad chooses Piraeus Bank. The Chatbot displays a list with the required documents. Mohamad returns to the previous page of the Chatbot and chooses Alpha Bank. The Chatbot displays a list with the required documents. Mohamad returns to the previous page of the Chatbot and chooses Eurobank. The Chatbot displays a list with the required documents. Mohamad returns to the previous page of the Chatbot and chooses National Bank of Greece. The Chatbot displays a list with the following documents:

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	1. Asylum seeker Applicant card or his residence permit card as a recognized refugee 2. Land line /internet bill 3. Certification of mobile provider/company 4. Social Security Number 5. Tax Number 6. A declaration, in order to be signed by the legal representative of the organization that is in charge of the Housing project that it is hosting him, which he should hand in to the Bank clerk. Mohamad chooses to proceed with National Bank of Greece because he has all the required documents available. The Chatbot informs him that the bank clerk will request the above mentioned documents in order to photocopy them. The bank will keep the photocopies and will return to him the original ones. The Chatbot informs him that in case he doesn't speak Greek he can use the assistance of someone that speaks both Greek and his native language. This person doesn't have to be a certified interpreter. The Chatbot also informs Mohamad that the bank does not provide any Greek interpretation. The Chabot informs him about the working hours of the Bank Branch and that there is not an appointment system. Finally, the Chatbot informs Mohamad that his bank account will issued to him right after the finalization of the procedure.
Frequency of Use:	The scenario will be used many times from different users and just few times from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES
Priority:	Low priority

2.3.7 Access to Housing

ID:	UC_OMNES_07
Title:	Access to Housing
Description:	Housing requests managed by Asylum Seekers Protection Directorate (DPAS)
Primary Actor:	1. Asylum Seeker Protection Directorate (DPAS) 2. KEM of Kallithea, Athens 3. Sheltered Accommodation Management (SAM) platform

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Preconditions:	1. Asylum Seeker Protection Directorate receives a housing request from Social Integration Centre (KEM) of Kallithea, Athens. 2. The request received by the KEM of Kallithea, was accepted as valid because it respects all prerequisites. 3. The prerequisites in order the request to be valid are: 1) International Protection Applicant Card and 2) that they live under vulnerable housing/social conditions. Mohamad's family consist by him, his wife and 4 children. One of his children has mobility disabilities. 4. Mohamad has his asylum seeker's Applicant card and he is currently homeless. 5. Asylum Seeker Protection Directorate has access to the *apartments.sam.org.gr* platform
Postconditions:	1. Mohamad and his family managed to find a safe and dignified home
Main Success Scenario:	Asylum Seeker Protection Directorate (DPAS), has full access in the *apartments.sam.org.gr* platform and has a nationwide picture of the partners that participate in the ESTIA program under UNHCR. After examining the application send by the KEM of Kallithea, Athens, a DPAS officer navigates through the platform in search of an available slot for accommodation provided by one of the ESTIA partners. A suitable apartment that fulfils the family needs of Mohamad is located in Kilkis area, at the housing project managed by OMNES. Through the SAM platform, DPAS officer confirms that the available apartment is accessible for people with mobility disabilities, has an elevator, solar water heater, an autonomous oil boiler and 2 bedrooms. Thus, the apartment is suitable for the vulnerability of Mohamad's family and DPAS flags the apartment as 'pending to filled', informing OMNES and UNHCR at the same time. DPAS informs the KEM of Kallithea that after examining the request an available apartment has been located in the town of Kilkis, managed by OMNES. KEM of Kallithea has to come in contact with Mohamad and inform him of the available apartment. After he and his family agree to be transferred to the accommodation in Kilkis, DPAS sends a referral to UNHCR informing about the allocation of Mohamad's family to the specific apartment located by the *apartments.sam.org.gr* platform, managed by OMNES. After all related parties are informed (Mohamad and his family, DPAS, UNHCR, OMNES) a transportation is arranged for them within 48 hours with the support of UNHCR. UNHCR informs OMNES regarding the exact date and time of their arrival in Kilkis.
Frequency of Use:	The scenario will be used many times from different users and only a couple of time at maximum from the same user.
Status:	The scenario is in the embryonic phase of the description. The technical development is not still started.
Owner:	OMNES

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Priority:	High priority

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3 REBUILD PLATFORM REQUIREMENTS

The REBUILD Platform will rely on strong foundations defined by **high-level requirements**. These requirements have been identified during the first stage of the project, starting from the analysis of the main objectives of the REBUILD project and refining them with the help of the project partners. The requirements have been defined at high level without detailed features or technologies to adopt for implementation. This approach has been followed in order to maintain definition of the platform general, in particular in the first phase of the project where some concrete aspects, related to the role of the platform and its usage, are not completely defined. The details will be defined after the results of the first pilot phase of the project become available.

It is important to underline that the following requirements are related to the REBUILD platform and not to the pilot application to be implemented and executed.

The requirements analysis mostly relies on the **Volere methodology** [6]. The Volere methodology comprises a general template for presenting the layout and structure of the requirements specification document, as a result of the requirements elicitation and analysis processes. Not all elements of the Volere template are considered to be suitable for our project. Therefore, a number of Sections from the Volere template about the description of functional and non-functional specifications have been chosen. The sections that were considered more suitable to the REBUILD requirements are the following:

- Functional Requirements
    - Functional and Data Requirements
- Non-Functional Requirements
    - Look and Feel Requirements
    - Usability and Humanity Requirements
    - Performance Requirements
    - Operational and Environmental Requirements
    - Maintainability and Support Requirements
    - Security Requirements
    - Cultural and Political Requirements
    - Legal Requirements

This deliverable adopts the aforementioned structure by reporting functional and non-functional requirements for the main components of the envisaged solution at proposal time.

For the description of each atomic requirement that belongs to each one of the aforementioned subsections we provide a tabular template based mainly on the Volere requirements shell, after applying the following modifications:

The following fields have been added to the default template:

- *Name*, this field has been added in order to provide in addition to the ID field, a short name that describes the specific requirement in human readable format.
- *Difficulty*, which indicates the level of difficulty for the implementation of this requirement (estimation from a technical point of view). Difficulty ranges on a scale from 1 (=low difficulty) to 5 (=extreme difficulty).

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- *Actors*, indicating either those persons or things that interact externally with the system or one of its components, or react through these components.

Table 1 summarises the REBUILD "requirements shell" (i.e., requirements gathering template) in tabular format, after the application of the aforementioned changes to the Volere shell.

From the original Volere table we decided to add another row "Related Use Cases" to link the described requirement with all the Use Case Scenarios it derives.

Table 2: Requirements table template

ID	***A unique identifier***
Name	*Title of the requirement.*
Requirement Type	*Whether it is a functional or non-functional requirement and in case of non-functional requirements the specific type of requirement according to the Volere notation.*
Description	*A requirement must say exactly what is required.*
Rationale	*A justification of the requirement*
Fit Criterion (Measurable)	*By measurable we mean is it possible, once the system has been constructed, to verify that this requirement has been met. In other words, this means the tests which must be performed in order to satisfy the requirement*
Customer satisfaction	*Degree of stakeholder happiness if this requirement is successfully implemented (Scale from 1=uninterested to 5=extremely pleased).*
Customer dissatisfaction	*Degree of stakeholder unhappiness if this requirement is not implemented (Scale from 1=hardly matters to 5=extremely displeased).*
Priority	*The requirement is ranked according to the customer value. (Scale from 1=low priority to 5=highest priority).*
Conflicts	*Any requirements whose implementation is blocked by this one.*
Constraints (Attainable)	*An attainable requirement will usually answer the question: How can the requirement be accomplished? Hence, here we provide any constraints / conditions for the requirement to be executed.*
Difficulty	*Level of difficulty for requirement implementation (estimation). (Scale from 1=low difficulty to 5=extreme difficulty).*
Actors	*An actor is someone or something outside the system that interacts with it or with one of its components (primary actor). If the actor interacts with the system or one of its components is a secondary actor*
Related Use Cases	
Author	*The owner of each requirement that was recorded.*
Revision	*This section lists when a version of the requirement was created.*

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3.1 DEFINITION OF REBUILD ARCHITECTURE REQUIREMENTS

Below the detailed description of every requirements, namely all the standards and formalisms that guarantee an easy and effective interaction among all the components.

ID	REQ.01
Name	Interoperability with legacy systems
Requirement Type	Non functional (Security)
Description	It has to be possible to connect the REBUILD platform with the existent public or private legacy systems (e.g. databases, web services). Secure and reliable communication with the existing LSP information systems have to be provided without requiring changes in these systems.
Rationale	The existent LSP services are based on different and probably legacy technologies. Some parts of these services will continue to be fully functional because are related to critical functionalities that cannot be easily changed or outsourced.
Fit Criterion (Measurable)	The platform is able to provide connectors towards the PA's legacy systems to enable the interoperability.
Customer satisfaction	5 (Scale from 1=uninterested to 5=extremely pleased).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	No other requirement is blocked by this one
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	Local Service Providers and REBUILD Technical Team
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UCS_UAB_03 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	ENG team
Revision	V1.0, 01/07/2019

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ID	REQ.02
Name	Open API access
Requirement Type	Non Functional (Operational and Environmental)
Description	Data and services available in the REBUILD platform have to be accessible via a set of APIs using standardized approaches (e.g. RESTful API).
Rationale	The REBUILD platform should provide tools, data and services to several actors, PAs, SMEs external systems etc. For this reason it is necessary that all the necessary platform functionalities have to be accessible through standard and well documented open APIs.
Fit Criterion (Measurable)	All REBUILD platform components provide a set of Open API to interact with them; All Open APIs of the REBUILD platform are documented in a standard and uniform way.
Customer satisfaction	4 (Scale from 1=uninterested to 5=extremely pleased).
Customer dissatisfaction	3 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	4 (Scale from 1=low priority to 5=highest priority).
Conflicts	No other requirement is blocked by this one
Difficulty	2 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD component owners
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UCS_UAB_03 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	ENG Team
Revision	V1.0, 01/07/2019

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ID	REQ.03
Name	Secure storage
Requirement Type	Non Functional (Security)
Description	REBUILD platform components have to provide secure storage functionalities in order to record data needed for their execution.
Rationale	It will be useful to have storage functionalities available in the REBUILD platform to manage and save in a secure way the information of the citizen and the usage of LSP service. The REBUILD platform should not permanently store any sensitive data in order to reduce security and privacy issues.
Fit Criterion (Measurable)	All REBUILD components have implemented proved expedients to secure the data they store and manage.
Customer satisfaction	4 (Scale from 1=uninterested to 5=extremely pleased).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	The Req.4 requirement is blocked by this one.
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD component owners
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_03 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UCS_UAB_03 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	ENG Team
Revision	V1.0, 01/07/2019

ID	REQ.04
Name	Privacy and Data Protection
Requirement Type	Non-Functional (Security)

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Description	REBUILD platform has to be compliant with the EU legislation regarding privacy and data protection. It should adopt all the necessary technologies, standards and methods to protect privacy of the users of the platform services and to secure stored information that could be considered private.
Rationale	Despite the fact that the platform should not permanently store any sensitive data, the services that will run on it could handle private data. For this reason, it is necessary that the REBUILD platform provides functionalities to protect personal information in line with the current legislation.
Fit Criterion (Measurable)	The REBUILD platform is compliant with Data Privacy and Data Protection EU regulations.
Customer satisfaction	5 (Scale from 1=uninterested to 5=extremely pleased).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	Although no requirement is blocked by this one, it is to be considered mandatory.
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD platform providers
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_03 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UCS_UAB_03 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	ENG Team
Revision	V1.0, 01/07/2019

ID	**REQ.05**
Name	Profiling analysis must provide a embedding vector
Requirement Type	Functional (Module associate to Task 3.1)

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Description	REBUILD profiling module has to create low-dimensional vectors that represent profiles and background information (Cultural background, origin, age, gender, skills, and education, family, status) among others.
Rationale	The use of complex techniques, such as encoders and Machine learning, shall provide a feature vector that will be used by the rest of modules (for instance, skills matching module). The rational is to receive as input a set of embeddings of the user/service features, to make a vector that allocates the input into a dimensional space that can be comparable with the rest of items.
Fit Criterion (Measurable)	Differentiation (or similarly) of related items.
Customer satisfaction	5 (Scale from 1=no-similar to 5=extremely similar). Evaluated by both. LSP and end-users
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	The performance of this module directly affects the rest of modules (skill matching, recommendation, chatbot interaction). Therefore, is critical to attain proper Platform function. This module heavily depends on the data available (collected) to create profiles and datasets for training.
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD platform providers
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_03 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UCS_UAB_03 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	CERTH
Revision	V1.0, 24/10/2019

ID	**REQ.06**

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Name	Skill matching through Machine Learning must provide appropriate matching
Requirement Type	Functional (Module associate to Task 3.2)
Description	REBUILD skill matching module will create a Deep Learning model to predict optimal matching in a deeper level aiming for a sustainable integration model.
Rationale	The use of deep learning architectures will permit to take the output of the Profiling analysis module to match the user embedded vector into a Local Service Provider that offers the functionality that this particular user needs.
Fit Criterion (Measurable)	2 approaches: a) QoS, services matches . b) How appropriate is a matching created by the REBUILD subsystem evaluated by the Service provider and the user
Customer satisfaction	5 (Scale from 1=unappropriated to 5=extremely appropriated).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	Although this module is not critical for the platform execution, it has a direct impact on user traction, due to the importance in guiding to migrants and service providers time-saving
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD platform providers
Related Use Cases	UC_02_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UCS_UAB_01 UCS_UAB_03 UC_OMNES_05 UC_OMNES_07
Author	UPM
Revision	V1.0, 24/10/2019

ID	**REQ.07**
Name	Recommendation creation
Requirement Type	Functional (Module associate to Task 3.3)
Description	The recommendation module must provide adequate tips and suggestions for supporting migrants/refugee accessing services and reach the desired content/infomrmation.
Rationale	The idea is to get information from the skills matching, interests, needs and availability of services to speed up the integration process. This module will access data from diverse sources to create the text and links to be presented.

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Fit Criterion (Measurable)	2 Approaches: a) Number of recommendations created. b) Evaluation by end-users and service providers.
Customer satisfaction	5 (Scale from 1=uninterested recommendation to 5=extremely pleased).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	This is not a critical module. But the problem is that the recommendations can delay or even not provide added value for the users
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD platform providers
Related Use Cases	UC_02_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UCS_UAB_01 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	UPM
Revision	V1.0, 24/10/2019

ID	**REQ.08**
Name	Personalised Interaction and perception
Requirement Type	Functional (Module associate to Task 4.4)
Description	The system must be able to interact with the user adapting its functionalities to the user needs. Additionally, the system must be able to collect information related to the user's interaction to present analytics that guide users and system administrators to improve the system functionality.
Rationale	The system shall adapt not only the language, but also the functionalities and level of support to the users based on the information available. The input shall come from the profiling modules, and in addition to information such as residence country, must be able to present customized services offer. Additionally, the system must register all the user interactions to present graphics and analytics of activity to help REBUILD system's administrators to improve the platform performance
Fit Criterion (Measurable)	Usefulness of the information shall be evaluated by: end users in terms of usability and REBUILD owner to evaluate people interactivity.

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Customer satisfaction	5 (Scale from 1=hard to use, non-comfortable to 5=extremely comfortable, easy to use).
Customer dissatisfaction	5 (Scale from 1=hardly matters to 5=extremely displeased).
Priority	5 (Scale from 1=low priority to 5=highest priority).
Conflicts	This is not a critical module, no one module depends on it, however is key in the success of the product as a user-friendly interface and surfing will help users to come back to it and even promote it.
Difficulty	4 (Scale from 1=low difficulty to 5=extreme difficulty).
Actors	REBUILD platform providers
Related Use Cases	UC_01_CIDAS UC_02_CIDAS UC_03_CIDAS UC_04_CIDAS UC_UNINETTUNO_01 UC_UNINETTUNO_02 UC_UNINETTUNO_03 UC_UNINETTUNO_04 UCS_UAB_01 UCS_UAB_02 UC_OMNES_01 UC_OMNES_02 UC_OMNES_03 UC_OMNES_04 UC_OMNES_05 UC_OMNES_06 UC_OMNES_07
Author	UPM
Revision	V1.0, 24/10/2019

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4 REBUILD REFERENCE ARCHITECTURE AND COMPONENTS

The **REBUILD Architecture** (Figure 1) was designed in order to be scalable and interoperable to deliver an application user-friendly and easy to use. The final user (both migrants and LSPs or any stakeholders) access to the REBUILD services through **User Interfaces**. These ones are the REBUILD smartphone App and REBUILD infographic web page.

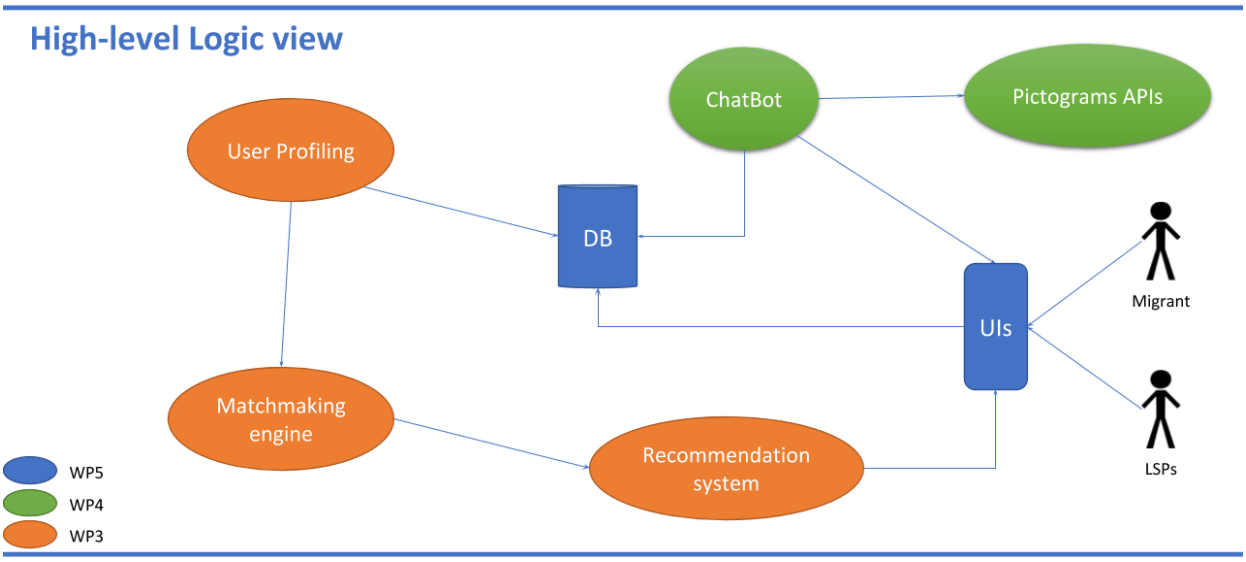

Figure 1: REBUILD High-level Logic Architecture

The RB App offers two types of content: free content and content visualisable after registration and profiling of user. Migrants can use the free content whenever they want, but if they need personalised services they have to register. The REBUILD platform profiles the users compliant with the GDPR, storing each kind of the user data(personal and not-personal data) in the **RB DataBase** by using cryptographic techniques to assure the privacy and protection of data. The **User Profiling** is in charge of building a multi-spatial vector to represent the profile of the user.

REBUILD App is able to provide end-users with personalised suggestion for a specific service. Users can talk with the **ChatBot** in order to receive help and suggestion on specific needs. Migrants can interact with the ChatBot in three different modalities: writing, speaking and use the pictograms provided by **Pictograms APIs**. The ChatBot uses the **Recommendation System**, that leverages the user profile vector and the Matchmaking System to analyse the data coming from different kind of data (e.g., personal data, educational data, skills, user desiderata, etc.), to provide suggestion to the end-user. The **Matchmaking System** works on the basis of the data provided by migrants and LSPs, for example in the scenario of Job seeking this component is able to match the skill of the migrants, their past employments with the more requested job profiles provided by LSPs.

REBUILD Architecture was designed to meet all the needs coming from the Use Case Scenarios without having a specific purpose. The idea is to have a **modular platform** in order to integrate and use specific technical components according to the specific requested service. This way to proceed guarantees the extensibility of the platform by adding new technical components with a limited effort, fostering the **interoperability** and **scalability**.

In the following sections, the REBUILD main components were described in detail.

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4.1 REBUILD TECHNICAL COMPONENTS

In this Section each component of the REBUILD platform will be described by using the following Component Card (Table 2). The aim is not to give a complete description of the component but its overview, mainly focused on the interaction with other components to better understand how the integration among all components work.

Table 3: Component Card template

ID	A unique identifier
Name	*The component name*
Description	*A general description of the component indicating its main scope and the role the component has in the architecture*
Functionalities	*A list of the main functionalities offered by the component*
Input Data	*Input data accepted by the component (if applicable).*
Output Data	*Output data produced by the component (if applicable).*
Interaction with other components	*This field lists interactions with other components of the REBUILD platform.*

4.1.1 User Profiling module

ID	UP
Name	User Profiling
Description	Module that embeds the inputs available of a user to be projected into a coefficients vector that represents the user to compared with the rest of users.
Functionalities	To provide representations of users that will serve as inputs to the "Matchmaking Engine" and the "Recommendation system" modules.
Input Data	All information collected and available from users (Registration)
Output Data	An output vector that allows mathematical treatment of the users.
Interaction with other components	The output vector will be used by the "Matchmaking Engine module" and the "Recommendation system"

4.1.2 Matchmaking Engine module

ID	ME
Name	Matchmaking Engine
Description	This module will receive the vector coefficients of a particular user and will project it into a space that will measure distance with the representation of services aiming at identifying the most similar services.
Functionalities	To find the most useful and similar services to the ones expected and preferred by the users.

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Input Data	User Profile data
Output Data	A list of services sorted by relevance (degree of acceptance by the user)
Interaction with other components	The input of the module comes from the user profiling engine and the output will be used by the recommendation system module.

4.1.3 Recommendation System module

ID	**RS**
Name	Recommendation System
Description	This module will collect information from multiple sources to create a set of personalised tips and suggestion.
Functionalities	To support migrants in the integration process by guiding them into sorted steps.
Input Data	A list of services and users sorted by relevance for a certain user.
Output Data	A set of N relevant services for a certain user.
Interaction with other components	The input of the module comes from the Matchmaking engine and the output is used in the User Interface.

4.1.4 Audiovisual communication module

ID	**CB**
Name	Audiovisual communication module
Description	An application and backend for the creation of short videos and the routing of those videos to the appropriate recipients.
Functionalities	- Request for Video creation using a scenario - Video creation directly from the end users - Routing of the video to the appropriate recipients based on the needs of migrants (e.g. to translators etc.)
Input Data	a) A video captured from a mobile device b) the language of the migrant creating the video
Output Data	A video directed to the appropriate recipient
Interaction with other components	Chatbot

4.1.5 Chatbot module

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ID	CB
Name	Chatbot
Description	This module will use a conversation tree defined by our pilot partners and will enable the communication of migrants and PAs through written text as well as visual communication
Functionalities	A chat service that combines automated answers as well as communication with social service providers (humans)
Input Data	A conversation tree related to the topic the chatbot should interact (e.g. medical).
Output Data	Communication with users through Facebook messenger or other chat channel.
Interaction with other components	Pictograms API

4.1.6 Pictograms API module

ID	PA
Name	Pictograms API
Description	This module will facilitate the communication between the users and the services by providing them with pictograms, and/or videos and audios to improve the understanding of the global application.
Functionalities	Facilitate the communication between the end-users and the different services throughput the user interface.
Input Data	The uuid of the service.
Output Data	A set of pictograms, or any media-content such as videos and audios that improves the understanding of the required service.
Interaction with other components	The module will send the output data to the user interface of the project in the service.

4.1.7 REBUILD Data Base module

ID	RDB
Name	REBUILD Data Base
Description	A data base that relies on the REBUILD Data Model defined in the D5.2 [7]
Functionalities	The REBUILD Data Base will store all the information coming from the interaction between the REBUILD platform and the users.

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Input Data	User data coming from the use of the apps
Output Data	User and system data
Interaction with other components	The REBUILD Data Base will interact directly with the Chatbot, User Profiling and User Interfaces modules

4.1.8 Users Interfaces module

ID	UI
Name	User Interfaces
Description	The User Interfaces module aims at allowing the end-users (migrants or LSPs) to interact with the REBUILD system.
Functionalities	The migrants can interact with the REBUILD App (front-end) and the LSPs can provide information related to the services they provide through a web-based application (back-end)
Input Data	User data coming from the use of the apps
Output Data	Data needed to satisfy the request of the users, coming from the integration of the REBUILD and LSP services.
Interaction with other components	The User Interfaces will interact directly with the Chatbot, Recommendation System and Data Base modules

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5 A SNAPSHOT ON THE TECHNOLOGIES STATE OF THE ART AND BEYOND

The aim of this section is to give the reader an overview of the technologies that will influence the entire REBUILD Platform, understand the state of the art and how the REBUILD project can go beyond it. This will be only a brief description to make this deliverable comprehensive and self-explainable. For further information about the technologies leveraged to make up of the REBUILD Platform and its related technical component, please refer to deliverable of "WP3 - Data analysis and skills matching" and "WP4 - The Digital Companion ".

5.1 MODELS FOR SKILL MATCHING

The central idea behind skill matching models is to find potential similarities among the different members or users to provide them with specific recommendations in a further step based on the proposed criteria. Along this section, the different stages for the Skill Matching component will be explained in detail. More specifically, an introduction to text embedding and information coding will be presented with the objective of defining how the profiling of the different users will be coded or represented. Then, a brief explanation of both skill matching and skill recommendation will be described to introduce the proposed approaches that will be explored. Finally, the last part of this section will remark the technologies and architecture that will be used to integrate this component in the final solution.

5.1.1 Text embedding and information representation

The ambition of skills matching task is to provide automatic and semi-automatic mechanisms to find synergies between multiple inputs to create relationships that speed-up complex manual tasks. In general terms, this is performed by soft matching [8], although the main application is given by job-matching [6], [9]. Within the REBUILD project, several migrant-Local Service Provider needs will be matched. These services will be developed mainly in T3.1, T3.2 and T3.3 respectively. An extended manner to proceed is to collect the information provided by all users and transform it into numerical inputs that algorithms can understand. This task is relevant in data science and it is generally known as pre-processing. Assuming that most of the information collected will be presented as text, then multiple Natural Language Processing techniques can be applied. The most novel approaches in text embedding representations rely on the EM-Algorithm [10], which allows consistent (and enough differentiated) representations at word (entity), sentence and paragraph level. The main ambition of technical activities in T3.1 and T3.2 are to properly identify and classify the diverse topics of interest and map these topics from user needs into subspaces that will be processed for the rest of the modules to guide the user and LSPs with the best options according to offered services and needs. REBUILD will go beyond the state of the art by incorporating local contexts and hierarchies that will permit better separation of the services, which will yield to a better classification and recommendations by the subsequent models.

5.1.2 Skill matching and Recommendations

The fast evolution of Deep Learning techniques is attracting a huge interest from research community. The skill matching task can be expressed as a multi-class classification problem, in which given a set of features (inputs from migrants), there is an algorithm that search for the most adequate set of services. The goal is to obtain a list of services (output levels) sorted according to the migrant needs. For this reason, the activities in WP3 will be devoted to develop Deep Learning architectures and appropriate selection functions. These functions, are normally called as loss function and that penalizes services that are not related (and therefore not interesting) to the user. The use of multi-layer Neural Networks represent the state-of-the-art [8] and represent the most attractive option that will be explored in REBUILD. In case the input data has multimedia content, then approaches based on Convolutional Neural Networks (CNN) or sequential models can provide added value in this task. The beyond-the-state of the art in REBUILD project will be the proposal of attention mechanisms that can better understand the user/service projection to improve the performance of the state of the art techniques.

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However, there are multiple aspects that must be considered to ensure data integrity and unbiasedness: 1) Data protection, ethical and privacy issues must be addressed properly. 2) Moreover, data security must be tackled from both data governance and IT-based security approaches. The former is referred to the data structure, accessibility of information and hierarchical levels for data access, whereas the later involves all security levels, authentication, encryption, etc. 3) Although there are some datasets in the literature, these are clearly biased (general jobs professional market), therefore REBUILD must ensure the mechanisms to gather information that can be extended for migrants, maintaining a balanced set and quality management procedures.

5.1.3 Programming Languages and Frameworks

Partners in REBUILD consortium are experienced in the use of Deep Learning frameworks for classification tasks. Python [11] is nowadays the most extended programming language for Deep Learning. The most common frameworks are TensorFlow [12] and Pytorch [13]. Some of the current works and contributions to the state-of-the art in computer vision [14], text analysis [14] of REBUILD partners provide guarantee for proper implementation of such algorithms for the proposed tasks. Furthermore, visual aspect of interfaces will be developed for Android technology and backend services will utilize technology such as NodeJS [15].

5.2 Models for a Digital Companion

In the context of migration and the support of migrant integration in new societies, a digital companion should take into account the linguistic and cultural barriers, and the volatility of population of migrants that should be supported. Considering these aspects, a digital companion should work on solutions that are flexible and easily adapted to new languages, illiterate populations, or populations with minimal technology skills. The chatbot communication as well as the audio-visual communication modules that REBUILD selected to propose and implement, cover those aspects while enabling public authorities to communicate fast and efficiently with the populations in need.

5.2.1 Hybrid (human/machine) chatbot

The chatbot component will work as a digital companion tool that will help migrants to communicate and get the information they need, and it will be developed in the scope of T4.3. The communication will be performed in a written way at first stage with the prospect to reduce it or completely replace it, by visual options. The visual options will be based on pictograms and multilingual signs developed in T4.1. There will be specific topics of interest where migrants and service providers will ask their questions. For each topic the chatbot will follow a predefined conversation tree and based on this, it will lead the conversation to a point that can provide the correct answer. For its proper operation, it will use the personal data user provided to REBUILD application during his/her registration. In order to consider all possible cases and all possible questions, the chatbot will have a routing component that will be responsible to understand when the conversation have to be routed to a hand-off discussion and it will transfer the conversation to a human partner.

So far, there have been developed many chatbots with high variety of topics, such as The National Geographic's Genius[i] bot which speaks like Einstein would, the Whole Foods [16] bot which is framed by recipes, product recommendations and cooking ideas and the Woebot [17] which works as a therapist. None of them has to do with migration issues and with information provision on everyday life problems that impacts migrant's life, and consequently, their integration. Most of the already available chatbots are working through Facebook Messenger and many of them such as Woebot are working in an unstructured way, by processing free text. In contrast, the REBUILD's chatbot will have a strict structure based on the already mentioned conversation trees and will be able to activate a hand-off conversation.

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5.2.2 Audio Visual Communication

The chatbot will provide an option for visual communication. This component will be developed in the scope of T4.2 in order to support population with difficulties communicating only in writing English/Italian/Spanish or Greek, or complete illiterate population. The users will record and sent a video with their question speaking in their mother language, instead of writing it to the chatbot. With this component an asynchronous communication between migrants and service providers will be provided where there will be enough time for the service providers to evaluate the requests and give the necessary priority to each one. The audio visual communication will be provided two-way. In the first way, the communication will start from a migrant who wants to ask a question to the corresponding service provider. So, the user will record and send his/her video and a routing component will decide who is the appropriate receiver. The answer to the request will be produced also as a video by the service provider. The opposite direction will also be supported and it will be based on task management. In this way the communication will start from an administrator who will create new tasks. The tasks will be frequently asked questions that are well known to service providers. A similar routing component will send the newly created task to an appropriate partner who will be responsible to answer. The partner can be a translator, a service provider's employee or another migrant who knows the spoken language in the video and is familiar with the question's answer. In order the routing component to work properly it has to have access to the personal information user has already provided to REBUILD.

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6 CONCLUSION

This document summarises the output of the tasks T5.1 - "Use cases and requirements (platform and service requirements)" and T5.2 - "Platform Architecture".

The design of the REBUILD reference Architecture will be exploited in the next activities of WP5. First of all, the Task 5.3 - "User Interface" will use the work done in the Use Case Scenarios and co-creation workshops to prepare the **mock-ups** and the real **REBUILD GUI**. Second,T5.4 - "REBUILD Platform development" will rely on the **specifications** of technical components defined in this document (Section 4.1), and finally the T5.5 - "System Interfaces & service integration" will start its activites taking into account the REBUILD Reference Architecture and the **interaction** among all components.

The Reference Architecture could change and be improved after the test and piloting phase taking into account the feedback coming from the users. In this way, we can deliver a more robust and open platform based on the usage in a **real life**. The functionalities of the REBUILD technical component could be changed and this will also imply on the relation among components. The final version of the REBUILD Architecture and component definition will be delivered in the D5.3 - "REBUILD Pilot Platform final version".

This deliverable also contributes to meet the Milestone MS2 - Pilot definition.

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