

D 4.2.1 – E-CHAIN SOFTWARE ENVIRONMENT

Activity 4.2 – Software development

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Partner: PP6 – Prosoft d.o.o., LP – Comune di Ancona

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ACRONYMS / ABBREVIATIONS

ACRONYM	DEFINITION
SoA	State of the Art
PP	Project partners
PT	Project Team
TC	Technical task coordinator
WP	Work package
IT	Information Technologies

REFERENCE DOCUMENTATION

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1	Application Form – E-CHAIN - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network 2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN	Application ID: 10048282	Lead Applicant: Municipality of Ancona

1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to the activity 4.2 Software development of E-CHAIN project - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network.

The purpose of this document is to identify requirements for software environment, specify software environment and infrastructure for development of the services realized and integrated in E-CHAIN platform for the deployment in the pilot sites. It provides also, as an overall specification of the HW, SW and system configuration in terms of components to be procured within partners of the E-CHAIN project.

It is the operational document for the execution of the project being used:

- by the Task Manager (TM) and Project Team (PT) to provide detailed information E-CHAIN software environment
- by the other Activity 4.2 Platform development - needed for D 4.2.1 – E-CHAIN platform, D 4.2.2 – Interface development kit.
- by the Activity 4.3 Integration and testing - needed as a reference document for all deliverables
- by the Activity 5.1 Pilot implementation - as contains production environment information needed as one of the inputs for D 5.1.2. – Deployment definition in the Pilot Sites.

1.2 WORKING PRINCIPLE

By software environment we mean the development environment, testing environment and production environment and infrastructure to be provided for the development, testing and operation of the E-CHAIN platform.

The main requirements and sources of data for defining appropriate software environment and their components derive from other deliverables, as follows:

- For development environment from
 - D 3.3.2 – Technical and non-technical requirements and
 - D 3.4.1 - E-CHAIN platform design and high-level architecture
- For testing environment from
 - D 4.3.3 – Test environment report
 - D 4.3.2 – E-CHAIN commissioning requirements
- For production environment from
 - D 4.3.4 – Commissioning report

2. BACKGROUND INFORMATION

E-CHAIN (Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network) main objective is to enhance connectivity and harmonization of data for the Adriatic Intermodal Network, through the realization of a modular integrated software (E-CHAIN platform) for the management of intermodal transport services in port areas for passenger transport. To enhance the current situation, E-CHAIN will focus on providing new services such as an improved Port multimodal info mobility system for the passengers, a ticketing system integrated with other transport modes, an advanced touristic co-marketing tool for the operators. These services will be designed and deployed in the selected pilot sites (Ancona, Split and Venice). A Business model suited to adapt the technology developed in the three applicative contexts will be created and specific needs will be taken into account.

The aim of WP4 is to develop, test and implement all components of E-CHAIN platform.

For this reason, development shall comprise a set of customer oriented services, related to mobility and tourism that have been selected in the WP3. Specific objectives:

- Develop selected services according to the specifics (technical and not) identified in WP3;
- Roll out service versions at pilot sites;
- Develop WSs to allow the integration between different services/systems for a multimodal and interoperable transportation
 - Timetables and travel solution optimizing resources (vehicles, staff), real-time events (e.g. delays) in a seamless solution: from Ancona centre to Split, train+bus+ferry complete information available by APP, WEB, totem.
 - Booking and ticketing modules to allow the payment of transport modes operated by different operators (Conerobus in Ancona + Trenitalia + Jadrolinija), thanks to the integration between different IT systems and stakeholder involvement.
- Develop help-desk system to assist travellers during the trip according to their needs.

3. DEVELOPMENT ENVIRONMENT

A software development environment (SDE) is the collection of hardware and software tools a system developer uses during application creation process to build software systems.

Taking care of development costs, in the development of the E-CHAIN software platform, developers should rely on free open source development tools whenever possible, if security and reliability are not compromised.

3.1. HARDWARE, NETWORK AND SOFTWARE REQUIREMENTS

3.1.1. DEVELOPMENT WORKSTATION REQUIREMENTS

- Intel Core i5 or i7 processor or equivalent, at least 2 vCPU on cloud environment
- At least 8 GB of RAM (for build&deploy)
- Network connection with 80 and 443 open ports
- Windows / Linux

3.1.2. E-CHAIN SERVER REQUIREMENTS

E-CHAIN Backend platform WEB Server Application Framework

- PHP >= 7.2.5
- BCMath PHP Extension
- CType PHP Extension
- Fileinfo PHP extension

- JSON PHP Extension
- Mbstring PHP Extension
- OpenSSL PHP Extension
- PDO PHP Extension
- Tokenizer PHP Extension
- XML PHP Extension
- Apache / Nginx / IIS

For E-CHAIN frontend E-CHAIN platform Application FrameWork

- Apache / Nginx / IIS

3.1.3. APPLICATION DEVELOPMENT TOOLS

- Visual studio code framework or equivalent
- Git client
- Mysql Workbench 8 or equivalent
- Node v. 15.x

3.1.4. DATABASE MANAGEMENT TOOLS

- Minimum Mysql Workbench 8 for local development
- Minimum phpMyAdmin / Mysql Workbench 8 for remote management

3.2. DEVELOPMENT ENVIRONMENT SPECIFICATION

3.2.1. DEVELOPMENT WORKSTATION

Cloud server

- Intel Core i5 or i7 processor or equivalent, at least 2 vCPU on cloud environment
- At least 8 GB of RAM (for build&deploy)
- Network connection with 80 and 443 ports open
- Linux or Windows operating system?

Development framework

- Visual studio code framework or equivalent

3.2.2. WEB APPLICATION FRAMEWORK SPECIFICATION

E-CHAIN Backend Web Server Application Framework - Laravel 7

- PHP >= 7.2.5
- BCMath PHP Extension
- CType PHP Extension
- Fileinfo PHP extension
- JSON PHP Extension
- Mbstring PHP Extension
- OpenSSL PHP Extension
- PDO PHP Extension
- Tokenizer PHP Extension
- XML PHP Extension
- Apache / Nginx / IIS

E-CHAIN frontend Web Server framework - Angular 9

- Apache / Nginx / IIS
- Node v. 15.x

Version control system

- Git client

3.2.3. APPLICATION DEVELOPMENT TOOLS SPECIFICATION

Editor

- Visual studio code

Version control system

- Git client

Web services development and testing environment

- Postman

Software and frameworks for frontend components

- Node

Software and frameworks for backend / web services

- PHP > 7.2
- Mysql > 7

3.2.4. DATABASE MANAGEMENT TOOLS

- Mysql Workbench 8 for local development
- phpMyAdmin / Mysql Workbench 8 for remote management

3.2.5. BACKUP TOOLS

- Database backup - on AWS S3
- code repository - on gitlab

4. TESTING AND STAGING ENVIRONMENT

Testing and commissioning are to be carried out on installations to ensure that they meet the E-CHAIN requirements in terms of:

- Design specifications
- Requirements of the validation process
- Project Application documentation
- ICT Network standards
- E-CHAIN services requirements

In the other activity, test results are to be recorded and included in the Operation and Maintenance manuals to ensure that a record exists of all tests undertaken and that the necessary information is provided to enable the installation to be maintained to continue to deliver its designed performance.

The test environment should ensure that all modules and components could be tested and verified in accordance with defined test procedures to ensure the smooth and reliable operation of the E-CHAIN system.

4.1. REQUIREMENTS AND SPECIFICATIONS

Testing of all components of the E-CHAIN platform will be performed in the test environment by the project partners. For testing purposes, E-CHAIN servers should be in "running" status and Internet access enabled.

Note: Defining the development testing procedures for services and components of the platform and provides guidelines for developers is a part of D 4.3.3 – Test environment report.

4.1.1. HARDWARE, NETWORK AND SOFTWARE REQUIREMENTS

4.1.1.1. PORT MULTIMODAL INFO-MOBILITY

The initial phase of testing the features and functionality of the Info-Panels, regardless of whether they will be physically installed on pilot sites (Ancona and Split) or accessible only via the Web, is performed via the Web.

To test E-CHAIN Info-panels features, the tester needs a computer with at least the following features:

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Internet browser (EDGE 87+ or Chrome 96+ or equivalent)

To test E-CHAIN Info-panel QRcode mobile app download feature, a smartphone or tablet with camera and QRcode reader app installed is needed.

The last phase of testing and commissioning for the pilot sites of Ancona and Split needs to be done on the panels themselves.

The minimum requirements for panels are:

- Intel Core i5 processor or higher
- Internet connection (ADSL2+ or higher speed connection)
- Touch screen with 1080p resolution or higher and 24” size or higher
- Operating system Windows 10 or higher
- Internet browser Google Chrome 19 or higher
- KIOSK mode enabled

4.1.1.2. MULTIMODAL TRAVEL SOLUTIONS

To test the E-CHAIN platform a computer with at least the following features is needed:

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows, Linux or MacOS operating system
- EDGE 87+ or Chrome 96+

4.1.1.3. TOURISTIC CO-MARKETING

A computer with at least the following features is needed to test :

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows, Linux or MacOS operating system
- EDGE 87+ or Chrome 96+

In addition, a smartphone is needed to test messaging feature of E-CHAIN platform with:

- Android or iOS operating system
- SIM card or eSIM (to receive SMSs)

4.1.2. WEB SERVICES

4.2. TESTING AND STAGING ENVIRONMENT SPECIFICATIONS

4.2.1. SERVER ENVIRONMENT SPECIFICATIONS

- Intel Core i5 or i7 processor or equivalent, at least 2 vCPU on cloud environment
- At least 8 GB of RAM (for build&deploy and server management)
- Network high speed fiber connection with 80 and 443 ports open

4.2.2. TOOL SPECIFICATIONS

Version control system

- Git client

Web services testing environment

- Postman

Software and frameworks for frontend components

- Node

Software and frameworks for backend / web services

- PHP > 7.2
- Mysql 8

5. PRODUCTION ENVIRONMENT

Production environment describe the setting where software and other products are actually put into operation for their intended uses by end users. It is a real-time setting, on premise or in cloud, where programs are run and hardware setups are installed and relied.

Note: These specifications will be used in the process of Verification and Commissioning environment and procedures applied in practice for services and components of the platform in output D 4.3.4 – Commissioning report.

5.1. INFRASTRUCTURE REQUIREMENTS

5.1.1. PILOT SITE 1 - ANCONA

CODE	E-CHAIN PLATFORM COMPONENT	REQUIREMENT	NOTES
P1-SH-1	E-CHAIN Platform Server	1	Cloud based
P1-SSH-1-01	Intel Core i5 or i7 processor or equivalent	2 pcs	minimum
P1-SSH-1-02	RAM	8GB	minimum
	High speed fiber connection		

P1-SH-1 Hardware requirements:

- Intel Core i5 or i7 processor or equivalent, at least 2 vCPU on cloud environment
- At least 8 GB of RAM (for build&deploy and server management)
- Network high speed fiber connection with 80 and 443 ports open

P1-SS-01 Server software requirements – Echain Backend platform (Laravel 7)

- PHP >= 7.2.5
- BCMath PHP Extension
- CType PHP Extension
- Fileinfo PHP extension
- JSON PHP Extension
- Mbstring PHP Extension
- OpenSSL PHP Extension
- PDO PHP Extension
- Tokenizer PHP Extension
- XML PHP Extension
- Apache / Nginx / IIS

PS3 Server software requirements – Echain frontend platform (Angular 9)

- Apache / Nginx / IIS
- Node v. 15.x

5.1.1.1. E-CHAIN NETWORK COMPONENTS

E-chain network components and management are managed by owners of their respective places for totems and server farm for servers.

5.1.1.2. DATABASE MANAGEMENT

phpMyAdmin / Mysql Workbench 8 for remote management

5.1.1.3. BACKUP MANAGEMENT

5.1.2. PILOT SITE 2 - SPLIT

5.1.2.1. PORT MULTIMODAL INFO-MOBILITY

Item	QTTY
TOUCH-SCREEN INFO-PANELS	3

Totems will be located in a demanding outdoor environment exposed to atmospheric influences (strong sunlight, high temperatures, wind, rain), can be the target of vandals and are intended for intensive interactive use. The quality and robustness of the device and the outer casing must correspond to the operating conditions in order to perform its E-CHAIN project function in the long run.

It is necessary to ensure stable power supply and internet connection of sufficient bandwidth as well as a system backup.

After the installation and initial setup of the operating system, the totems will be software maintained and its contents updated online. The panels are intended for interaction with users and display of real time information, so non-stop availability is necessary.

Requirements specification:

Material:	steel sheet 2mm, corrosion protection
Cooling / heating:	Closed cooling system with compressor air conditioning
Screen size:	55" - 85"
Panel:	IPS
Resolution:	3,840 x 2,160 4K
Brightness:	2,500cd / m ² regulated by brightness sensor
Touch screen sensor / protective glass:	as required / 8mm (4 + 4) safety glass with anti-reflective coating
Control computer	: SOC, Intel Celeron, 4GB RAM, 32GB SSD
Operating system:	Windows 10 or higher

Internet Browser: Google Chrome 19 or higher

KIOSK mode enabled

Control system for automatic sensor control (temperature, humidity, pressure, light...), automatic heating and cooling regulation, protection and alarm due unexpected unwanted situations

Connectivity: USB, LAN, WIFI/LTE

Certificates: IP66, IK10, RED, EMC, LVD

Installation requirements:

Totem installation is performed according to the manufacturer's technical specifications, minimum prerequisites must be ensured:

- adequately prepared surface with mounting base
- provided power supply
- provided internet connection (wireless or wired) at bandwidth at least 300 Mbps

Location 1 – Jadrolinija terminal (behind on bus station)

- One-sided panel by the pillar facing the bus station
- Power supply – 220V available on site
- Internet link – wired available on site

Location 2 – Poljana kneza Trpimira (bike rental point)

- One-sided panel near bike rental spot facing to the street
- Power supply – 220V available on site
- Internet link – wired available on site

Location 3 – Trg Franje Tuđmana (Riva)

- One-sided panel on the “pedestrian island”
- Power supply - 220V available on site
- Internet link – wired available on site

A mobile computer is needed for Info-panel initial setup, testing and maintenance

Item	QTTY
MOBILE WORKSTATION	1

- Intel Core i5 or i7 processor or equivalent
- At least 8 GB of RAM
- WiFi and Ethernet or USB Network adapter
- Touch Screen
- Windows 10 or Linux

5.1.2.2. MULTIMODAL TRAVEL SOLUTIONS

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows or Linux operating system
- Chrome 96+ browser, EDGE 87

5.1.2.3. TOURISTIC CO-MARKETING

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows or Linux operating system
- Chrome 96+ browser, EDGE 87

5.1.3. PILOT SITE 3

5.1.3.1. PORT MULTIMODAL INFO-MOBILITY

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows or Linux operating system
- Chrome 96+ browser
- Kiosk mode

5.1.3.2. MULTIMODAL TRAVEL SOLUTIONS

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows or Linux operating system
- Chrome 96+ browser or Edge

5.1.3.3. TOURISTIC CO-MARKETING

- Intel Celeron n4020 processor or higher
- Internet connection (ADSL or higher speed connection)
- Windows or Linux operating system
- Chrome 96+ browser or Edge

5.1.4. WEB SERVICES

5.2. PRODUCTION ENVIRONMENT SPECIFICATION

5.2.1. PILOT SITE 1

5.2.1.1. E-CHAIN SERVER(S)

Virtual machine on Intel Xeon 8253 CPU, Windows Server 2019 Standard, 4GB RAM

Microservices on AWS new EC2 instances.

DB Backup on Amazon AWS S3

5.2.1.2. DATABASE & BACKUP MANAGEMENT

Microservices and Touristic data are stored on EC2 instances on mysql database v. 8 and daily backup is stored on S3 instances

5.2.2. PILOT SITE 2

5.2.2.1. PORT MULTIMODAL INFO-MOBILITY

INFO-PANEL SPECIFICATIONS

Item	QTTY
TOUCH-SCREEN INFO-PANELS	3

Totems will be located in a demanding outdoor environment exposed to atmospheric influences (strong sunlight, high temperatures, wind, rain), can be the target of vandals and are intended for intensive interactive use. The quality and robustness of the device and the outer casing must correspond to the operating conditions in order to perform its E-CHAIN project function in the long run.

It is necessary to ensure stable power supply and internet connection of sufficient bandwidth as well as a system backup.

After the installation and initial setup of the operating system, the totems will be software maintained and its contents updated online. The panels are intended for interaction with users and display of real time information, so non-stop availability is necessary.

Requirements specification:

1. Totem touchscreen with intel i5 or equivalent processor

- – 4GB of RAM or more
- – 128 GB SSD or more
- – Ethernet 100MB or 1GB LAN connection
- – Monitor/TV 4k 48'' or more
- – Audio speakers

2. Licenses and settings

- – Microsoft Windows Pro 10
- – McAfee antivirus/firewall SW or same level protection SW

3. Accessories

- – HDMI v.2 cable
- – ETHERNET cat.5 cable

Installation requirements:

Totem installation is performed according to the manufacturer's technical specifications, minimum prerequisites must be ensured:

- adequately prepared surface with mounting base
- provided power supply
- provided internet connection (wireless or wired) at bandwidth at least 300 Mbps

A mobile computer is needed for Info-panel initial setup, testing and maintenance

Item	QTTY
MOBILE WORKSTATION	1

- Intel Core i5 or i7 processor or equivalent
- At least 8 GB of RAM
- WiFi and Ethernet or USB Network adapter
- Touch Screen
- Windows 10 or Linux

The mobile workstation will be provided by the installation team.

5.2.2.2. MULTIMODAL TRAVEL SOLUTIONS

Same server & hosting solution as for Pilot site 1.

5.2.2.3. TOURISTIC CO-MARKETING

Same server & hosting solution as for Pilot site 1.

5.2.3. PILOT SITE 3

5.2.3.1. PORT MULTIMODAL INFO-MOBILITY

No info-mobility point totem will be provided for pilot site 3. The system will be accessible from smartphone or pc as web application.

5.2.3.2. MULTIMODAL TRAVEL SOLUTIONS

Same server as pilot site 1.

5.2.3.3. TOURISTIC CO-MARKETING

Same server as pilot site 1.

5.2.4. WEB SERVICES

Web services area available “per site”, so there are three cluster of the same type of services. Public group of services with public data are available without using authentication. Private group of endpoints are protected by JWT authentication. All endpoint use JSON format and HTTPS protocol.