Crossfreight Project

Work Package 2

Activity 2.1 – Field Operation Test Plan

Deliverable 2.1

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| Project acronym	Crossfreight
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1. Executive summary

The purpose of this document is to detail the methodology used and how it has been modified to best suit the objectives of the CROSSFREIGHT project.

This approach aims to consolidate the implementation strategy for the subsequent phases of the pilot project for each project partner by providing them with a tool capable of incorporating the specificities of each project, both in terms of the pilot project's purpose and the specific operational context in which it will be implemented.

This approach allows each partner to specifically illustrate the "flow of actions" underlying the pilot project's development. Through a planning and monitoring tool for these activities, created based on the new FESTA methodology, each partner was able to identify the key steps to follow to correctly define the Field Operational Tests.

Finally, to maximize the benefits of activities 2.1, 2.2, and 2.3 of WP2, not only the planning phase for the Field Operation Test development activities was studied, but we also went further, analyzing the entire FESTA methodology in detail, defining the additional two phases: project "running" and "assessment."

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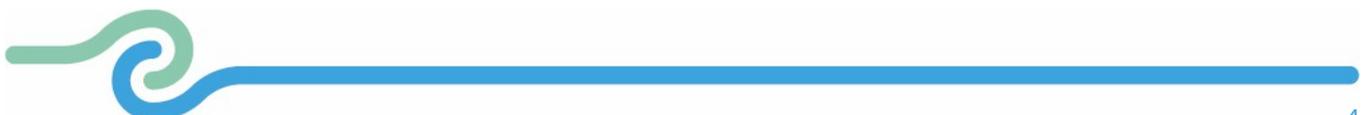
2. Methodology

2.1. Introduction

From the analyses conducted and reported in deliverables D.1.1.1 and D.1.2.1, it is clear that each pilot project is, even if minimally, different from the others. The uniqueness of each pilot project is the result of multiple factors, including the operational context, the specific function each will perform, and different integration needs with pre-existing and already operational systems.

At this point, we asked ourselves a key point that lies at the heart of the CROSSFREIGHT project: given what has been said so far, why then attempt to use a single methodology common to all pilot projects?

The answer we gave was anything but trivial: using a single structured approach allows us to:

- Compare different pilots using same or similar functionalities;
- Design interoperability with other pilots at an early stage;
- Use a common vocabulary;
- Keep track of processes for the "last railway mile" that could be useful to design a "last railway mile processes map" and identify technical requirements

The methodology used for the development of each pilot project was the **FESTA Methodology**.

The FESTA methodology defines a Field Operational Test (FOT) as "a study conducted to evaluate one or more functions under normal operating conditions typically encountered by users, using a study design to identify real-world effects and benefits."

In this case, "normal operating conditions" require that participants use the tested systems during their daily activities and that data recording be performed independently.
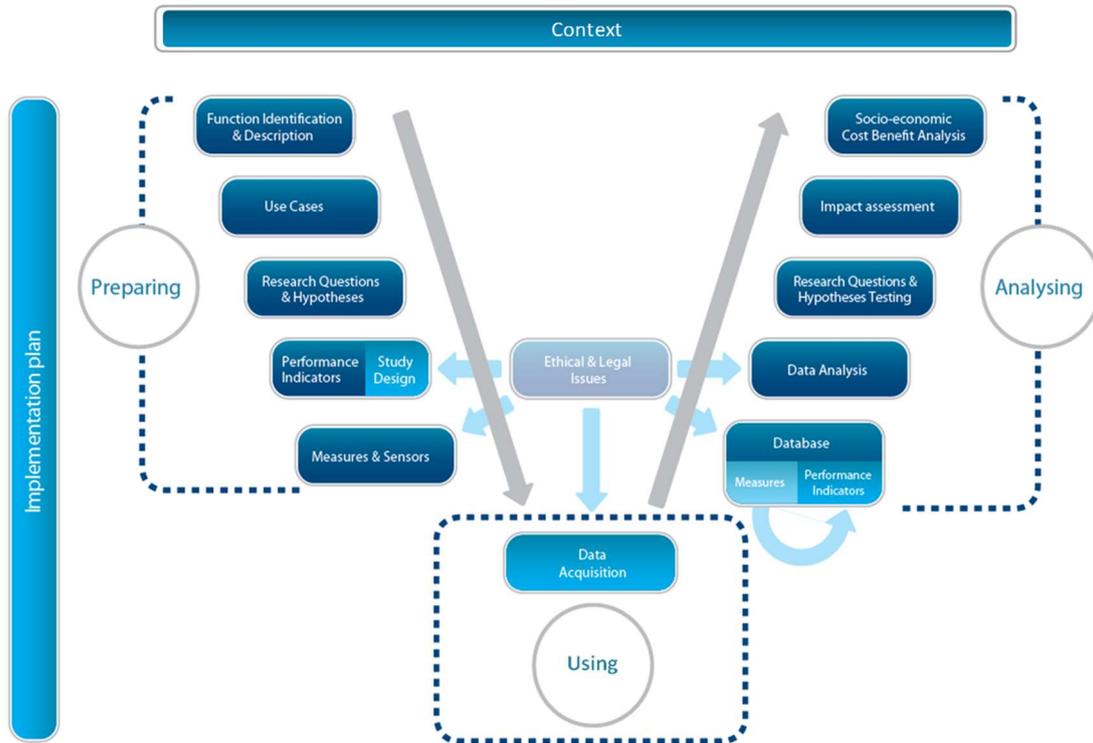
Figure 1. The FESTA V Diagram

However, the CROSSFREIGHT project was not designed to independently carry out project engineering activities. Therefore, while maintaining the criteria on which the FESTA Methodology is based, some modifications to the methodology were necessary to align it with the objectives of the CROSSFRIGHT project.

Having to reshape the FESTA Methodology, we chose to address the entire methodology, not just the "Preparation" phase, but also analyzing the "Utilization" and "Analysis" phases that will be object of Activities 2.2 and 2.3, respectively.

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2.2. The "Modified FESTA Methodology"

The analysis conducted to make some changes to the FESTA Methodology led to the identification of the following "Stages".

Planning [Stage 1]	Running [Stage 2]	Evaluation [Stage 3]
• Defining the pilot action: define functions, use cases and research questions and hypotheses, tools and data collection • Perform a feasibility check • Preparing the study: determine KPI, design the test environment (real/virtual)	• Conducting the study: test the ICT project in the previously identified test environment	• Storing the data, analysing the data, testing hyphotheses, answering research questions • Evaluate KPIs • Determining the impact: impact assessment and deployment scenarios, socio-economic cost benefits analysis

As a result of the analysis performed we have a new diagram for the so-called "**Simplified FESTA Methodology**" (see Figure 2)
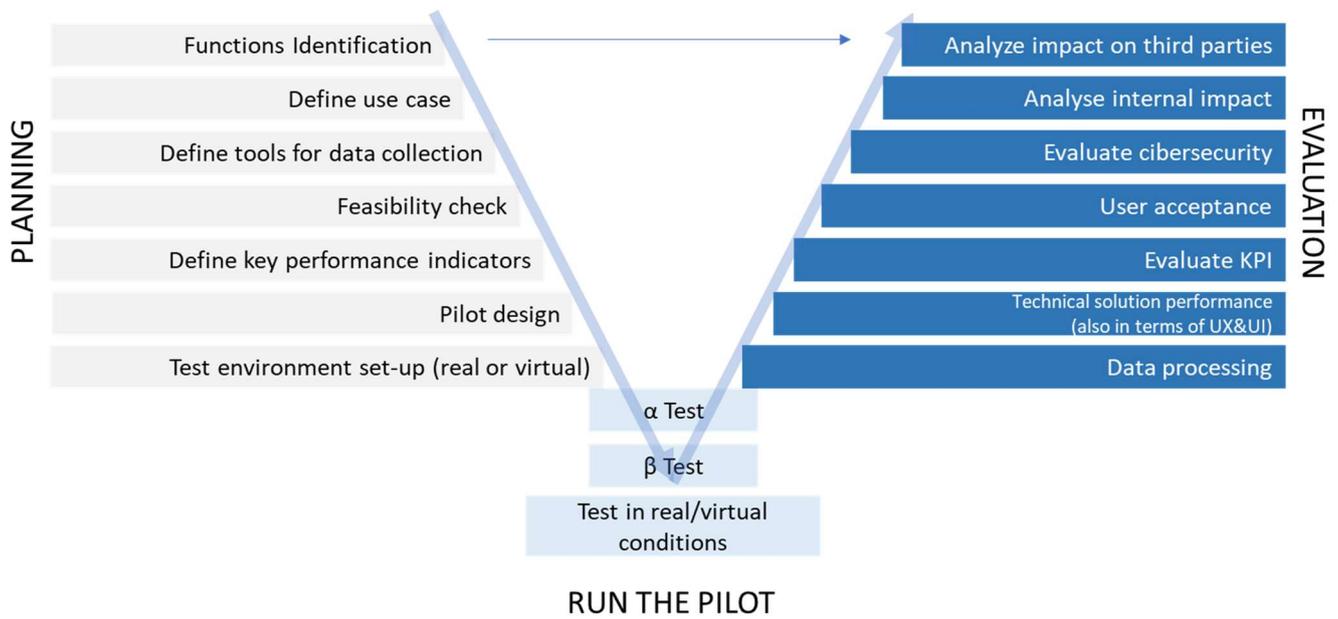
Figure 2. Simplified FESTA Methodology diagram

In this document we will explore only the Planning phase, leaving the description of the remaining phases to Activities 2.2 and 2.3.

2.2.1. Stage 1 - Planning

A Field Operation Test (FOT) can always be related to a wider perspective than is defined by just a description of the function to be tested.

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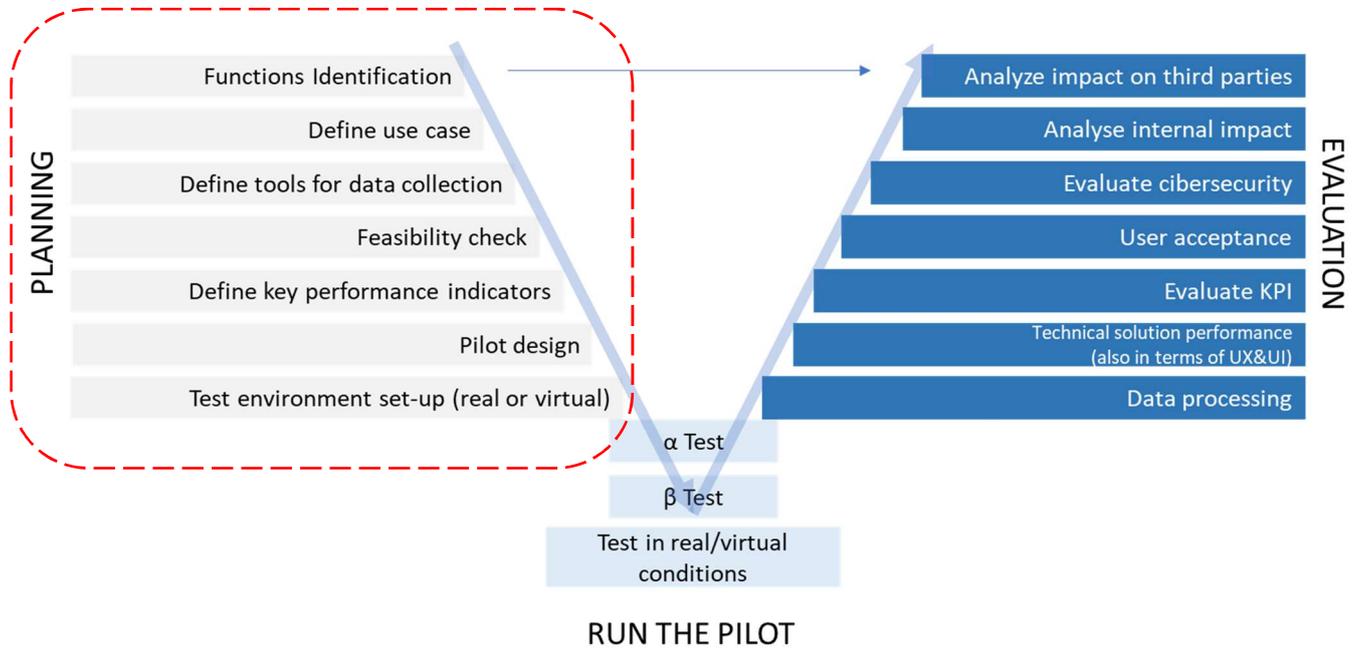
Figure 3. Simplified FESTA Methodology diagram (Stage 1 – Planning)

Listed below are the individual activities that make up the Planning phase.

- ❖ **Step 1: Selection and description of functions**
  - • Single or combination of functions
  - • Cooperative systems (interactions with other systems)
- ❖ **Step 2: Definition of use cases and situations**
  - • A specific event which a system is expected to perform according to a specific function
- ❖ **Step 3: Identification of the data source**
  - • Is there a database from which the necessary data can be imported?
  - • Simulated data entry (manual or by a connection with another ICT tool)
- ❖ **Step 4: Feasibility check**

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- Does the project require specific technologies or skills that are available and can be managed effectively?
- Are there any legal aspects that could prevent the project from proceeding?
- Can the project be managed effectively within the existing organizational structure or by third parties?

❖ **Step 5: Link hypotheses with indicators for quantitative analyses**

- KPI-1: Lower CO_2 emissions;
- KPI-2: Higher availability of the track;
- …..
- KPI-n:………..

❖ **Step 6: Design of pilot ICT tool**

- Plan each step for the design of the ICT project (tools, programming language, GUI, etc…)

❖ **Step 7: Design test environment for pilot ICT tool**

- Plan each step for the design of the test environment for pilot ICT project.

A structured list of activities as a function of each Step of the Stage 1 has been designed and sent to all the PPs to help them keeping track of each activity for the Planning of the Pilot Action (see Annex 1 - Stage 1. PPs Planning activities).

In the next chapter will be presented the Field Operation Test for each PP as a result of the Planning analysis.

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2.3. Planning analysis for each PP

2.3.1. ITL planning analisys

2.3.1.1. A brief description of the pilot project

ITL Foundation is the partner of CROSSFREIGHT project in charge of the coordination of the pilot action that will be implemented in Ravenna Port Authority railway infrastructures.

The overall objective of the pilot project is to shift from the actual manual operation of single railway shunting process managed via e-mail and phone to the expected assisted automation through a software module for optimizing the planning and execution phase of railway shunting operations at the Ravenna hub, as well as its integration with existing systems and/or those under development by the Port Authority of the Central Northern Adriatic Sea.

2.3.1.2. Application scope

The aim of the application is to prioritize shunting operations and to optimize resources allocation as well as to digitalize data sharing in the intermodal node of the Port of Ravenna with potential transferability to the intermodal nodes of Emilia-Romagna Intermodal Cluster and other nodes

Objectives of the software module for optimizing the planning and execution phase of shunting operations:

- optimization of shunting team assignment and improvement of operational efficiency,

- increase in the utilization of railway node and network capacity,

- improvement of interoperability and synchronization among the various stakeholders (railway undertaking, shunting operators, intermodal terminals, and Multimodal Transport Operators – MTO),

- reduction of the environmental impact and CO_2 emissions of railway operations,

- reduction of energy consumption in railway operations.

2.3.1.3. Identification of the main modules

The aim is to provide the Port Authority with a software module for the optimization of the planning and execution phase of railway shunting operations at the Ravenna port hub, through the automation and digitalization of railway operations – Rail Shunting System (RSS) – ensuring effective and efficient allocation of resources, assets, and the execution of the various planned and ongoing operations.

The module represents an integrated system for the management (planning, execution) of all phases related to shunting and positioning of railway wagons within the Ravenna hub area.

The system must be capable to manage the railway operation in the Candiano yards (left-side yard "Candiano" and right-side yard "Base e Pesa").

The module must be capable of acquiring possible georeferenced positioning data of locomotives and wagons for potential rescheduling activities.

2.3.1.4. Identification of the main functions

1) **Annual/Weekly Scheduling:** Management of the annual dataset of handling requests from railway undertakings transmitted by RFI, including all trains from different railway companies for each valid timetable throughout the year. The RSS module must manage data for long-term planning.

2) **Daily Scheduling:** The RSS module must allow control of planned operations, adding information regarding predicted departure/arrival times (Estimated Time of Departure/Arrival - ETD/ETA), and extraordinary trains and cancellations derived from the real-time update system provided by RFI (PIC) or potentially other information received directly from railway undertakings.

3) **Optimization:** The RSS module must include an optimization system that produces an optimized plan for shunting operations, responding to efficiency criteria in terms of utilizing teams dedicated to shunting and minimizing operations and rolling stock handling (km travelled per locomotive), which will support and streamline the operator's activities.

4) **Acquisition of Shunting Requests During Execution:** The system must acquire shunting requests during execution with information on the wagons associated with each train. This information can

be entered directly by external users (e.g., yard managers, railway undertakings, etc.), generating email notifications upon receipt of the requests (documents) for incoming primary shunting, outgoing primary shunting, supply secondary shunting and withdrawal secondary shunting.

5) **Shunting Registration:** The RSS module must support personnel in completing the shunting orders prepared during daily scheduling for each train/movement and allocating resources – i.e., associating planned shunts with available teams – to cover the entire workload while optimizing operations (minimizing cost in terms of time, manpower, and machine handling) and respecting team availability constraints.

6) **Shunting Start:** Upon completion of shunt registration, the assigned team must receive a notification indicating the date and time to begin the shunt, allowing them to start execution and certify the event using a dedicated function on appropriate mobile devices.

7) **Shunting End:** The team will complete the shunt execution and must certify the event using a dedicated function in the dedicated window available on the mobile device (e.g., tablet). At this stage, it should be possible to enter additional notes regarding immobilization, immobilization time, and free-text notes.

8) **Pre-Archiving:** For each executed shunt, relevant information must be entered, simultaneously transmitting the information to third parties (sending an automatic notification to those concerned).

9) **Archiving**: For each executed shunt and after the "train departure" event, the entire shunting cycle should be considered complete, allowing for invoicing. A summary report (Excel-pdf format) with the services performed must be issued, sending information on the completion of the shunt and train departure

2.3.1.5. Data source

The module must interface with Rail Management Platform of Ravenna Port. It will also draw data from RFI (PIC) or potentially from railway undertakings.

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2.3.1.6.   Feasibility check

The project is deemed feasible as the module will be integrated with systems that are already being used at the port of Ravenna. The use of the module will require some specific training, but the provider will be obliged to carry out this kind of training to the end users.

No legal restrictions that could undermine the project have been identified.

2.3.1.7.   Key Performance Indicators (KPI)

- Number of movement requests managed by the RSS module for annual and weekly scheduling; % of requests managed by the module compared to the total number of movement requests
- Number of movement requests managed by the RSS module for daily scheduling; % of requests managed by the module compared to the total number of movement requests
- Capacity of the module to absorb train delay due to the external reasons (delay on network etc.) based on the average arrival delay and average departure delay per train.
- The difference in time spent between manual and automized planning
- The use of resources such as means, infrastructure and shunting teams in terms of time spent

2.3.1.8.   Gantt for each activity

	M1	M2	M3	M4	M5	M6
PHASE 1	Analysis and design					
PHASE 2		Development				
PHASE 3				Producing user manual and documentation		
PHASE 4				Testing		
PHASE 5					Training	
PHASE 6					Impact assessment	
PHASE 7						Release

2.3.1.9. Design test environment for pilot ICT tool

The first step of test environment will be virtual. A production environment will be cloned, and all the use cases will be tested in order to verify the effectiveness of module

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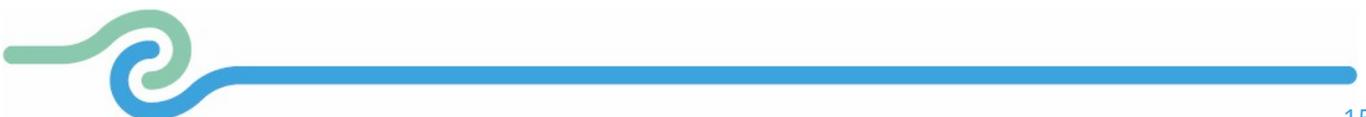
2.3.2. Adriafer planning analisys

2.3.2.1. *A brief description of the pilot project*

The pilot project at the Port of Trieste, led by Adriafer, focuses on the digitalization of shunting and train circulation procedures within the port railway network. The main objective is to further integrate and expand the functionalities of the existing ICT tools (PCS Sinfomar and Trainshunt) to provide a single, harmonized platform for managing shunting requests, train authorizations, and wagon data.

Since 2019, Adriafer has already implemented several digital solutions, such as the Trainshunt software for shunting operations integrated with the Port Community System Sinfomar module for train management. However, not all processes have been digitalized yet, and gaps remain in terms of interoperability, data quality, and real-time coordination.

The pilot aims to bridge these gaps by extending the digitalization of operational workflows, enabling smoother train circulation authorisation process within the Trieste port area, reducing manual interventions and human errors, and ensuring that all actors involved in the shunting process rely on a single and reliable data source. This initiative will contribute to higher data visibility among the involved actors that leads to an improved coordination among terminals, railway undertakings, and port authorities. Moreover, to reduce the process execution timing, and to avoid residual manual operations and human errors.

2.3.2.2. *Application scope*

The pilot project will be implemented within the Port of Trieste railway network, where Adriafer manages shunting operations across different port terminals. The scope focuses on the integration of PCS Sinfomar and Trainshunt to ensure seamless digital management of shunting requests, authorizations, and wagon data.

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The system will support the coordination of all shunting-related processes within the port area, with direct benefits for terminals, railway undertakings, and Port Authority.

2.3.2.3. Identification of the main modules

The system will include the following modules:

a) Shunting request management: submission, cancellation, and suppression of shunting requests;
b) Execution module: shunting request acceptance/refuse, resource planning, operations start and conclusion;
c) Wagon database: shared and synchronized wagon lists between PCS Sinfomar and Trainshunt;
d) Data exchange interface: interoperability functions ensuring real-time transfer of operational data between the two systems.

2.3.2.4. Identification of the main functions

The ICT system will provide the following main functions:

a) User access control through secure login and role-based profiles;
b) Digital submission and processing of shunting requests, including cancellation and suppression options;
c) Digital acceptance or refuse of the shunting request;
d) Automatic synchronization of wagon data between PCS Sinfomar and Trainshunt;
e) Operational data visualization, allowing planners and operators to monitor the status of shunting activities in real time;

2.3.2.5. Data source

The data sources for the pilot project will be:

- PCS Sinfomar: providing official shunting request declarations, customs-related information, and security authorizations;
- Trainshunt: containing operational data collected in the field by Adriafer's teams, including wagon composition and shunting execution details;

- Shared wagon database: acting as the central reference for wagon information across both systems;
- Historical records: past shunting operations and circulation requests stored in existing databases, to be imported for consistency and performance benchmarking.

2.3.2.6. Feasibility check

The feasibility of the pilot project is ensured by the fact that both ICT tools — PCS Sinfomar and Trainshunt — are already in operation within the Port of Trieste. The pilot will therefore build on existing infrastructures, focusing on extending functionalities and improving interoperability.

The platform will be designed to be user-friendly and to integrate seamlessly into the current workflow of Adriafer's planners and operators.

The availability of established ICT tools, combined with a step-by-step implementation strategy, makes the project both realistic and cost-effective. Furthermore, the solution will be scalable and replicable in other port nodes facing similar operational challenges.

2.3.2.7. Key Performance Indicators (KPI)

The following KPIs will be used to assess the effectiveness of the pilot project:

1. Reduction of shunting request processing time (from submission to authorization);
2. Percentage of digitalized shunting operations compared to total operations;
3. Data quality improvement (measured by consistency between PCS Sinfomar and Trainshunt wagon lists);
4. Error rate reduction in operational data entry and communication;
5. User adoption rate of the integrated ICT solution.

2.3.2.8. Gantt for each activity

The pilot project will follow these main phases:

	Decsription	M1	M2	M3	M4	M5
PHASE 1	Definition of functional and technical specifications, based on consultations with operators and system providers					
PHASE 2	Realization of interoperability modules between PCS Sinfomar and Trainshunt					
PHASE 3	Technical validation, bug fixing, and refinements with selected key users					
PHASE 4	Training sessions for operational staff and deployment in selected port yards					
PHASE 5	Rollout to the entire port area and monitoring of KPIs					

2.3.2.9. *Design test environment for pilot ICT tool*

The pilot project will set up the test environment by leveraging existing infrastructure and tools already in operation at the Port of Trieste. The testing will be conducted under both real and virtual conditions.

The design of the test environment is based on the following:

1. Existing Infrastructure: The pilot builds on the operational PCS Sinfomar and Trainshunt tools, which are already in use. This approach makes the project realistic and cost-effective.
2. Seamless Integration: The platform is designed to integrate smoothly into the current workflows of Adriafer's planners and operators.
3. Testing Phases: The testing process includes "Technical validation, bug fixing, and refinements with selected key users".
4. Deployment: The pilot will be deployed in "selected port yards" before a full rollout to the entire port area.

This step-by-step implementation strategy, combined with the use of established ICT tools, ensures the project's feasibility.

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2.3.3. AIN planning analisys

2.3.3.1. *A brief description of the pilot project*

The Air, Maritime and Railway Traffic Accident Investigation Agency, pursuant to Article 12 of the Public Procurement Act, and in accordance with the Amendments to the Ordinance on the Implementation of Simple Procurement Procedures, will initiate a simple procurement procedure for the subject of procurement: Application for Data Monitoring in the Railway System/CROSSFREIGHT, estimated procurement value: EUR 9,600.00 excluding VAT or EUR 12,000.00 including VAT.

The operational objectives at the AIN focus on enhancing safety management procedures through the implementation of a digital platform dedicated to the reporting and analysis of railway accidents and incidents. This solution aims to streamline the investigation process, reduce manual data handling, and provide rapid access to critical information across departments and relevant authorities. The core focus of the new business processes at the AIN is the full digitalization of accident and incident reporting workflows. Currently managed through Excel sheets and manual communication channels, the goal is to migrate to an integrated software platform with secure login access and user-friendly interfaces.

The software will support structured workflows covering accident notification, on-site investigation documentation, investigation status (open/closed), and the management of safety recommendations. Advanced filtering and data visualization features will help identify high-risk areas, recurring causes, and performance gaps.

2.3.3.2. *Application scope*

The main expected outputs of the digitalization process at the AIN include a significant improvement in the speed, accessibility, and reliability of safety-related data. By replacing manual Excel sheets with

a secure digital platform, the process will enable faster reporting and retrieval of information related to accidents and incidents, thereby supporting quicker decision-making and follow-up actions.

The implementation of the new digital platform at the AIN will follow a process to ensure a smooth transition from current manual procedures. It is currently managed through Excel sheets and manual communication channels, and the goal is to move to digitalization with secure login access and user-friendly interfaces.

2.3.3.3. Identification of the main modules

The new system must include the following modules:

1. Notifications (The module enables recording and tracking of received notifications in railway transport)
2. Serious Accidents, Accidents and Incidents (The module enables recording and tracking of accidents/incidents in railway transport)
3. On-sites investigations (The module enables recording and tracking of on-site investigations in railway transport)
4. Suicides and attempted suicides (The module enables recording and tracking of suicides and attempted suicides in railway transport)
5. Investigations (The module enables recording and tracking of investigations in railway transport and their status)
6. Safety Recommendations (The module enables recording and tracking of issued safety recommendations in railway transport)

2.3.3.4. Identification of the main functions

The new system must be developed by integrating the following functions:

1. The technical solution must be developed modularly
2. The possibility of developing new modules, which can be enabled or disabled when deploying the solution to a particular environment
3. Access to the solution via a web browser

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4. The solution should be compatible with at least the web browsers Google Chrome, Microsoft Edge and Mozilla Firefox (latest available browser versions)

5. The solution must support simultaneous operation of multiple users

6. The solution must support an unlimited number of users

7. The solution administration should enable login, authentication and user management:
   a. creation of user profiles for logging into the system (name, surname, e-mail, password, activation status)
   b. authentication and session system (user login/logout, protection via CSRF token, session timeout)
   c. management of user accounts, roles and rights
   d. creation of user groups (authority level, e.g. administrator, principal investigator, investigator)
   e. activation and deactivation of solution users
   f. overview and search for solution users

8. Support for multiple user authentication models

9. Access to individual modules based on defined roles and rights

10. Possibility of assigning access rights users at the level of individual modules and objects (tables, reports and others) and operations on them (data retrieval, entry, modification, deletion, execution)

11. The solution has the ability to record user access (audit log: record of date, IP address, user ID and action during login)

12. The solution should enable data import from external systems (example: CSV, Excel)

13. Automatic permanent recording of all errors in operation

14. The solution is based on the so-called "responsive design" model, i.e. the system's user interface automatically adapts to the resolution and orientation of the screen (computer, mobile phone, tablet, ...)

15. The solution has the ability to create a backup copy and the ability to recover the system and data in the event of a catastrophic event (disaster recovery)

16. The solution must enable the ability to upload documents (e.g. PDF, Word, JPG, PNG, EML)

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17. The solution must enable data export (e.g. CSV, Excel)

18. The solution must enable searching and filtering of entered data.

2.3.3.5.   Data source

The data that will be imported into the new system is contained in our Excel sheets. Once the digitalization platform is composed, we will continue to enter all new data into it.

2.3.3.6.   Feasibility check

This digital solution will be developed with the IT company on a simple procurement procedure. The AIN has qualified employees who will use the new digital solution. The user training sessions will be organized for internal staff to ensure effective use of the platform. The platform will be developed user-friendly as possible. The new digital process for accident and incident management is fully aligned with existing national and European railway safety regulations. It specifically supports the implementation of obligations set out in the EU Railway Safety Directive (EU) 2016/798, which requires infrastructure managers, railway undertakings, and national safety authorities to systematically collect, analyze, and report on safety-related events.

2.3.3.7.   Key Performance Indicators (KPI)

Some possible KPI's are as follows:

1. Optimizing our processes
2. Getting faster information
3. Higher quality of railway safety investigations.

2.3.3.8.   Gantt for each activity

The Gantt chart below shows all the activities in time related to the pilot project

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	Description	M1	M2	M3	M4	M5
PHASE 1	Initiate a simple procurement procedure Architecture					
PHASE 2	Select the tenderer and sign a contract					
PHASE 3	Tenderer develop technical solution Designing of connectors for future interoperability					
PHASE 4	Data import Validating imported data					
PHASE 5	Alpha & Beta Test Field Operational Tests (UAT					

2.3.3.9. *Design test environment for pilot ICT tool*

The testing will be performed for:

    I.   Checking the transferred data and correct display in the database;

    II.   Testing the entry of new data in the database;

    III.   Database testing on the field.

2.3.4. ERF planning analisys

2.3.4.1. A brief description of the pilot project

The Northern Adriatic Sea Port Authority will entrust Esercizio Raccordi Ferroviari di Porto Marghera S.p.A. with monitoring its railway infrastructure used for shunting to and from the terminals belonging to the Venice-Marghera Scalo Railway District.

Given the size of the railway infrastructure, it quickly became clear that the traditional monitoring tools did not allow for effective and efficient management.

For this reason, a new method was needed, not only for collecting data on the condition of the track, but also for providing the data in a way that can be analysed at later stages.

The development of a new ICT tool will not only allow monitoring of the condition of the track geometry over time but also correlate this with a maintenance policy based on the time-history analysis of certain key parameters.

The pilot project will be developed by examining only the switches operated by ERF.

2.3.4.2. Application scope

The new system must be able to manage the data collected during the monitoring phase of the railway infrastructure belonging to the Venice Marghera Scalo Railway District, which consists of approximately 45 km of track and approximately 150 switches. Monitoring operations occur approximately twice a year.

2.3.4.3. Identification of the main modules

The new system must include at least the following modules:

a. Geolocation of the components of the railway infrastructure;

b. Association of the measured data with the corresponding element;

c. Extrapolation of the time history of the geometric characteristics of each element;

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d. Comparison with current regulations (RFI/STI INFRA).

e. Information on the status of the element.

f. Possibility of operating in the field using a Mobile Station and obtaining the measured data in real time at the "Master" station.

g. Interfacing with external systems is not envisaged at this stage.

2.3.4.4.   Identification of the main functions

The system must be developed by integrating the following functions:

a. System login via username and password;

b. Introduction of georeferenced elements;

c. Forms used to enter the geometric characteristics of the measured element based on its type, consistent with the reference standards;

d. Constant comparison with the reference standards and a corresponding summary indicator of the element's status.

e. Data editing/view-only mode;

f. Data filtering and extraction criteria.

2.3.4.5.   Data source

The entire georeferenced infrastructure of the Venice-Marghera Scalo Railway District will be used as the data source for the cartographic base.

The data imported into the pilot project is in ".shp" (shapefile) or equivalent format.

Historical data of individual measurements taken in recent years using traditional methodologies will also be imported.

2.3.4.6.   Feasibility check

The project requires the use of specific applications, preferably opensource, freeware and highly reliable, capable of managing georeferenced objects not only at the graphical level (frontend) but also at the system logic level (backend).

The use of web app-type architecture is also required as the project involves both desktop and mobile workstations.

Following an initial analysis, the following technologies were identified: QGIS, PostGIS, PostgreSQL (currently being finalized, etc.)

The user will not need specific expertise in geospatial data management as the platform will be developed "ad hoc" to be as user-friendly as possible.

The availability of these technologies on the market, combined with a proper platform setup that allows for ease of use by the operator, makes its implementation feasible, also based on no new staff will be required.

2.3.4.7.   Key Performance Indicators (KPI)

The ability to have a time-history of the status of each parameter of the infrastructure element, on the basis of which an in-depth analysis can be carried out, will certainly bring advantages in terms of maintenance policy management.

Some possible KPIs are as follows:

I. Switch unavailability rate

II. Number of train incidents due to switch malfunctions (safety relevant)

III. Switch degradation rate per ton (Maintenance Policy)

2.3.4.8.   Gantt for each activity

The Gantt chart below shows all the activities in time related to the pilot project

		M1	M2	M3	M4	M5	M6
PHASE 1	Architecture	■					
	Pages front-end		■				
	Back-end REST Services		■				
	GIS Software connection			■			
PHASE 2	Login Front-end/Back-end	■					
	Microservices		■	■			
	GIS connection			■	■		
	Infrastructure elements		■	■	■		
	Data input forms			■	■		
PHASE 3	Alpha & Beta Test				■	■	
	Field Operational Tests (UAT)						■

2.3.4.9. Design test environment for pilot ICT tool

The tests will be divided into two phases, and a **Gantt chart shall be prepared for each**:

I. Testing of geospatial data management (introduction of new elements, deletion, modification, etc.) and reference standards;

II. "On Field" testing:

    a. Field testing of data entry for each type of switch;

    b. Verification of data acquisition and correct display in the database;

    c. Verification of correct display of the switch status indicator;

    d. Verification of correct extrapolation of the time history of the measured data in the most common formats (.xlsx, .pdf, .jpg).

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2.3.5. PP6 - Sangritana planning analisys

2.3.5.1. *A brief description of the pilot project*

Sangritana intends to create a train tracking system that will be used to monitor the rail traffic across the rail node of Saletti – Fossacesia in Val di Sangro, in south Abruzzi region in Italy. At the same time the pilot project will focus on the security part of parked trains in terminal, with security cameras to be installed on parked wagons.

The project will require the implementation of an IT platform, an 'Industrial Community System', which will collect this information and enable it to be shared with all stakeholders in the supply chain. The software in question will consist of the following modules/features:

- A locomotive tracking system that records the position and speed of locomotives in real time via GPS;

- A mapping of the existing tracks that will make it possible to visualize:

  - the real-time position of the railway wagons (with a distinction between full and empty wagons);

  - the wagons being repaired and to be repaired on the Saletti track, with the possibility of reserving repair slots;

- A dashboard containing data on shunting operations and related statistics, including management of shunting slots and staff rostering;

- A section containing data on loading/unloading slots at individual terminals;

- A monitoring system connected to remote temporary cameras that will be added to parked trains.

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2.3.5.2.   Application scope

The new system must be able to collect the information given by the devices installed on trains and on different sections of the rail line and terminal, within the rail agglomerate of Saletti-Val di Sangro-Fossacesia compounds and convert this information to traffic management signals.

This key feature to start will allow the application of side features that will give the situation of wagons under maintenance, plan the parking of wagons in parking sections and digitalize the traffic across the main section of the line.

Another key side feature will be the security process, adding temporary camera sensors to parked wagons in both the terminal of Saletti and other non-secured areas of the compound, so to have security alerts when there are breaches of security.

The key users will be the operators of Sangritana, namely the Operations Director of the rail compound, which at the moment is responsible of the rail traffic management across the compound, the shunting operators at Saletti, Sevel Plant, Ex Salcef and Fossacesia T.D.S. Station, which are the key operators, the Terminal Manager of the TISV terminal at Saletti.

The environment of the system will be desktop based, with the option to have a mobile application.

2.3.5.3.   Identification of the main modules

The new system must include at least the following modules:

a. Geolocation of the components of the railway infrastructure;

b. Geolocation of the trains in the infrastructure, both in shunting operations and in parking;

c. Management of the rail track at the Saletti TISV – CIMA workshop compound, with dedicated system for maintenance of the wagons;

d. A detailed mapping of all the existing rail tracks;

e. A dashboard containing data on shunting operations and related statistics, including management of shunting slots and staff rostering;

f. A section containing data on loading/unloading slots at individual terminals;

g. A monitoring system connected to remote temporary cameras that will be added to parked trains.

h. Information on the status of the element.

i. Interfacing with external systems is not envisaged at this stage.

2.3.5.4.   Identification of the main functions

The system must be developed by integrating the following functions:

a. System login via username and password;

b. A real-time map of all the compound with the current situation of traffic;

c. A table with the current status of all trains and wagons within the compound;

d. A table with the personnel allocated to the various activities;

e. A user interface connected to the CIMA workshop;

f. A user interface connected to the security activities, linked to the camera devices;

g. Data editing/view-only mode;

h. Data filtering and extraction criteria.

2.3.5.5.   Data source

The entire georeferenced infrastructure of the Saletti-Fossacesia Compound will be used as the data source for the cartographic base.

Historical data of individual measurements taken in recent years using traditional methodologies will also be imported.

2.3.5.6. *Feasibility check*

The project requires the use of specific applications, preferably opensource, freeware and highly reliable, capable of managing georeferenced objects not only at the graphical level (frontend) but also at the system logic level (backend).

The main architecture of the system will be desktop based.

The user will not need specific expertise in geospatial data management as the platform will be developed "ad hoc" to be as user-friendly as possible.

The main geospatial data management will be performed by using static beacons on the key nodes and dynamic sensors interacting with the static beacons on portable devices that will be installed at the front and the rear of trains or wagons. On the portable devices there will also be the security cameras.

The totality of the indicated hardware technologies is available on the market; the key task will be to link these technologies with the software platform to be developed. The creation of the software platform and the customisation of the hardware devices will be granted by an external expert, focused on IT activities related to georeferencing transports.

2.3.5.7. *Key Performance Indicators (KPI)*

By adopting KPI parameters it will be possible to evaluate the performance and the overall impact of the newly created system compared to the previously utilized analogic solutions.

Some of the forecasted KPIs are as follows:

a. Number of wagons in transit in the compound and relative number digitally processed by the system;

b. Number of repair activities performed by the CIMA workshop at Saletti and relative number digitally processed by the system;

c. Number of trains processed at TISV terminal and relative number digitally processed by the system;

d. Number of episodes of security breaches, with percentage recorded by the implemented camera system.

2.3.5.8. Gantt for each activity

The pilot action will focus on the already drafted activities of the project.

Activity	P3 (Apr-Sep 25)	P3 (Oct 25-Mar 26)	P3 (TBD)	Notes
A.2.1 Test Plan	D.2.1.1			The activities related to the test plan will focus on the preparation of the hardware base at terminal, starting already in September, while in parallel performing the software development.
A.2.2 Tests Executions		D.2.2.1		The activities related to the test executions will be related to conducting tests of the pilot system during P3.
A.2.3 Tests Assessments		D.2.3.1		Test assessment activities will take place at the end of activity A.2.2
A.3.1 Transferability			D.3.1.1	Activities A.3.1 are forecasted for P5.
A.3.2 Exploitation			D.3.2.1	Activities A.3.2 are forecasted for P5.
A.3.3 Action Plan			D.3.3.1	Activities A.3.3 are forecasted for P5.

2.3.5.9. Design test environment for pilot ICT tool

The tests will be divided into two phases:

Phase 1: a virtual case scenario will be drafted as initial test, particularly to structure the ICT solution, verify the functionalities of the system and the user interface. The phase 1 will not involve the hardware devices.

Phase 2: the second phase will involve real cases with actual trains approaching the TISV terminal at Saletti. In this scenario, the hardware devices will be added to the testing, providing the actual position of trains.

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2.3.6.   PP7 - Lučka Uprava Šibenik planning analisys

2.3.6.1.   *A brief description of the pilot project*

The development plan for the railway infrastructure and freight transport in the port of Šibenik should combine a strategy for improving the railway infrastructure in the port with an approach to how ICT tools can be used to improve its efficiency. Following that, LUŠ will produce a soft pilot project that will deal with the optimization of Railway Station Capacity and Loading.

Port of Šibenik will develope pilot project which aims to enhance the efficiency of railway station capacity and cargo loading/unloading in the Port of Šibenik using Excel as the primary tool for planning, tracking, and analysis. By leveraging standardized Excel templates, manual data input, and basic analytics (formulas, pivot tables, charts), the project optimizes train schedules and loading processes on a single platform during a two-month test phase. The goal is to increase throughput by 15%, reduce loading times by 20%, and improve coordination among stakeholders.

2.3.6.2.   *Application scope*

The pilot targets a single railway platform in the Port of Šibenik to test:

Capacity optimization: Improved utilization of existing tracks through better scheduling.

Loading/unloading efficiency: Standardized processes to reduce container handling time.

Stakeholder coordination: Streamlined data sharing among port authorities, railway operators, and cargo owners via Excel.

The scope is limited to existing infrastructure, manual data collection, and Excel-based analytics, ensuring low-cost implementation. Successful results will guide a full rollout across the station.

2.3.6.3.   *Identification of the main modules*

Soft pilot is structured into Excel sheets, each serving as a module:

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- Introduction and Summary: Outlines goals with a bar chart for visualization.

- Challenge Identification: Lists bottlenecks (e.g., limited platforms, slow loading) with conditional formatting for prioritization.

- Stakeholder Analysis: Maps roles and responsibilities with a pie chart for task distribution.

- Station Capacity Optimization: Tracks train flow and schedules using tables.

- Loading/Unloading Optimization: Monitors handling times with filters and averages.

- Tracking and Coordination: Excel templates for train schedules and feedback.

- Implementation Plan: Details steps and timelines with a Gantt chart.

- KPI and Evaluation: Tracks performance metrics with line charts.

- Risk Management: Identifies risks (e.g., data inaccuracies) with mitigation strategies.

2.3.6.4.   Identification of the main functions

- Data Entry: Manual input of train schedules, loading times, and other required data by stakeholders into standardized Excel templates.

- Data Analysis: Use of formulas and tables to analyze train throughput and loading efficiency.

- Visualization: Bar and line charts to display train flow, loading times, and KPI progress.

- Coordination: Shared Excel files for real-time updates among port authorities, railway operators, and cargo owners.

- Prioritization: Conditional formatting to highlight delays or high-priority issues

- Reporting: Tables and charts for summarizing performance and identifying bottlenecks.

2.3.6.5.   Data source

Data will be collected manually from port reports and stakeholder inputs:

- Port Authorities: Train arrival/departure times, platform availability

- Railway Operators: Train IDs, schedules, and number of containers.

- Cargo Owners: Feedback on loading accuracy and delays.

2.3.6.6. Feasibility check

The pilot is feasible due to:

- Existing Infrastructure: No new tracks or equipment required; focuses on optimizing current resources.

- Stakeholder Buy-In: Port authorities, operators, and cargo owners already generate relevant data, which can be standardized in Excel.

- Scalability: Successful testing on one platform can be expanded to all project partners.

- Risk Mitigation: Training ensures accurate data entry because standardized templates reduce errors.

Challenges include potential delays in manual data entry which can be avoided by clear guidelines and training.

2.3.6.7. Key Performance Indicators (KPI)

The following KPIs will measure pilot success, tracked via Excel:

- Train Throughput: Increase daily trains

- Loading/Unloading Time: Reduce average vagon handling time

- Error Rate: Decrease loading errors

- Stakeholder Satisfaction: positive feedback from cargo owners on process accuracy, collected via Excel forms.

Visualized using line charts for progress over time.

2.3.6.8. Gantt for each activity

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2.3.6.9. *Design test environment for pilot ICT tool*

	Description	M1	M2	M3
PHASE 1	Design Templates			
PHASE 2	Training			
PHASE 3	Pilot Testing			
PHASE 4	Feedback Collection			

The soft pilot environment test relies on Excel table.

- Data Flow: Stakeholders email .xls or CSV files or manually enter data into shared Excel files which can be stored on a local server or OneDrive for collaboration

- Test Scope: One platform, several daily trains, 2-month period. Data entry occurs daily by operators and port staff.

- Validation: Weekly reviews of pivot tables to check data accuracy; feedback forms from cargo owners to identify issues.

- Backup: frequently file backups to prevent data loss.

- This environment ensures low-cost, user-friendly testing with minimal technical requirements.

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2.3.7. PP8 - Transagent planning analisys

2.3.7.1. A brief description of the pilot project

Transagent Rail Ltd. will carry out its pilot project in cooperation with external experts in order to improve their performances, and the benefits from the realization of pilot activities will have impact on the overall community – from employees, users and clients to the general public.

Railway transport is insufficiently represented in the total transport of goods, despite its advantages in terms of economy, safety and the least harmful impact on the environment.

Development within the framework of digitization and innovation through the implementation of the project to improve the quality and reliability of cross-border rail freight services is a prerequisite for creating a competitive company on the rail freight market and ultimately for encouraging a change in the type of transport.

2.3.7.2. Application scope

The new system must be able to enable real-time train tracking, thereby improving the efficiency, safety, and coordination of railway operations. The application can be used by railway operators and field personnel to obtain accurate and up-to-date information on train movements.

2.3.7.3. Identification of the main modules

The new system must include at least the following modules:

a. Train traffic monitoring
b. Personnel information
c. Creating and storing documentation necessary for railway traffic
d. Sending notifications to all interested parties

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2.3.7.4. Identification of the main functions

The system must be developed by integrating the following functions:

a. System login via username and password;
b. Train formation according to the input specification;
c. Real-time monitoring of train movements, including informations upon arrival at the designated terminal and the automated distribution of notifications (e-mails) to all interested parties;
d. Data editing/view-only mode;
e. Data filtering and extraction criteria.

2.3.7.5. Data source

The entire infrastructure of HŽ INGRASTRUKTURA (IM) will be used as the data source for the cartographic base.

2.3.7.6. Feasibility check

The project requires the use of specific applications, preferably opensource, freeware and highly reliable, capable of managing georeferenced objects not only at the graphical level (frontend) but also at the system logic level (backend).

The use of web app-type architecture is also required as the project involves both desktop and mobile workstations.

Following an initial analysis, the following technologies were identified: MySQL

The user will not need specific expertise in geospatial data management as the platform will be developed "ad hoc" to be as user-friendly as possible.

The availability of these technologies on the market, combined with a proper platform setup that allows for ease of use by the operator, makes its implementation feasible, also based on no new staff will be required.

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2.3.7.7. Key Performance Indicators (KPI)

Some possible KPIs are as follows:

KPI-1: Faster flow of information

KPI-2: Minimizing the negative aspect of the human factor in terms of errors

KPI-3: Optimization of business and resources based on better availability of information

2.3.7.8. Gantt Chart

		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
PHASE 1	I-1: First sub-phase; I-2: Second sub- phase; I-3: Third sub-phase.											
PHASE 2	I-1: First sub-phase; I-2: Second sub-phase; I-3: Third sub-phase; II-4: Fourth sub-phase; II-5: Fifth sub-phase; II-6: Sixth sub-phase.											
PHASE 3	Testing of the complete solution											
PHASE 4	User training											

Description of sub-phases:

1. Interactive freight train tracking – automatic notifications for clients who require updates regarding changes related to trains.
2. Graphical display of trains and their positions on the railway network with access to detailed information (for authorized users).
3. Graphical list view of trains with visible wagons, including access to train sheets and locomotive fault documentation.

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4. Work orders for employees (drivers, inspectors, and other staff) – automatic dispatching and the possibility for workers to confirm and accept tasks.

5. Processing of work and travel orders with integrated payroll calculation elements – integration of documents and images (captured via mobile device/tablet and linked to orders).

6. Prevention of illogical data entry during creation/editing of orders. Monitoring of chronological work sequence and staff scheduling.

7. Order lock after 48 hours – employees cannot modify an order after 48 hours; only administrators have editing rights after that period.

8. Work time tracking with restriction on entering overtime that violates the Labor Law (e.g., no entries over 12 hours allowed).

9. Monthly working hour overview with available hour tracking per employee. This supports better workforce planning and prevents assigning work to employees who exceeded their monthly quota.

10. Vehicle tracking system – graphical display on the railway map alongside trains, including geolocation data and mileage (KM) status.

11. Train document generation: SE-2 (integrated digital signature), SE-4 (automatic submission to HŽ Infrastructure), TV-24, WDR, locomotive faults + image integration from computer or mobile/tablet.

12. Completed train list – searchable by various criteria; each train entry allows access to associated documents and work orders.

13. Dispatch orders – automated notifications to individuals or groups, digital signing supported, with a signature log view.

14. Supplementary licenses – management, creation, and display of fully digitalized licenses for train drivers.

15. Train timetable management.

16. DMS – a mini document management system for documents and regulations.

17. The system must support secure authentication. Users must be assigned roles based on job responsibilities to authorize or restrict access to modules and functionalities.

18. The system must be web-based, allowing integration, control, and management of business and service systems.

19. Track usage monitoring module – must track HŽ Infrastructure tracks used by train drivers, both textually and graphically. Driver profiles must include medical certificates, vehicle type certifications, infrastructure route knowledge certificates, driving licenses, and the ability to

generate/update these. The system must alert if a driver has not operated on a certified track 11 months after certification. The system must also alert after 34 months if a driver hasn't completed a knowledge check for a specific locomotive series. This module must be accessible to traffic planning, operations, and administrative departments.

20. Health check monitoring – automatic notifications 30 days before expiration of medical certificates (occupational medicine).

21. Knowledge check tracking – periodic checks for train drivers and operational staff, with notifications 30 days before expiration.

22. Training center staff must have access to documentation, certificates, and licenses.

23. Document creation per train within the app's working folder to allow early delivery and fulfilment of control requirements, and storage of completed documentation.

24. System compatibility across devices – desktop, laptop, tablet, and mobile devices (optimized for Android OS).

25. Process automation and integration – the system must automate and integrate key business processes with other solutions, increase productivity, reduce human error, and provide centralized control of all major business operations.

2.3.7.9. Design test environment for pilot ICT tool

The tests will be performed in one phase, divided into four steps:

1. STEP: Train formation according to the input specification

2. STEP: Real-time train monitoring

3. STEP: Arrival of the train at the arrival terminal

4. STEP: Sending notifications to all interested parties (HŽI, customer, transport orderer – terminal, etc.)

3. Conclusions

The proactive approach to developing a new methodology, based on the FESTA Methodology, compatible not only with the project's objectives but also with its various phases, allowed each project partner to accurately identify and manage every aspect of the ICT tool's planning phase.

To gain a comprehensive overview of the entire methodology to be used in the CROSSFREIGHT project, three steps were defined:

1. Planning,
2. Running,
3. Assessment.

In this first phase, the focus was on the PLANNING phase.

Specific tools were implemented to help each PP track the various activities of this first phase without losing sight of its objective: defining the Field Operational Tests.

The identification and in-depth description of the requirements and features that each project must possess allowed us to draw up a Gantt chart useful for optimizing the implementation timelines for each pilot project.

Comparing the Gantt charts for each project highlights not only the complexity of each project but also the different development plans depending on the level of maturity of the system into which the pilot project will then be inserted.

This represents a good starting point for the next two steps, Running and Assessment for each pilot project.

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Annex 1 - Stage 1. PPs Planning activities

	PROJECT NAME		
	CROSSFREIGHT ICT PROJECT		
	DESCRIPTION		VERSION
	Application (RSS software module) for optimizing the planning and execution phase of railway operations in the intermodal node of Ravenna		Pilot action
	PROJECT PARTNER		
	ITL		

Interreg — Co-funded by the European Union
Italy – Croatia
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FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

STAGE 1 - PLANNING

ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	Shunting users import annual dataset of movement requests by railway companies transmitted by RFI (PIC) with the set of trains from the different railway companies for each timetable valid all year round, enabling Rail Shunting System (RSS) module to manage data for long-term planning	P	X	X					
2	The RSS software module controls and monitor planned operations, adding information relating to arrival/departure forecasts (Estimated Time of Departure/Arrival) and extraordinary trains and cancellations obtained from the real-time update system provided by RFI (PIC) or possibly from other information received directly from the railway companies	P	X	X		X			
3	The RSS software module provides daily scheduling by carrying out the so-called "shunting request" operation based on both annual/weekly trains scheduling (ID1) and real-time data on train arrival/departure status	P	X	X					
4	The RSS software module is interoperable with the Rail Management Platform in the production phase by the Port System Authority of the Central-Northern Adriatic Sea adopted for the intermodal node of Ravenna	P	X		X	X			
5	The RSS software produces optimized planning of rolling stock maneuvers, responding to efficiency criteria measured by specific and realiable KPIs	P	X						
6	The RSS software module provides quantitative KPIs for assessing optimisation of teams dedicated to shunting operations (operations per day), minimising operations and movement of rolling stock (km travelled per locomotive)	P	X				X		
7	The RSS software module collects maneuver requests for the executive phase which can be entered directly by external users (e.g. railway undertaking, shunting operator, etc.), generating e-mail notifications upon receipt of requests for primary and secondary incoming and outgoing operation	P	X	X		X			
8	The RSS software module supports the personnel in charge of completing the shunting orders prepared in the daily planning (ID3) for each train and carry out the allocation of resources respecting the availability constraints of teams	P	X	X					
9	Yard operator accesses rolling stock maneuver orders and confirms the shunting team association or enters it directly, and the order is considered finalized and assigned shunting team executes it within the set timeframes	P	X						
10	Assigned shunting team receives a notification indicating the date and time of the start of the rolling stock maneuver, being able to begin its execution and certifying the event using a specific function by laptop and/or tablet	P	X	X					
11	Shunting team completes the rolling stock maneuver and certifies the event using the appropriate function in the dedicated window available on laptop and/or tablet, enabling to also enter additional notes	P	X	X		X			
12	The RSS software module enables to enter relevant information for each rolling stock maneuver performed, simultaneously transmitting the information to third parties by sending relevanrt automatic notification	P	X						
13	For each rolling stock maneuver performed and after the "train departure" event, the RSS software module supports invoicing, by issuing summary report (Excel-PDF format) with services performed and the other information	P	X						

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME	
CROSSFREIGHT ICT PROJECT	
DESCRIPTION	VERSION
Data visibility along the Trieste railway traffic management	Pilot action
PROJECT PARTNER	
Adriafer S.r.l.	

FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

			STAGE 1 - PLANNING							
ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	The PCS Sinfomar creates automatically the planned shunting requests based on a train time schedule. The user can see the proposed shunting request via UX	C		X					
2	The PCS Sinfomar algorithm matches the shunting request with a real train declared by train agents for customs controls. The user sees that some data are already filled authomatically by the system.	C		X					
3	The user complete the data and sends the shunting request to the Adriafer Trainshunt software	C		X					
4	The shunting operator sees in Trainshunt that a new request has been received. Checking and acceptance / refuse.	C		X					
5	The shunting resources are assigned to the shunting operations. The execution phase starts and ends.	C		X					
6	The shunting monitoring data are shared with the PCS Sinfomar and the users can see the data via UX	C		X					
7	The data about the railcars are alligned within the 2 systems: the Adriafer's railcar data are the priority, if they are not present Sinfomar uses the decalred data by the train agent	P	X	X					
8	The data sharing between Sinfomar and Trainshunt is performed via an API	P	X		X				
9	Data harmonisation to enable data sharing	P	X		X				
10	KPIs monitoring	L	X				X		
11	whats about uncorrect data? Also at different stages?	TIL							

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME		
CROSSFREIGHT ICT PROJECT		
DESCRIPTION		**VERSION**
Application for monitoring and analyzing extraordinary events within the railway system		Pilot action
PROJECT PARTNER		
Air, Maritime and Railway Traffic Accident Investigation Agency		

FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

	STAGE 1 - PLANNING							
ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	Our created Excel sheets that we have been fulfilling and maintaining until now (received emergency notification of accident/incident, our on site investigation, all accident/incident occurred on railways including suicides, opened/closed investigation by us, our safety recommendations)	C	X						
2	Composing a digitalization platform for all our created Excel sheets (transfer of all data) on our web site with login	P	X						
3	Adding online form on our web site for emergency notifications of accident/incident	P	X						
4	Finding an external company through public procurement to compose a digitalization platform	P	X						
5	Possible adding of other authorities to access our platform with login but without the ability to make changes in the platform	L	X						
6	We can access a digitalization platform from anywhere on site, with a login, to get faster information/filter data like places where accident/incident occurred the most, causes of accident/incident analyzed by infrastructure manager and railway undertaking, our issued safety recommendations and other information	P		X					
7	Once the digitalization platform is composed, continue to enter all new data into it	P		X					
8	The data that will be entered into the digital platform are located in our created Excel sheets	P			X				
9	An external company through public procurement will compose a digitalization platform with the ability to filter data, create charts, layouts	P				X			
10	Our Department for Railway Traffic Accidents Investigation will continue to enter all new data into a digitalization platform	P				X			
11	Optimizing our processes						X		
12	Getting faster information						X		
13	Higher quality of railway safety investigations						X		
14	We will select the best and simplest programming language for working with digital databases based on the suggestions of our IT expert and an external company	P						X	
15	We will select the best and simplest layouts, filter data, creating charts and other tools for working with digital databases based on the suggestions of our IT expert and an external company	P						X	
16	Ability to connect to the platform with a laptop and tablet	P						X	
17	Testing a digitalization platform from anywhere on site	L							X
18	Making update if needed	L							X
19	So far, all emergency notifications are first reported to our duty phone and subsequently by email. In connection with adding online form for reporting emergency notifications, the possibility of online reporting is created as well as the remaining previous reporting practice	TIL							
20	Possibility of obtaining false information through online emergency notifications, but we contact certain railway stations to which the site of the accident/incident belongs in order to obtain correct/additional information	TIL							

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME		
MINOSSE		
DESCRIPTION		VERSION
Railway sidings infrastraucture monitoring system		Pilot action
PROJECT PARTNER		
Esercizio Raccordi Ferroviari di Porto Marghera S.p.A.		

Interreg
Co-funded by the European Union

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FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

	STAGE 1 - PLANNING								
ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	Users shall create, edit, visualize, analyze, and publish geospatial data for all the switches installed Venezia Marghera Scalo Railway District's Main siding	C	X						
2	The software shall manage changings of the infrastructure geometry	P	X						
3	Interactions with SIMA	L	X						
4	The user shall see on a screen the reference value by norm	P	X						
5	Keep track of time-history of measures	P	X						
6	Highlight out of limits measures	P	X						
7	Add a new measure to a selected element (on site measure)	P		X					
8	When a new measure has entered in the system by using a slave position, master have to see the updated status of the element measured	P		X					
9	Excel sheets used in time	P			X				
10	Geographic Information System (GIS)	P			X	X			
11	Check legal aspects about used technology	P				X			
12	MTBF for each switch (days? Month?)	P					X		
13	t/month of goods passed over the element	P					X		
14	unavailability/year (%)	P					X		
15	Rugged tablet (slave)	P						X	
16	Notebook (master)	P						X	
17	think about GUI, forms, filter function, graphs…..	P						X	
18	Programming language? …….	C						X	
19	On site test: data entry shall be done in real condition.	P							X
20	Updated data (master)	P							X
21	whats about uncorrect data? Also at different stages?	TIL	X			X		X	

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME		
SALETTI 4.0		

DESCRIPTION	VERSION
Application for managing and reporting rail traffic along the Fossacesia/Torino di Sangro - Atessa rail infrastructure, with additional functions for the rail traffic management at TISV Terminal Intermodale Saletti Val di Sangro and the relative workshop.	Pilot action

PROJECT PARTNER
Sangritana S.p.A.

FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

STAGE 1 - PLANNING

ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	The system will have 5 key user interfaces with relative interactions: Rail Operator, Shunting Operator, Terminal Operator, MTO, Carrier	P	X						
2	The software will manage for the Rail Operator the following details: CIM document archive, train ETA and ETD, wagons identification and train creation	P	X						
3	The software will manage for the Shunting Operator the following details: train shunting monitoring on a real time basis, parking allocation, wagons shunting and CIMA interaction	P	X						
4	The software will manage for the Terminal Operator the following details: train composition and loading/unloading operations.	P	X						
5	The software will manage for the MTO the following details: train shunting monitoring on a real time basis, train loading/unloading order and status. The software will provide the security interface for train monitoring during the parking via special cameras.	P	X						
6	The software will manage for the Carrier the following details: train shunting monitoring on a real time basis, train loading/unloading order and status.	P	X						
7	A Bertani/Livorno/SEVEL conventional train will be used as a use case, testing 3 functionalities: Rail Operator, Shunting Operator, Terminal Operator	P		X					
8	A Honda/Trieste/TISV intermodal train will be used as use case testing all functionalities: Rail Operator, Shunting Operator, Terminal Operator, MTO and Carrier	P		X					
9	Manual insertion of data for Rail Operator, Terminal Operator, MTO and Carrier	P			X				
10	Automatic train position collection for the beacons placed across the line	P			X				
11	1st on-field test of the beacons and positioning at position 1 - station Fossacesia/Torino di Sangro	P				X			
12	2nd on-field test of the beacons and positioning at position 2 - rail node of Saletti-Paglieta	P				X			
13	3rd on-field test of the beacons and positioning at position 3 - rail terminal of Saletti-TISV	P				X			
14	4th on-field test of the beacons and positioning at position 4 - SEVEL entrance	P				X			
15	5th on-field test of the beacons and positioning at position 5 - rail park Ex Salcef - TIAM	P				X			
16	6th on-field test of the beacons and positioning at position 6 - CIMA workshop	P				X			
17	Rail Operators KPIs: % of monitored trains, % of monitored wagons	P					X		
18	Shunting Operators KPIs: % of monitored trains on line, % of monitored wagons at parking spaces, % of monitored wagons at workshop	P					X		
19	Terminal Operators KPIs: % of monotored trains at terminal, % of monitored wagons at terminal.	P					X		
20	MTO KPIs: % of monitored trains, % of monitored wagons.	P					X		
21	Carrier KPIs: % of monitored trains, % of monitored wagons	P					X		
22	Software part A: Rail Operator Interface	P						X	
23	Software part B: Shunting Operator Interface	P						X	
24	Software part C: Terminal Operator Interface	P						X	
25	Software part D: MTO interface	P						X	
26	Software part E: Carrier interface	P						X	
27	Software part F: beacons connections and data exchange	P						X	
28	Software part G: workshop interface	P						X	
29	Software part H: cameras and security devices platform	P						X	
30	Test position 1 - station Fossacesia Torino di Sangro	P							X
31	Test position 2 - rail node Saletti-Paglieta	P							X
32	Test position 3 - rail terminal of Saletti - TISV	P							X
33	Test position 4 - SEVEL entrance	P							X
34	Test position 5 - rail park ex Salcef - TIAM	P							X
35	Test position 6 - CIMA workshop	P							X

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME		
CROSSFREIGHT ICT PROJECT		
DESCRIPTION		VERSION
Optimization Plan for Railway Station Capacity and Loading		Soft pilot action
PROJECT PARTNER		
Port of Šibenik Authority (PP7)		

FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

STAGE 1 - PLANNING

ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	Show project goals with a bar chart for visualization	P						X	
2	List bottlenecks (e.g., restricted platforms) with conditional formatting	P	X						
3	Map roles and responsibilities with a chart	P						X	
4	Track train flow and schedules	P		X					
5	Track freight handling times	P		X					
6	Excel templates for schedules and feedback	P			X				
7	Detail steps and timelines with a Gantt chart	C						X	
8	Track performance metrics with line charts	P					X		
9	Identify risks (e.g., inaccurate data) with mitigation strategies	C				X			
10	Set up Excel spreadsheets for data entry and analysis	TIL							X

Legend

C	Task completed
P	Task pending
L	Late task
TIL	Need "Thinking in the loop"

PROJECT NAME		
CROSSFREIGHT		
DESCRIPTION		VERSION
FIS (FREIGHT INFORMATION SYSTEM)		Pilot action
PROJECT PARTNER		
TRANSGENT RAIL Ltd.		

FESTA-V METHODOLOGY "MODIFIED VERSION" developed for CROSSFREIGHT PROJECT

	STAGE 1 - PLANNING								
ID	Description	Status	Functions identification	Use case	Tools for data collection	Feasibility check	KPI	Pilot design	Test environment set-up
1	The new system must be able to enable real-time train tracking, thereby improving the efficiency, safety, and coordination of railway operations. The application can be used by railway operators and field personnel to obtain accurate and up-to-date information on train movements.	C	X						
2	The software shall manage simulation of rail transport event from start to finish	P		X					
3	Combination of manualy entered data and data that is directly updated from connected ICT's.	P			X				
4	Global Positioning System (GPS)	P			X	X			
5	Check legal aspects about used technology	P				X			
6	Faster flow of information	P					X		
7	Minimizing the negative aspect of the human factor in terms of errors	P					X		
8	Optimization of business and resources based on better availability of information	P					X		
9	Rugged mobile phone (slave)	P						X	
10	Notebooks/computers (master)	P						X	
11	think about GUI, forms, filter function, graphs…..	P						X	
12	Programming language? …….	P						X	
13	test: data entry shall be done in real condition.	P							X
14	Updated data (master)	P							X
15	whats about uncorrect data? Also at different stages?	TIL							

Legend

C	Task completed
P	Task pending
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