



Project acronym: **DECTS**

Project title: **Deaf Emergency Chat and Training System**

Third Party: **OwnYourData**



Deliverable 2.1

Requirements Document

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Table of content

1	Introduction	5
1.1	Background / Deliverable Description	5
1.2	Relation to other DECTS deliverables	5
2	Work done and current status	6
2.1	Methodology	6
2.2	Results and discussion	6
2.2.1	Stakeholders	6
2.2.2	Standards	7
2.3	Maintenance and next steps	7
3	Requirement Specification	8
4	Conclusions	16



Executive Summary

The deliverable provides an overview of the requirements in the DECTS project which implements and evaluates an end-to-end workflow for deaf and hard of hearing persons for consent management, secure and privacy preserving personal data provisioning in case of an emergency, and rolling out the existing Austrian solution at the European level.

The document includes a general introduction to the project in chapter 1, the methodology including a stakeholder analysis in chapter 2, and the actual requirements in chapter 3. The document is concluded with an outlook and a glossary.



1 Introduction

1.1 Background / Deliverable Description

Article 9 of the UN convention of the rights of persons with disabilities requires countries to take measures for the full and equal participation of persons with disabilities (including access to communication and information services) and the European Disability Strategy 2010-2020 also calls for the principle of accessibility at all levels. Despite this, there are still about 1 million deaf and hard of hearing persons in Europe who currently rely on outdated technology (e.g. fax) and help from others to make an emergency call.

The good news is that existing standards and technologies can provide an adequate and barrier-free solution. DEC112 (Deaf Emergency Call System) already implemented an emergency infrastructure (compliant to NENA NG9-1-1 and ETSI TS 103479) including a mobile app to enable deaf and hard of hearing persons to access emergency services in Austria. This solution has been in operation since February 2019. A lot has been learned about the actual needs of emergency callers as well as call takers in control rooms.

This document describes the requirements In the DECTS project (Deaf Emergency Chat and Training System) and the main goals are:

- Research and development of consent management technology to exchange training chat protocols between deaf persons and call takers in control rooms.
- Allow secure and privacy-preserving data provisioning of pre-recorded personal information in the course of an emergency chat.
- Extend DEC112 to operate at European level by implementing national and international accessibility to emergency services.

1.2 Relation to other DECTS deliverables

This requirements document is one out of 3 documents providing the detailed description about this project:

- D2.1 Requirements Document: lists functional and non-functional requirements for consensus management, data provisioning, and emergency call routing
- D2.2 Design Specification: describes and depicts the system design together with API endpoints and data formats of the various components; it also includes translated texts for the multi-language mobile app, chat bot, and viewer application
- D2.3 Data Management Plan: outlines used data, processing steps, as well as storage and archiving means



2 Work done and current status

This section presents the performed work in the DECTS project regarding requirements elicitation, current status, and outlook for further development.

2.1 Methodology

In the course of the project the following steps were performed:

- Identify relevant list of stakeholders and describe their needs as well as their environment where they operate and make decisions
- Describe Requirements (this document), deduce the Design Specification (D2.2), and validate against the Data Management Plan (D2.3)
- Setup a dedicated test system for deploying and verifying available components and iteratively feedback any learnings
- Deploy solution with partners and collect further feedback

Due to the Covid-19 crisis a lot of communication took place in emails and virtual meetings and so far we did not have the chance for many in-person meetings with stakeholders identified in section 2.2. Nevertheless, it was possible to achieve the objectives of the project and will continue to refine the solution.

2.2 Results and discussion

2.2.1 Stakeholders

Initially, a list of relevant stakeholders was compiled:

- Deaf and hard of hearing persons as users of the DEC112 App (tag: **eu** - end user)
- Control rooms and emergency service providers as users of the DEC112 Border and Viewer application (tag: **cr** - control room)
- Organizations representing deaf and hard of hearing persons for promoting the DEC112 solution (tag: **org** - organization)
- Government & politics for establishing legal circumstances to operate emergency chats (tag: **gov** - government)
- Public Safety industry for integrating with the DEC system (tag: **in** - industry)
- Community of volunteers to develop and operate the DEC system (tag: **com** - community)
- MyData-Operators for providing a personal data store to persist and provide additional information in case of an emergency chat (tag: **pds** - personal data store)

All requirements were mapped to at least one of those stakeholders to document source and motivation. Additional feedback from the respective groups is added in each section when new input becomes available.



2.2.2 Standards

In the course of developing DEC112 the following standards were identified and are adhered to in developing and operating the DEC system:

- ETSI TS 103 479 - Core elements for network independent access to emergency services; described in detailed here:
https://www.etsi.org/deliver/etsi_ts/103400_103499/103479/01.01.01_60/ts_103479v010101p.pdf
- Decentralized Identifier (DIDs) for managing identities of end-users; described in detail here:
<https://www.w3.org/TR/did-core/>

2.3 Maintenance and next steps

Currently, the DEC112 system is maintained by Wolfgang Kampichler, Richard Prinz and Mario Murrent (company: *MeeCode by Mario Murrent*) with the help of volunteers and funded through various research grants and company donations.

The OwnYourData Data Vault is maintained and operated by the public charity to foster personal use of data (legal name: *Verein zur Förderung der selbstständigen Nutzung von Daten*)- a non-profit association registered in Austria.

Both groups are working now for some years in their respective domain and have joined forces in this project. Because of the fruitful collaboration and the established user base they will continue to operate the described system and there are plans to find a dedicated non-profit association to also provide a legal entity for upcoming projects.

3 Requirement Specification

3.1 Overall Description

The project DECTS (Deaf Emergency Chat and Training System) aims to provide deaf emergency calls and a training environment in several languages.

3.2 Building Blocks

Figure 3.1 depicts building blocks and data flows of the system.

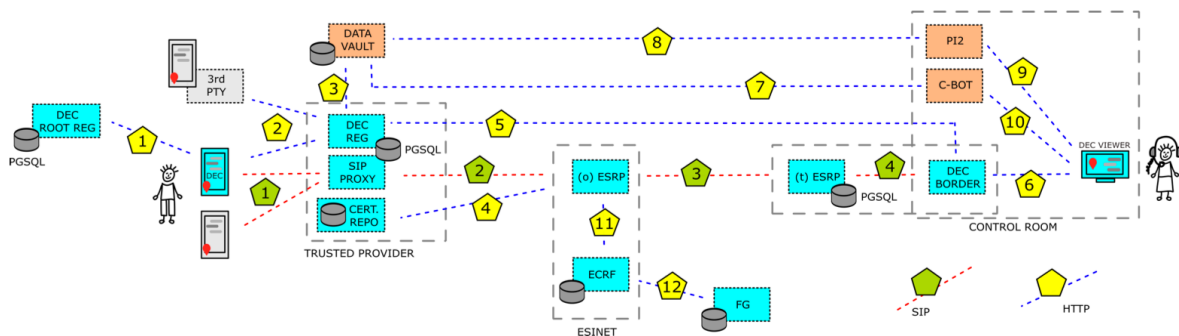


Figure 3.1: Building Blocks of DECTS

3.3 Non-Functional Requirements

Non-functional requirements specify the system’s operation capabilities and constraints that enhance its functionality.

3.3.1 Performance and Scalability

Requirements that describe throughput under a given workload for a specific time frame in each setting.

ID	Tags	Description
Perf_1	gov, org	The overall system shall handle at least 10.000 registered users.
Perf_2	gov, org	The overall system shall handle at least 50 concurrent emergency chats

3.3.2 Portability and Compatibility

Requirements to make sure that the system can be operated now and in the foreseeable future on the available platform infrastructure.

ID	Tags	Description
Port_1	com	Available standards and best practices for the respective areas should be identified and adhered to.



3.3.3 Reliability, Availability, and Maintainability

Requirements describing the accessibility of the system to the users at a given point in time and how to quickly recover from any failures. This

ID	Tags	Description
Rel_1	com	Server components shall be made available as Docker containers.

3.3.4 Security

Requirements about authorized access and protection.

ID	Tags	Description
Sec_1	gov	All external data transfer shall be encrypted.

3.3.5 Localization

Specify requirements in line with the context of the target audience..

ID	Tags	Description
Loc_1	eu, cr	The user interface shall be available in German, English, French, Spanish, and Romanian.

3.3.6 Usability

Requirements that define the ease-of-use for the system.

ID	Tags	Description
Usab_1	eu	The DEC112 app shall be designed to be usable also in stressful situations when performing an emergency chat.
Usab_2	eu	Confirmation of the phone number shall require entering a verification code sent via SMS.

User feedback from existing DEC112 system:

- Users do not necessarily have a web browser installed on their smartphone and can't use a link in an SMS to confirm their phone number during onboarding.

3.4 Functional Requirements

Functional requirements describe how a product must behave and which features and functions are available.



3.4.1 Root Registry

The root configuration provides the DEC112 App a list of DEC112 registries and other resources (e.g. language resources).

ID	Tags	Description
Root_1	cr, com	The root registry shall provide an API for the DEC112 App to provide a list of available DEC112 registries.
Root_2	eu, com	The root registry shall provide an API for the DEC112 App to provide language resources (e.g., text templates in different languages).

3.4.2 DEC112 App

The DEC112 App is a react-native app available for Android and iOS. It is the primary interface for a user who wants to make an emergency chat using the DEC112 infrastructure.

ID	Tags	Description
App_1	eu, cr	The DEC112 app shall allow users to initiate and perform an emergency chat.
App_2	eu, cr	The DEC112 app shall require users to perform an onboarding workflow to provide additional information in case of an emergency chat.
App_3	eu, cr	The onboarding workflow shall include SMS verification of the entered phone number.
App_4	eu, com	Additional information provided during the onboarding workflow shall either be stored on the mobile phone or made available at a service endpoint specified in a DID.
App_5	eu, cr	On initiation of an emergency chat either the locally stored additional information or the DID should be provided.
App_6	eu, cr	The DEC112 app shall be able to continue running when the app is put into background mode.
App_7	eu	The DEC112 app shall allow users to test emergency calls.
App_8	eu	The DEC112 app shall provide a possibility for the user to delete their registration.
App_9	eu	Additional Information stored on the device shall be editable by the user - except for the phone number.



App_10	cr	The phone number shall not be editable after successful registration.
App_11	com	The DEC112 app shall provide the possibility to show the accepted legal after successful registration in the help tab.
App_12	eu	The DEC112 app shall provide the possibility to change the language after successful registration in the settings menu of the help tab.
App_13	eu	The DEC112 app shall allow users to send preconfigured texts parts during an emergency call.
App_14	eu, cr	The DEC112 app shall inform the user in case the emergency center ended the emergency call.
App_15	eu, cr	The user must not be able to send any more messages when the emergency call has been ended by the call centre.
App_16	eu	The DEC112 app shall display an indication when the network connection is not available.
App_17	eu	The DEC112 app shall provide the user the possibility to end the emergency call.
App_18	eu, gov, cr	The DEC112 app shall send position updates during an emergency call.
App_19	eu	The DEC112 app shall send system information including battery status and carrier information during an emergency call.
App_20	eu	The DEC112 app shall notify the user if no profile data has been entered.
App_21	eu	The user shall have the possibility to postpone the entering of profile data.
App_22	eu	The user shall have the possibility to read FAQs within the app.
App_23	eu, com	The user shall have the possibility to view details about the partners of DEC112.
App_24	eu	The DEC112 app shall provide information about the current version of the app.
App_25	eu	The indication when no network connection is available shall disappear when the network is reconnected.



App_26	eu	The onboarding workflow shall provide the user the possibility to choose a display language.
App_27	eu	The onboarding workflow shall provide the user the possibility to choose a country.
App_28	eu	The onboarding workflow shall provide the user the possibility to resend the phone verification code.

3.4.3 Registration API

The DEC112 Registration API (RegAPI) is responsible for managing DEC112 registrations and to provide configuration information for DEC112 clients (DEC112 App).

ID	Tags	Description
Reg_1	com	The RegAPI shall provide an API for DEC112 clients to retrieve local configuration data.
Reg_2	com, cr	The RegAPI shall provide an API for DEC112 clients to register new users.
Reg_2	pds	The RegAPI shall provide an API endpoint for requesting to store additional information in a configured PDS. This storage location is managed through a DID.

3.4.4 Data Vault

The OwnYourData Data Vault is a Personal Data Store and holds additional information (emergency data) that is automatically provided during an emergency chat. Additionally, it allows to store and manage consent information about test chats.

ID	Tags	Description
DV_1	gov, pds	All emergency data shall be stored encrypted.
DV_2	eu	A user shall be able to login with the phone number and an SMS verification key.
DV_3	eu	The PDS shall allow editing emergency data.
DV_4	gov	The PDS shall provide an immutable access log to emergency data.
DV_5	eu	The PDS shall store consent information about training chats.
DV_6	eu	The PDS shall allow querying usage data about personal training chats.
DV_7	eu	The PDS shall allow editing and revoking consent information.



3.4.5 ESRP & ECRF

The ESRP represents the emergency service routing proxy known as core service of the NG112 based DECTS architecture. It is the forwarding entity between trusted SIP service providers and control room and typically interfaces with an ECRF and a PRF.

ID	Tags	Description
ESRP_1	cr, gov	The ESRP shall route an emergency chat to the appropriate control room.
ESRP_2	gov, com	The ESRP shall implement the emergency call signalling interface according to ETSI TS 103 479
ESRP_3	gov, com	The ESRP shall implement the LoST (Location to Service Translation) interface according to ETSI TS 103 479.
ESRP_4	gov, com	The ESRP shall implement the HeLD (HTTP enabled Location Delivery) interface according to ETSI TS 103 479.
ESRP_5	gov, com	The ESRP shall implement a PRF (Policy Routing Function) or interface with a PRF according to ETSI TS 103 479
ESRP_6	gov, com	The ESRP shall support TCP and TLS as transport protocol.
ESRP_7	gov, com	The ESRP shall support a registration of dequeuing entities according to ETSI TS 103 479.
ESRP_8	gov, com	The ESRP shall support adding specific SIP header fields either received from the PRF or via static configuration.
ESRP_9	com	The ESRP shall be deployed as a Docker container.
ESRP_10	com	The ESRP shall implement or support common logging facilities (e.g. syslog).
ESRP_11	cr	The ESRP shall provide user authentication for registered users (i.e. dequeuing entities).
ESRP_12	gov, com	The ESRP shall support different uniform resource names (URNs) for emergency service identification.
ESRP_13	gov, cr	The ESRP shall support Location by Reference and Location By Value.
ESRP_14	cr	The ESRP shall support geodetic location (point, circle) and civic address.



The ECRF represents the emergency call routing function known as core service of the NG112 based DECTS architecture. It is the mapping entity and may also operate as FG (forest guide) in an international deployment.

ID	Tags	Description
ECRF_1	gov, cr	The ECRF shall create mappings for different emergency services.
ECRF_2	cr, com	The ECRF shall support polygons and multipolygons as control room service boundaries as in ETSI TS 103 479.
ECRF_3	gov, com	The ECRF shall implement the LoST (Location to Service Translation) interface according to ETSI TS 103 479.
ECRF_4	gov	The ECRF shall support TCP and TLS as transport protocol.
ECRF_5	com	The ECRF shall be deployed as Docker container.
ECRF_6	com	The ECRF shall implement or support common logging facilities (e.g. syslog).
ECRF_7	cr	The ECRF shall support different uniform resource names (URNs) for emergency service identification.
ECRF_8	cr	The ECRF shall allow CRUD operations on mappings during runtime.

3.4.6 Border

A gateway / PSAP border device for connecting to the DEC112 service entities.

ID	Tags	Description
Bord_1	cr	The Border gateway shall act as a standard-compliant endpoint in a control room for an emergency chat.
Bord_3	cr	The Border shall integrate SIP based message communication into backend PSAP systems.
Bord_2	com	The Border shall hold a credential store and provide this information for registered consumers.



3.4.7 Chatbot

The chatbot provides an alternative endpoint for the Border and simulates responses from a call taker in a control room. This provides a training environment for end users and also manages chat protocol data in a consent-based way.

ID	Tags	Description
Bot_1	eu	The Chatbot shall generate predefined responses based on user input.
Bot_2	eu, org	Responses from the Chatbot shall be configurable and allow the user to navigate through a branch structure.
Bot_3	org, gov	A person interacting with the Chatbot shall have the possibility to make the chat history (containing personally identifiable information) available to defined institutions based on a usage policy.
Bot_4	pds	The usage policy shall be sent to the users' account in a Personal Data Store .
Bot_5	gov	The Chatbot shall support later changes and revocations of the usage policy attached to a chat history.

3.4.8 PI2

Additional information (emergency data) can be stored in a PDS and made available at a service endpoint defined in a DID. The PI2 service provides all mechanisms to resolve, retrieve, and decrypt information from a PDS requested by the Viewer via a DID.

ID	Tags	Description
PII_1	gov, com	Access to the PI2 shall be secured from unauthorized requests.
PII_2	cr	The PI2 service shall be able to resolve a DID and extract the relevant service endpoint.
PII_3	cr	The PI2 service shall retrieve and optionally decrypt data provided at a defined service endpoint.
PII_4	pds	The PI2 service shall store and manage key parts from the Shamir's Secret Sharing Scheme identified by the DID.

3.4.9 Viewer

In a control room for a call taker the Viewer is the client to answer emergency chats and access chat protocols from a chat bot.



ID	Tags	Description
View_1	gov	A user in a control room shall enter a username and password to login to the Viewer before accessing any functionality.
View_2	cr	The Viewer shall provide visual and audible indication for an incoming emergency chat.
View_3	cr	If an emergency chat provides additional information via a DID the View shall request this information via the PI2 service.
View_4	cr	The Viewer shall display the available location information on a map.
View_5	cr	The Viewer shall provide a chat functionality for the call taker to enter and send text messages.
View_6	cr	The Viewer shall display received and sent text messages in chronological order.
View_7	cr	The Viewer shall show the list of available chat protocols from a defined chatbot.
View_8	cr	The viewer shall display the chat history for a selected chat protocol.

4 Conclusions

This document outlined the requirements identified in the initial design phase of the DECTS project. Based on a stakeholder analysis, the know-how gained in the first year of operating the DEC112 system, and the goals defined in the project proposal the main components where identified and non-functional as well as functional requirements were documented. Based on these requirements the design is described in Del 2.2 Design Specification.



Appendix

Glossary

Below is a list of acronyms and abbreviations used throughout the document.

Abbr.	Definition
DEC112	Deaf Emergency Call
DID	Decentralized Identifier
ESRP	Emergency Service Routing Proxy
JSON	JavaScript Object Notation
PDS	Personal Data Store
PI2	Personally Identifiable Information - service component to resolve a DID and provide associated emergency information
PSAP	Public Safety Answering Point