

ACTION PLAN FOR FOSTERING COORDINATED
MULTIMODAL FREIGHT TRANSPORT THROUGH ICT
SYSTEMS - PP05-LK

DELIVERABLE D.T3.2.7

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1. Executive summary

This document includes the action plan fostering coordinated multimodal freight transport through ICT systems in the node of the Port of Koper.

Considering the results of the pilot action, it breaks down the goals of the strategy and wish list (WPT1) in specific tasks, KPIs, timeline, identification of financial resources and definition of responsible actors. From the results obtained through the analysis performed in WPT1, there was clearly identified that a need for further digitization of processes in the port of Koper is urgently needed. The co-financing opportunity offered by the COMODALCE project gave a priority to the introduction of an OCR system with the integration of an ICT tool provided by a railway operator.

Being Adria Kombi a Slovenian railway operator collaborating in the COMODALCE project, it was clear that a fundamental opportunity was given also to this company in order to identify the lacks and obstacles encountered during the railway transport of containers from/to the port of Koper.

In the WPT2 a combined pilot action was conducted by Luka Koper (LK) and Adria Kombi (AK), where LK provided the OCR system and AK implemented an ICT solution which would have to fit the needs of not only railway operators working with LK, but in general all the users of such a system which would be involved in the railway transport of containers in port's area.

The results obtained through WPT2 were useful for the development of a further Action Plan foreseen in WPT3, which resulted in a joint plan for the development of such a solution not only in the port of Koper and not only for the railway transport.

The following chapters are going to describe in detail the steps followed for the achievement of the results planned in WPT2 through its pilot action and puts the basis for further actions to be taken in order to improve the potentials of the provided system.

2. The strategy and the pilot action

The "*Port's Development Plan*" defined by Luka Koper for the period 2016-2020 represented the Milestone for further steps moved towards the digitalization processes foreseen in the port of Koper.

The port of Koper saw an extreme increase of volumes of containers and cars in the last decade. The development plans of the port foresee the increase of space but also an optimization of processes through the digitization of information transferred between stakeholders involved in operative processes in the port of Koper. One of the solutions planned by the end of 2020 and also to be implemented in next years, following the new "*Port's Development Plan for the period 2021-2025*", was the automation of some operative processes at the container terminal, in order to face the increasing quantities of containers and trains for the railway transport at the terminal.

For the 5-years period the strategies were:

- Increase of automation of processes at the terminals;
- Digitization of information exchanged between port's users (customs, forwarders, railway operators, terminals etc.);
- Reduction of employees on the field for a reduction of accident risks.

For both the periods (10-years plan):

- Automation of processes combined between different terminals
- Traceability of every container wagon in the port's area.



Perspectives	Goal	Measurement
1. Environmental and safety perspective	Decrease of paperwork and reduction of employee injuries	Automated IT based standard procedure at Container Terminal
2. Internal processes perspectives	Integration of internal processes with the tool proposed for the pilot, which would be friendly to all the users	ICT tool components installed; training of staff to use new technologies and testing in real life
3. Innovation and growth perspective	Integration of the system with other systems for a complete traceability of containers and wagons in port's area	Automated traceability and registration of containers' and wagons' movements within port's area
4. Customer / Partner perspective	Inclusion of stakeholders in the implement processes of the new technologies and IT-components; Cooperation with them for the creation of the interfaces	Visualization of processes before and after the implementation of the pilot in order to rate the success of the IT-development
5. Financial perspective	Reduction of costs at the terminal (both for reduction of accidents and increase of numbers of trains/day loaded/unloaded in port's area; own financial resources in addition to 85% funds from EU	OCR system fully installed and financed with EU contribution; reduction of accidents at the terminal while checking wagons

VISION:

Our vision is to establish automation of processes for the detection of multimodal freight units entering the container terminal on rail to ensure proper traceability of wagons and containers as well as monitoring of the condition of the transport equipment along the entire logistic chain.

Wish list of ICT measures:

Based on the strategic goals a "detailed wish list of ICT functionalities to be tested in the pilot actions (WPT2)" was defined.

Wish list of ICT measures			
Title	Short description	Link to the strategic goal	Link to the pilot action
1.	Automatic detection of containers and wagons transported by trains to/from port's Container Terminal	goal no. 1 and 2	Yes, when the train passes through the scanning gate, all containers transported on that train, as well as its wagons, are correctly detected, and the data transferred is readable and well saved in terminal management system



2.	Reduction of risks for employees on the field	goal no.3	Yes, employees moved from field to the office for the analysis of scanned pictures allows to reduce the risks of accidents and injuries for employees
3.	Data transfer between logistic service provider	goal no.2	Yes, the information about the respective container/wagon is correctly exchanged via interfaces with stakeholders and users of the system

Pilot Action

After the completion of the table-research and analysis process foreseen in the WPT1, Luka Koper and Adria kombi jointly started the development of ad-hoc solutions for the railway transport of cargo with containers in the port of Koper. The solutions studied during the technical meetings with stakeholders were initially concentrated on the proper location for the introduction of the new digital technology. The best position was identified in front of Container Terminal's gate, where the exchange between tracks 1F and 25C for inbound and outbound train is allowed.



Figure 1: identified location for the positioning of the OCR system in the port of Koper (Source: Luka Koper's archive)

The solution chosen for the pilot action aimed to install an OCR scanning system in the port of Koper at the entrance of the container terminal, for the scanning of wagons and containers transported through railway in the port of Koper. The system is able to scan the trains with containers at terminal's gate and provides all the data codes and videos through a detection system which scans the wagons/containers in real time, saving all the information on a local server. The implemented solution shows images about detected serial numbers, status of the wagons and containers (including eventual damages) and records



images also for later disputes with forwarders, owners of the containers etc. The system consists in an installation of a double portal over two railway tracks in front of the container terminal.

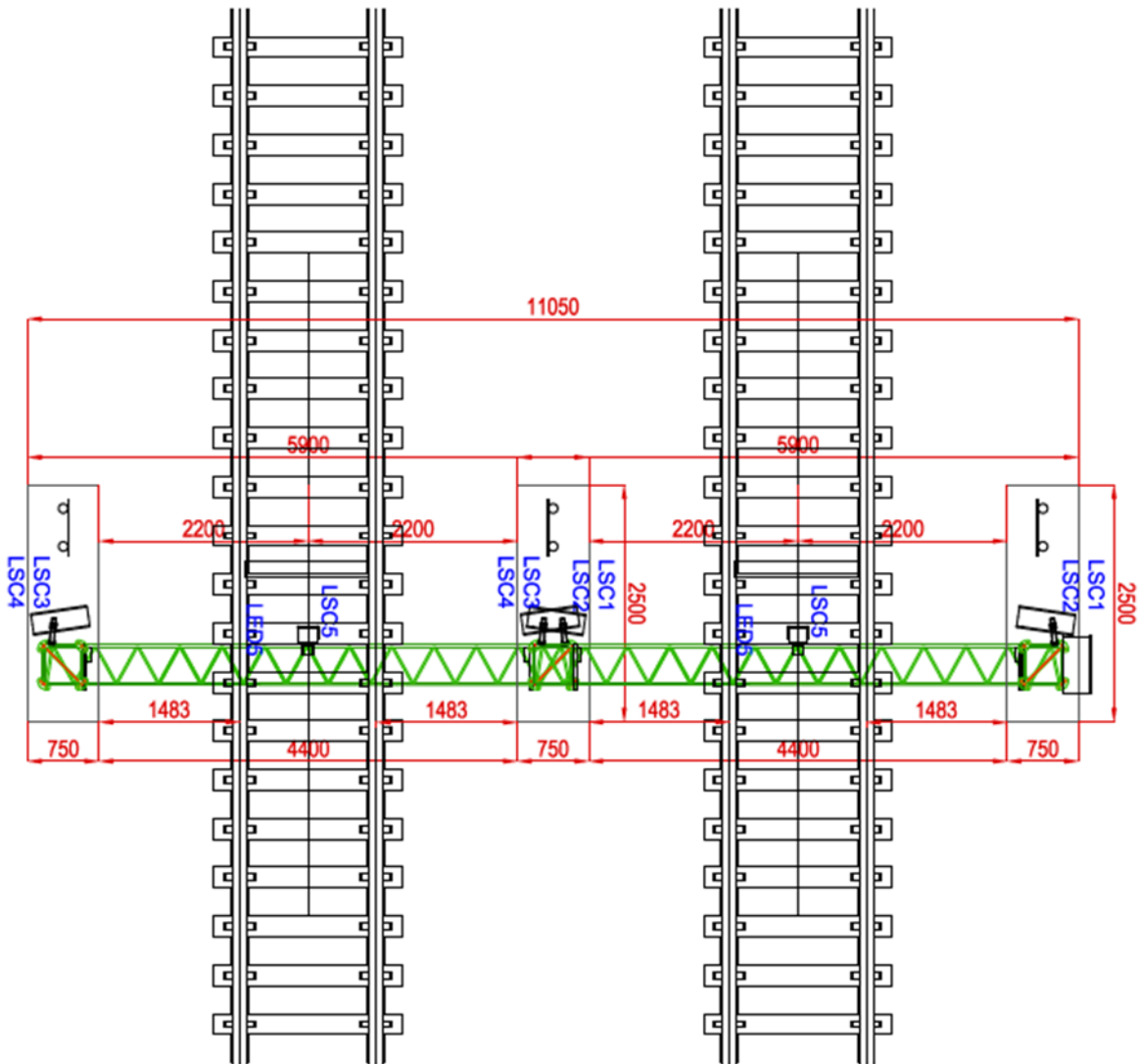


Figure 2: design of the OCR system in the port of Koper (Source: Luka Koper's archive)

It mounts an equipment composed by video cameras with high resolution capacity and with lighting system for the detection of serial numbers and damages in every type of atmospheric conditions and for 24 hours a day. In addition to this, the high capacity of the video card and of the storage disks installed, allows the servers to record the trains passing inbound and outbound of the Container Terminal for many weeks, before archiving the data.

The design for the chosen location has been drafted by the working team and after the project design was completed by the chosen contractor, the tender for the purchase of the portal was published. The CAMCO company was successful in the tender and provided the equipment by the end of August 2021.

Meantime, some works for the construction of foundations took more time than expected and the concrete installation of the OCR portal was postponed to October 2021. The works were successfully completed by the end of the year and additional integrations of the software provided by Adria Kombi were needed at the beginning of 2022. Actually, the equipment is fully installed as seen below:



Figure 3: installed OCR system in the port of Koper (Source: Luka Koper's archive)

The installed equipment allows the Port's Community System (PCS) to efficiently follow the operational processes at the railway which serves the Container Terminal and digitally fulfils the expectations of the stakeholders involved in the processes. Here below a view of the recorded container on the wagon:



Figure 4: view of the scan of the OCR system in the port of Koper (Source: Luka Koper's archive)

The system allows also the see the above container from four different sides. The Investment I2 was successfully completed by the end of 2021 and handed over for use at the beginning of 2022, when all the data flows were used by the involved stakeholders. Actually, the system is fully in use at the Container Terminal and implementations are foreseen in next years.

The system was integrated with the ICT tool provided by Adria Kombi as per its pilot action and served for the further improvement of the system before its entering in production. It brought complete functionalities for all the users of the system, which meant live purchase of data and permanent saving of data for later analysis or checks.



3. Identification of the actions

3.1. Mapping the actions

The table below summarizes the level of actions which were taken/need to be taken for the pilot actions from 2020 until 2030:

ACTION/MEASURE	ESTIMATED COST	TIME HORIZON
<i>Interoperability with other systems in the port's area</i>	<i>1.000.000 euros</i>	<i>2025</i>
<i>Installation of scanning solutions also for trucks, integrated with port's PCS</i>	<i>500.000 euros</i>	<i>2027</i>
<i>Development of user interface for the whole system</i>	<i>150.000 euros</i>	<i>2030</i>

3.2. Setting the actions

In this section, please describe the actions included in the previous table. Please find some examples as guidance. Please replicate this table for each action.

Action no. 1: Interoperability with other systems in the port's area	
Description of action/measure <i>Describe the action foreseen and the expected results from its implementation</i>	<i>A train scanning facility which automatic recording and digitization of data inbound/outbound for trains at the terminal should be installed and integrated into the IT-system. Each single train unit should be registered by several characteristics (photos, ID-No., etc.). The operation should be integrated with other systems in the port.</i>
Description of the main steps for its implementation <i>List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc...)</i>	<i>After the completion of the installation and testing of functionalities of the OCR system installed at Container Terminal's gate, in next years the attention will be put on road transport and further OCR systems are planned at port's gates for the scanning of trucks' registration numbers and containers on board. The procedure will foresee the following steps:</i> <ul style="list-style-type: none"> - <i>Analysis of railway OCR system installed;</i> - <i>Analysis of similar functionalities on other systems on cranes, reachstackers etc.;</i> - <i>Integration of OCR's functionalities with other system for the traceability of containers in the whole port's area.</i>
Stakeholders involved <i>List the stakeholders involved. What is their role in the action? Will they be the direct beneficiaries?</i>	<i>ACTUAL IT (IT provider for Luka Koper) Luka Koper's container terminal (terminal operator) Association of forwarders in Koper (Forwarders)</i>



Timeline <i>Indicate the time horizon for the implementation of the action</i>	2025
Investment cost <i>How much will cost the construction/realization of the future initiative/action/technology?</i>	1.000.000 EUR (excluded maintenance costs)
Sources of financing¹ <i>What are the sources of financing? Private capital, public capital, CEF, etc... How much is the share covered by each of them?</i>	Own funds
Impact of the initiative <i>Describe the expected future economic, social, environmental impacts of this initiative</i>	<p><i>With the scanning OCR system of the train units a lot of data will be transferred automatically optimizing operative processes. It will establish a new level of tracking and tracing activities for all the users involved. By integrating it with other recording systems in the port it will allow the whole PCS to have evidence of each position of containers and their transport within port's area. It will increase the level of digitization of data in port's area. The information will be available immediately with a whole view of the status of containers and freights transported. In addition to this, images will still be available for a long time, due to the saving of data on port's servers for later analysis/check.</i></p>
KPIs <i>Please identify the KPI to be used for measuring the action's impact</i>	<p><i>Less accident on the field, near the train - virtual check instead of live check on the field; Less legal costs following protest for damages of containers or wagons - all data recorded and no need for further discussions after check of images; Increase of daily trains completed at Container Terminal due to the speeded up checking procedures at the terminal.</i></p>

Action no. 2: Installation of scanning solutions also for trucks, integrated with port's PCS	
Description of action/measure <i>Describe the action foreseen and the expected results from its implementation</i>	<p><i>The installation of the new OCR system requires a friendly integration with port's PCS for the further share of collected data at Container Terminal's gate. The solution provide by the OCR system on railways will be transferred also on road, by providing a scanning facility also for trucks on road. The scanning system will follow the logic introduced by the OCR installed for the railway transport. The data will be saved on a server which will be available for</i></p>

¹ This information, if already available, could be assumed in the draft version and it has to be confirmed in the final one



<p>Description of the main steps for its implementation <i>List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc...)</i></p>	<p><i>later checks.</i></p> <p><i>After the completion of the installation and testing of functionalities of the OCR system installed at Container Terminal's gate, in next years the attention will be put on road transport and further OCR systems are planned at port's gates for the scanning of trucks' registration numbers and containers on board. The procedure will foresee the following steps:</i></p> <ul style="list-style-type: none"> - <i>Analysis of railway OCR system installed;</i> - <i>Project design for road gates;</i> - <i>Approval of the investment by Management Board;</i> - <i>Publication of tender for construction of road OCR;</i> - <i>Selected provider of road OCR;</i> - <i>Construction of OCR at port's gates;</i> - <i>Analysis of system's functionalities;</i> - <i>Integration of road's OCR with other systems in the port for full traceability of trucks and containers;</i> - <i>Full digitization of processes at container terminal.</i>
<p>Stakeholders involved <i>List the stakeholders involved. What is their role in the action? Will they be the direct beneficiaries?</i></p>	<p><i>ACTUAL IT (IT provider)</i> <i>Luka Koper' container terminal (Terminal operator)</i> <i>Adria Kombi (railway operator)</i> <i>Association of Forwarders (forwarder)</i></p>
<p>Timeline <i>Indicate the time horizon for the implementation of the action</i></p>	<p><i>2027</i></p>
<p>Investment cost <i>How much will cost the construction/realization of the future initiative/action/technology?</i></p>	<p><i>500.000 EUR (excluding maintenance costs)</i></p>
<p>Sources of financing² <i>What are the sources of financing? Private capital, public capital, CEF, etc... How much is the share covered by each of them?</i></p>	<p><i>Own funds + EU contribution through projects (Interreg 80 % or HORIZON 70% or CEF 50 %)</i></p>
<p>Impact of the initiative <i>Describe the expected future economic, social, environmental impacts of this initiative</i></p>	<p><i>With the scanning OCR system of the train units a lot of data will be transferred automatically optimizing operative processes. It will establish a new level of tracking and tracing activities for all the users involved. It will increase the level of digitization of data in port's area. The information will be available immediately and in a better quality. In addition to this, images will be available for a long time, due to the saving of data on port's servers for</i></p>

² This information, if already available, could be assumed in the draft version and it has to be confirmed in the final one



	<i>later analysis/check.</i>
KPIs <i>Please identify the KPI to be used for measuring the action's impact</i>	<i>Increased digitalization of processes in the port's area; Less accidents and errors linked with physical check of containers, trucks and wagons; Automation of data transfer for all the users involved; Higher satisfaction of parties involved and customers.</i>

Action no. 3: Development of user interface for the whole system	
Description of action/measure <i>Describe the action foreseen and the expected results from its implementation</i>	<i>The development of a whole interface will include the development of further functionalities for all the terminals included in port's area (not only Container Terminal). Scanning systems are going to be installed also at other terminals and all these integrated digital registration systems are going to bring more data immediately, which will require an increase of digital storage capacities.</i>
Description of the main steps for its implementation <i>List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc...)</i>	<i>The whole creation of the new interface will require many steps, which will link all the terminals involved in port's logistics:</i> <ul style="list-style-type: none"> - <i>Analysis of system capacity at each terminal</i> - <i>Analysis of data required by users</i> - <i>Definition of data to be integrated in the common interface</i> - <i>Creation of a database for the data to be integrated with EU's directives and linked systems (ex.: EDIFACT and other systems adopted at EU level)</i> - <i>Publishing of tender for creation of such an interface</i> - <i>Integration of all the systems in a common interface created in line with EU directives and systems already adopted at EU level</i> - <i>Testing and entering in production of the new interface</i>
Stakeholders involved <i>List the stakeholders involved. What is their role in the action? Will they be the direct beneficiaries?</i>	<i>Customs Forwarders IT providers Railway operators Shipping agencies Port's terminals</i>
Timeline <i>Indicate the time horizon for the implementation of the action</i>	<i>2030</i>
Investment cost <i>How much will cost the construction/realization of the future initiative/action/technology?</i>	<i>150.000 EUR (excluding maintenance costs)</i>



Sources of financing³ <i>What are the sources of financing? Private capital, public capital, CEF, etc... How much is the share covered by each of them?</i>	<i>Own sources</i>
Impact of the initiative <i>Describe the expected future economic, social, environmental impacts of this initiative</i>	<i>Increased level of digitization of the logistic processes in port's area Higher level of data transfer between all the stakeholders and users in general of the new interface</i>
KPIs <i>Please identify the KPI to be used for measuring the action's impact</i>	<i>Higher satisfaction of all the users Increase of alignment of port's interface with EU's directives and requirements for international paperless exchange</i>

Conclusion

The pilot action achieved the expected results and is ready also for future implementations of the system. In fact, the OCR system could be integrated with other systems which are part of the PCS and could allow the operators to follow the containers during their whole journey at the Port of Koper. From the perspectives analysed in this document, actual Development Plans are showing an increase of digitization accompanying the introduction of such system for the automation of data exchange, which can speed up operative processes, as well as reduce risks for errors, damages or accidents.

Actually, the system allows a reduction of operative estimated times for around five minutes per train, which means that approximately for 24 trains per day it can represent a gain of two hours per day. In terms of percentage, it represents a reduction of more than 8 % of the operative time at the railway gate of the Container Terminal.

As said, not only the external stakeholders will benefit from the introduction of such a system, co-financed by the COMODALCE project through the Activity I2, but also the involved employees will indirectly benefit from it as a safer and more secure working process, where the digitization is able to limit the presence of checkers on the field. It reduces the possibility of accidents involving employees and offers safer working conditions. Such an improvement has not been yet quantified from the social point of view, but a reduction of absence of employees due to illness is reflected for sure also in a reduction of payments of sick leave.

From the technical point of view, the railway operators and all the other logistic operators involved are enthusiastic about the innovation. As mentioned above, the installed equipment can represent the basis for the concrete development of the full digitization of the manipulation processes related to the railway transport of containers and of their manipulation within port's area, by the end of 2025. It can happen through the integration of the OCR railway system with a road OCR system installed at port's gates and through the integration of such a system with the systems mounted on cranes, reachstackers etc. which can

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offer a complete traceability of the containers within port's area. In a later step, the unification of port's system with others in line with EU regulations and directives can offer a large-scale traceability system, with less probabilities for errors, damages and delays.

It's already proved that the system can be integrated with other video/data systems in the port which can provide a traceability of each container, truck and wagon in port's area. In addition to this, the system can be also integrated with the other systems for gates, trucks and trains. This further step, which links road PCR system through the ICT solutions for multimodality in suburban areas, is foreseen within the pilot activities planned in the newly submitted EU project named ACCESSMILE. The evaluation process is ongoing within the Interreg CE Programme.