
METROCARGO ®

An innovative system for intermodal freight transport



PRESENTATION TO APM TERMINALS

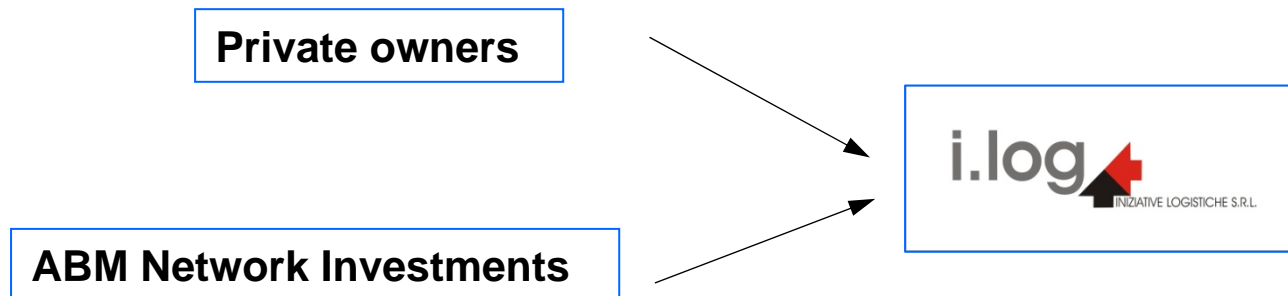
Vado Ligure, 15 September 2009

Who are



I.LOG was founded in 2004 to promote and develop innovative logistic initiatives, engineering and software development.

I.LOG has a particular know-how in the road and rail transport, and in the design of logistic infrastructures, and holds the licence of the **METROCARGO** ® concept patent.



Metrocargo development: the early stages

- Initial development consisted in studying possible technical solutions to solve the logistic problem of making intermodality more efficient
- Several solutions were designed and challenged
- It was finally decided to follow a solution that handles containers touching only the corner fittings

Metrocargo development: the first prototype

- Automatic transfer shuttle prototype (full scale) with Laboratorio di meccanica generale e di meccanica delle vibrazioni della Facoltà di Ingegneria di Genova, and other partners

**UNIVERSITÀ DEGLI STUDI
DI GENOVA
FACOLTÀ DI INGEGNERIA**



Metrocargo development

- The mechanical solutions were satisfactorily developed within Metrocargo Automazioni srl
- The problems still to be solved were_
 - Identifying, locating and centering the container corner fitting for lifting
 - Scanning the incoming trains to obtain the container sequence on the wagons (empty, 20 foot, 40 foot etc)
 - Scanning the incoming trains to check the containers ownership codes
 - To assure safety a security of the automated working area, where no person should enter
 - Assuring the reliability of the various data flowing in the system
- These problems are being tackled with the help of VIT, an EC funded research project

VIT Project



SEVENTH FRAMEWORK PROGRAMME

VIT

Vision for Innovative Transport

Project partly funded by the EC

Grant agreement no. 222199

SP4-Capacities - Research for SMEs

www.vitproject.eu



VIT Project

The project structure is that a number of small enterprises (SMEs) form a Consortium with researchers (RTD performers) to do development and research work for an industrial project.

The EC grants funds to the SME's to pay for the research work.

Following is the list of SMEs and RTD performers in the VIT project

VIT consortium



■ SMEs



□ I.LOG (IT) *project coordinator*



□ Molinari Rail AG (CH)

□ WITT (DE)

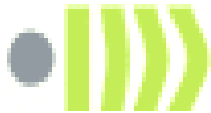
□ Systems Navigator (NL)

VIT consortium



■ RTD performers

- ❑ DISI - Università degli Studi di Genova (IT) -- *RTD coordinator*



- ❑ Speed Poland



- ❑ SAT (DE)



- ❑ Imavis srl(IT)



- ❑ Dundee University (UK)




VIT Project is partly funded by the EC
www.metrocargo.it



VIT Project

- European Community has partly financed the research project VIT VISION FOR INNOVATIVE TRANSPORT.

The VIT project (Vision for Innovative Transport) is about the development of **computer vision technologies** to achieve full automation of the innovative Metrocargo system for intermodal shipment of containers and swap bodies.

Proposal Submission Form		
	EUROPEAN COMMISSION 7th Framework Programme on Research, Technological Development and Demonstration	Research for the benefit of SMEs <i>Research for SMEs</i>
		A1: Content
Proposal Number	<input type="text" value="000000"/>	Proposal Acronym
		<input type="text" value="VIT"/>
General Information		
Proposal Title	<input type="text" value="Vision for Innovative Transport"/>	
Duration in months	<input type="text" value="18"/>	Call identifier
		<input type="text" value="FP7-SME-2007-1"/>
Sector code(s) most relevant to your topic		
Sector code 1	<input type="text" value="Transport"/>	
Sector code 2	<input type="text" value="Information and Communication Technologies"/>	
Free keywords (industrial application)	<input type="text" value="intermodality, rail transport, container loading, swap body, video-surveillance, safety systems, automation"/>	
Free Keywords (S&T)	<input type="text" value="computer vision, 3D reconstruction, motion analysis, statistical learning, dynamic event recognition, process simulation and automation, OCR"/>	
Abstract (max. 2000 char.)		
<small>The VIT project (Vision for Innovative Transport) is about the development of computer vision technologies for an innovative system for intermodal shipment of containers and swap bodies across Metrocargo. This system will adapt a network of terminals distributed in the territory connected by scheduled freight trains. Containers will be transferred from one train to another as for passenger traffic. Loading will be done horizontally under the electric feeding line, without shunting the train to a load yard with diesel traction. The time required to load a train will be about 40 minutes instead of the current 8-12 hours. It is foreseen that 10-15% of current long distance road traffic can be transferred to rail with comparable delivery time and lower transport costs. The models developed within VIT will be integrated in Metrocargo. Computer vision is the key technology enabling the design and implementation of comprehensive and modular covering automation, safety and security. A high degree of automation guarantees the processing speed that makes the loading system practically viable and economically sound. In addition VIT will ensure human safety when human presence is detected in dangerous areas and records of the infrastructure. The scientific and technological objectives are the study, design and development of (i) a robust and redundant vision system for precise positioning of the lifting units for automatic load/unload, (ii) vision functionalities to check the correctness of train loading, (iii) an innovative package of a low cost 2D/3D visual module to scan the train composition, (iv) a video-surveillance system to monitor off-board zones, (v) a system security infrastructure to detect and solve possible system failures. These goals will be reached through a balanced effort involving contributions from both the participating OMCs and the VIT technology team. A detailed description of the VIT system and its components will be provided in the deliverables.</small>		
Similar proposals or signed contracts?		
a) Has this proposal (or a very similar one) been previously submitted to a call for proposals of the 7th EU RTD Framework Programme?		
		<input type="text" value="no"/>
IF YES		
- please give the call identifier		<input type="text"/>
- please give the proposal or contract number (if known)		<input type="text"/>
b) Is this proposal (or a very similar one) currently being submitted to another call under FP7?		
		<input type="text" value="no"/>
IF YES please give the call identifier		
		<input type="text"/>

VIT Project

- Aims of the EC-funded research project VIT are the study, design and development of:
 - a robust and redundant vision system for precise positioning of the lifting units for automatic load/unload
 - vision functionalities to check the correctness of train loading
 - an innovative prototype of a low-cost 2D visual module to scan the train composition
 - a video-surveillance system to monitor automatic operation areas where personnel should not enter
 - a system security infrastructure to detect possible system failures.

VIT Project

- Work has started on the first of June 2008 and is progressing rapidly. Significant progress has already been made on the most crucial component, the vision system that must identify the side slot of the container corner fittings and guide the lifting columns so they can lift the container.
- ILOG, through its controlled company Metrocargo Automazioni, is constructing a full scale mechanical prototype of a Metrocargo plant, with all significant components except the vision system for identifying the corner fitting. Mechanical tests will be performed manually until the vision system is developed within the VIT project.
- The mechanical prototype will be made available to the VIT project for development and testing

VIT Project

- The Metrocargo full scale prototype installed in the port of Vado Ligure was made available to VIT for development and testing.

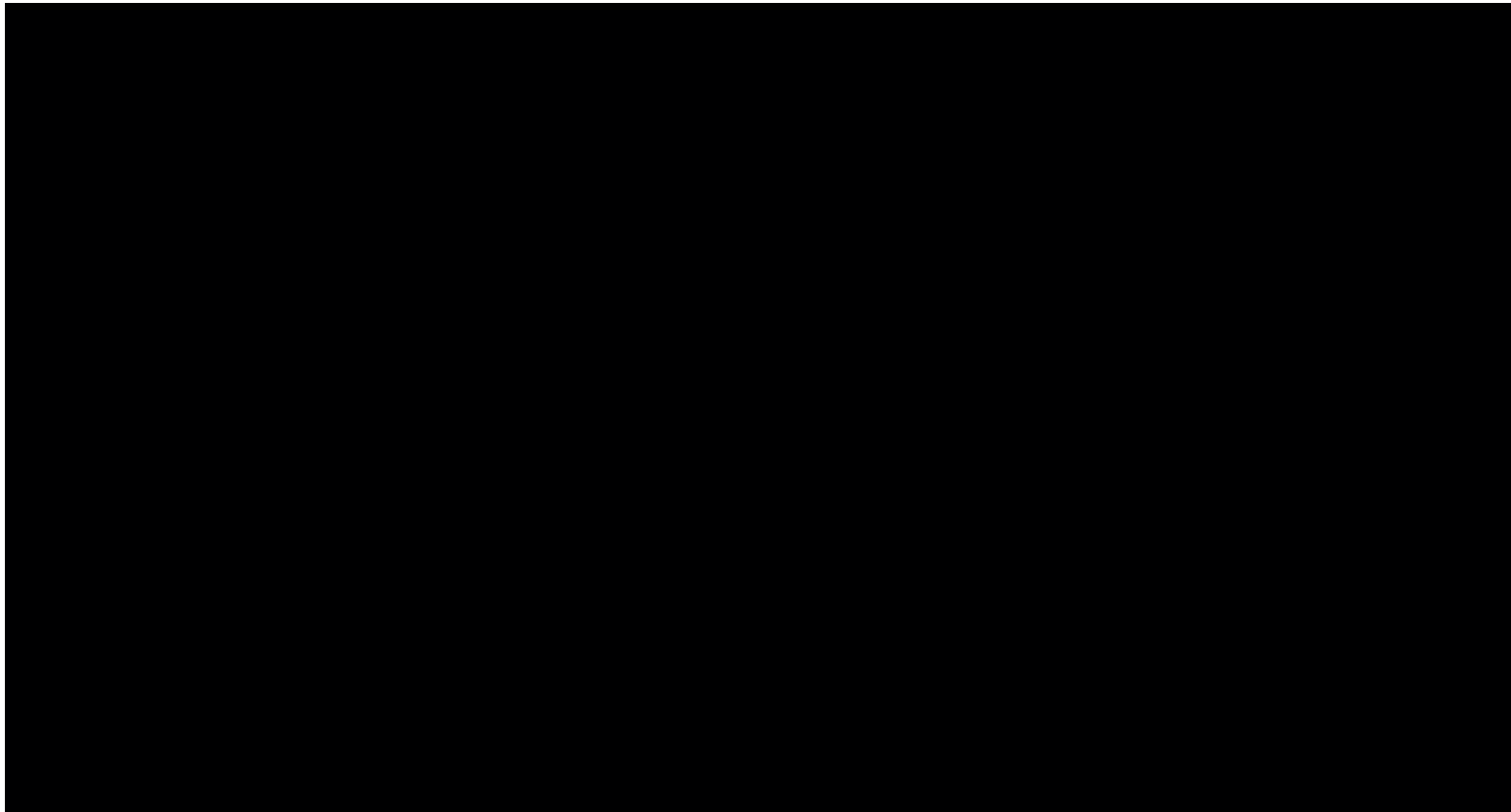


VIT Project

- After 12 months some results of the VIT project have been incorporated in the mechanical Metrocargo prototype installed in the port of Vado (Savona).
 - The vision system for centering the corner fittings is working and extensive technical tests will be performed in the next few months.
- Satisfactory software demonstrations have been effected for:
 - Train scanning (giving the sequence of empty- 20 foot – 40 foot containers on wagons)
 - Reading of container ownership codes
 - Detection and recognition of persons in an environment of moving machinery, to assure security and safety in the secluded automatic operation area
 - System security infrastructure for the operation of a Metrocargo plant

VIT Project

- This is a detail of the visual equipment on the lifting column.



What is METROCARGO®

The MetroCargo® system is a smart Electro-mechanic system that allows charging and discharging containers from a train in only a few minutes.



A key feature of the Metrocargo® system is its adaptability to any kind of train and container type WITH NO NEED OF SPECIAL MODIFICATIONS TO THE WAGONS NOR THE CONTAINERS. Optical recognition technology allows the system to “read” a train composition as it enters the station and even the identifiers of each single container (no need of special RFID or barcoding).

Metrocargo Plant

The system has 3 main components:

- 4 Lifting Towers (2 per side on track)
- 2 independent transfer cars
- Sorting Platforms



Metrocargo Plant

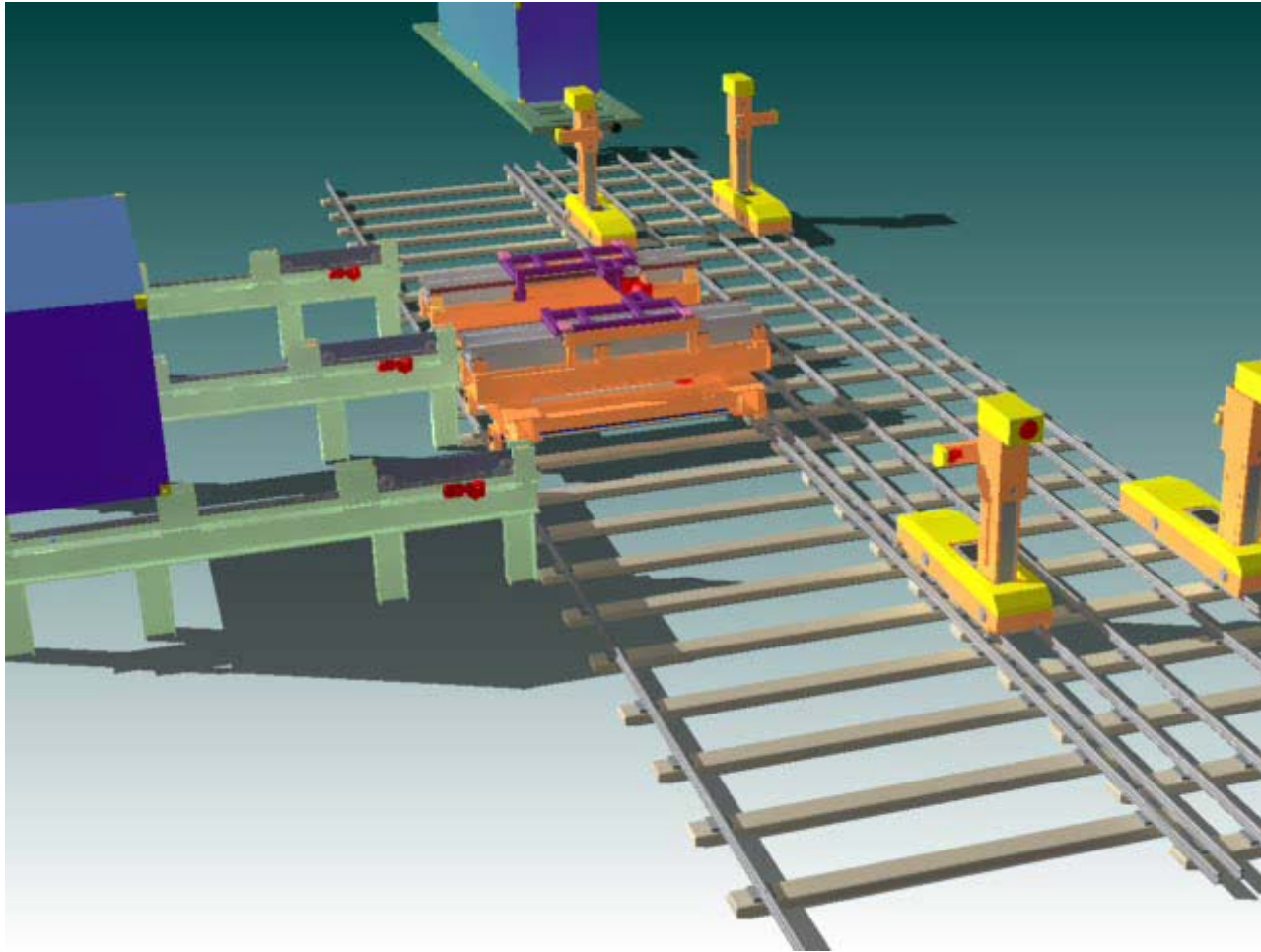
Four towers allow to lift/to let down containers on wagons. Towers work inserting a pin in the side slot of the corner fitting of containers.

Two independent transfer cars insert a bridge between wagons and container and then move horizontally container on sorting platform.

Sorting Platforms have motors that allow to move container unload/reload on trucks.



Metrocargo Plant



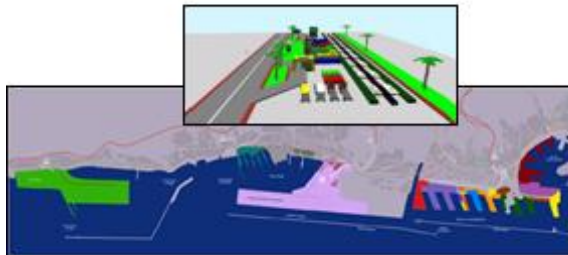
Innovative technical device Metrocargo®

Applications

Network



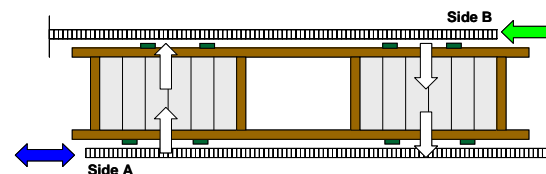
Port-Inland Connections



City Logistics



Transfer Between Different Gauges



Metrocargo® solution for APM TERMINALS in Vado Ligure

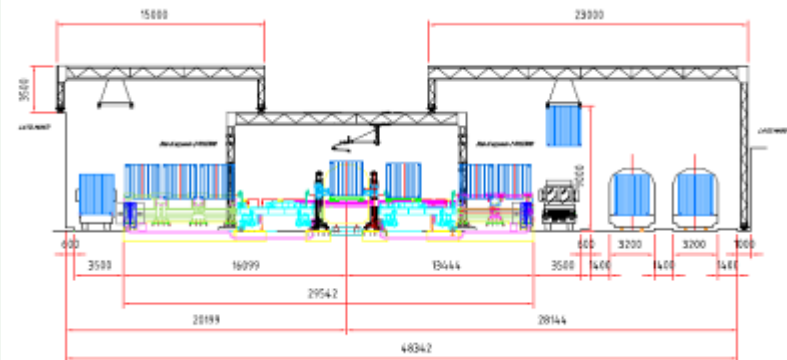


Metrocargo® terminal features

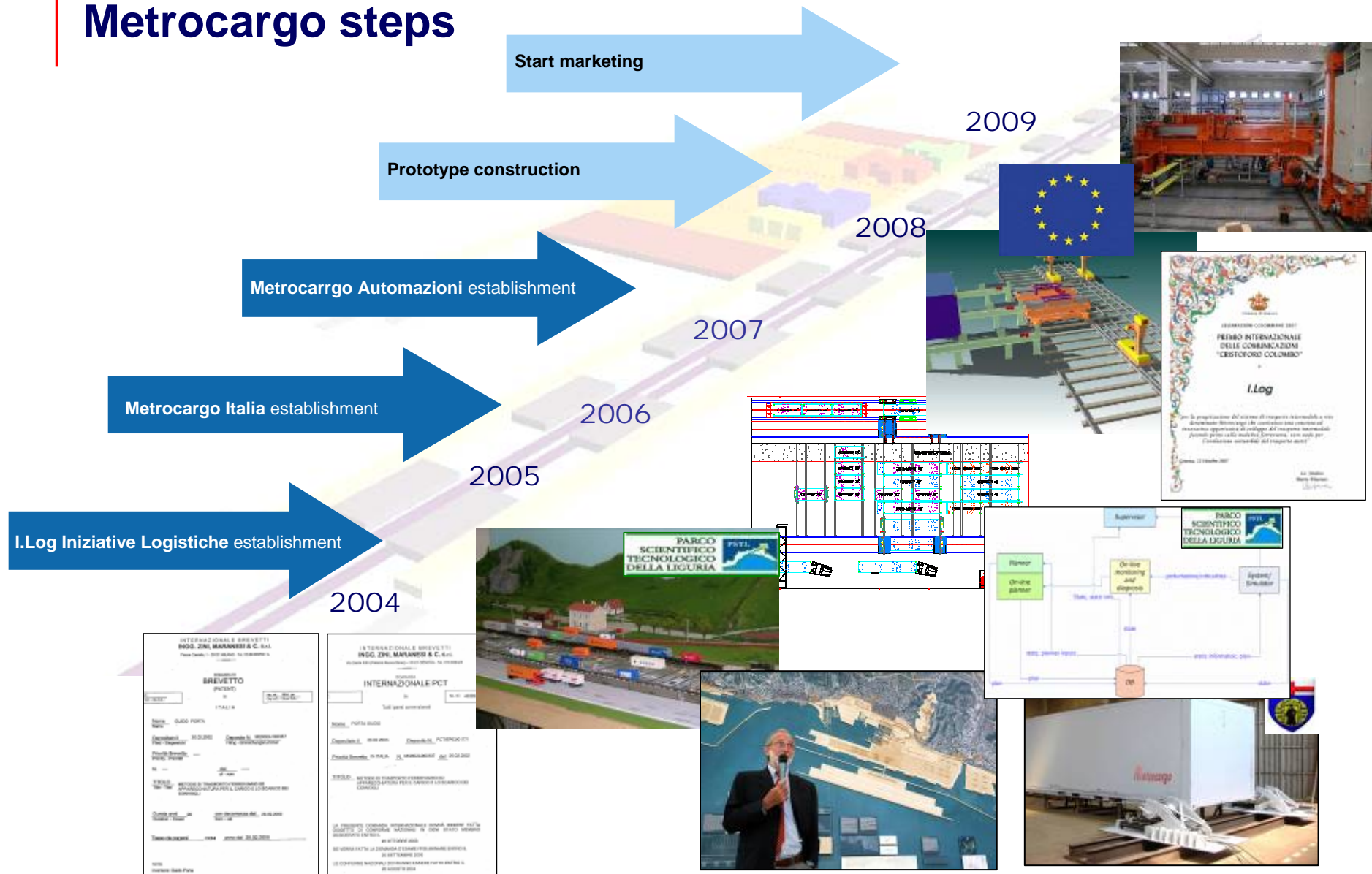
- used surface	21.400 m ²
- Max width	45 m
- max train length	458 m
- max capability per train	66 teu
- storage capacity	192 teu per side
- number of Metrocargo© transfer systems	6/8 per side
- n° RTG	2 per side

Maximum Metrocargo® terminal performance

-time load/unload train:	40 min (pair)
-operative days	350
-trains/day:	20 (pair)
-trains/year:	7.000 (pair)
-loading factor	80%
-teu/day:	1.056
-teu/year:	793.200



Metrocargo steps



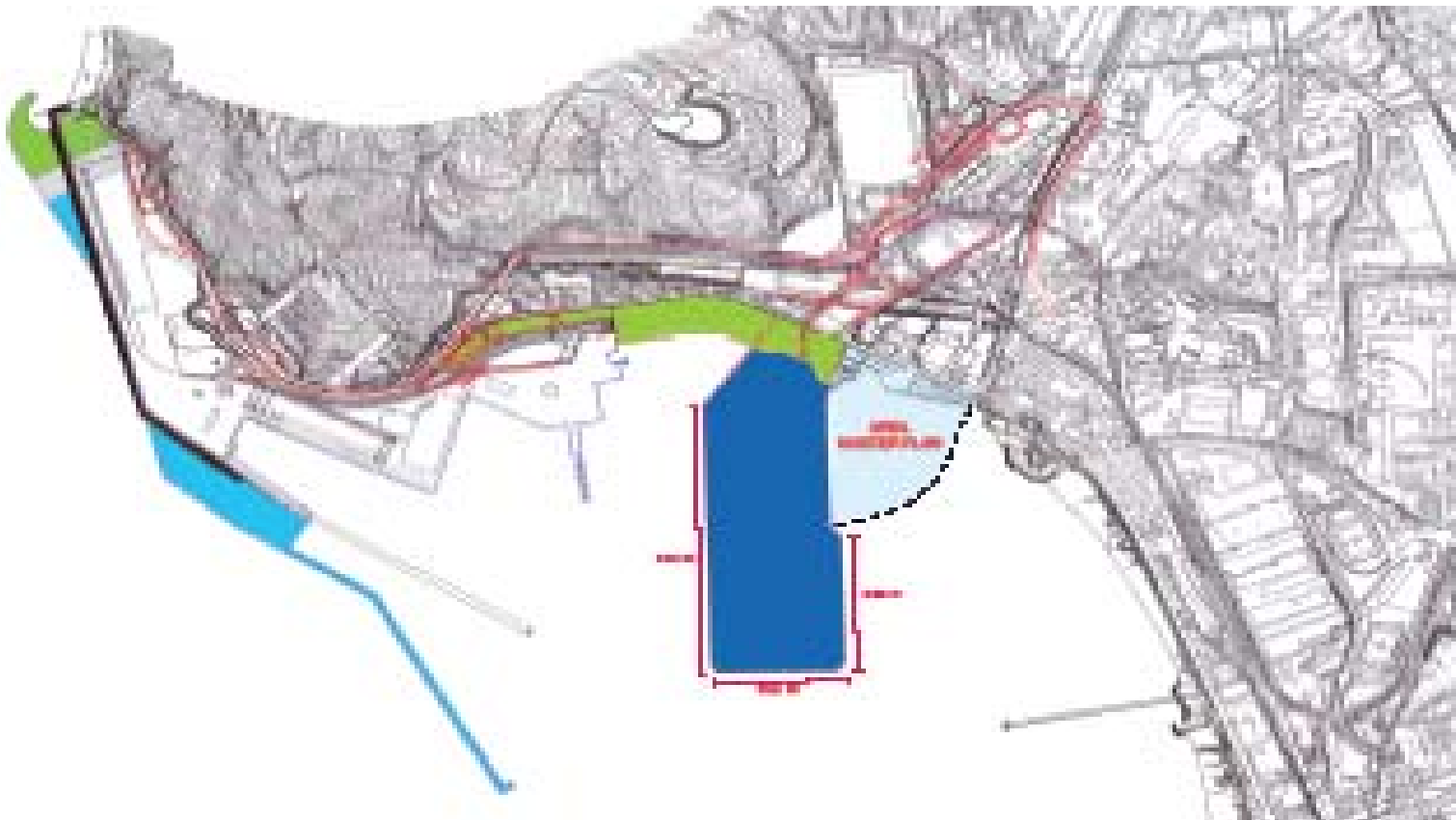
The port and logistic system of Savona



Dry-port in Val Bormida



Planned investments in Vado Ligure

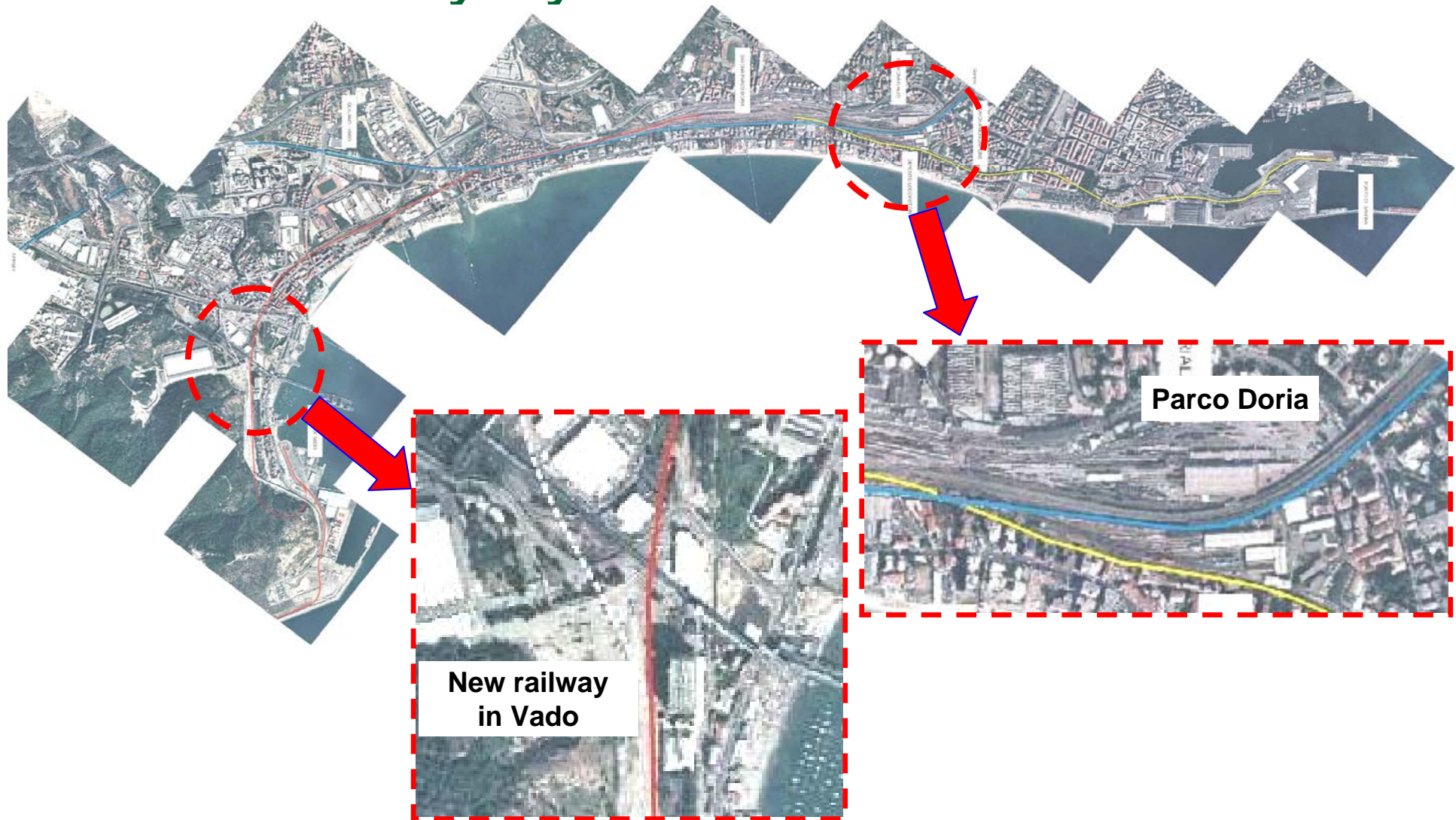


The container terminal

Railway connection will be the backbone of the logistic system of Savona and Val Bormida



The railway system of Savona



Traditional handling

- Traditional handling
 - ❑ working on one rail at a time
 - ❑ long loading time

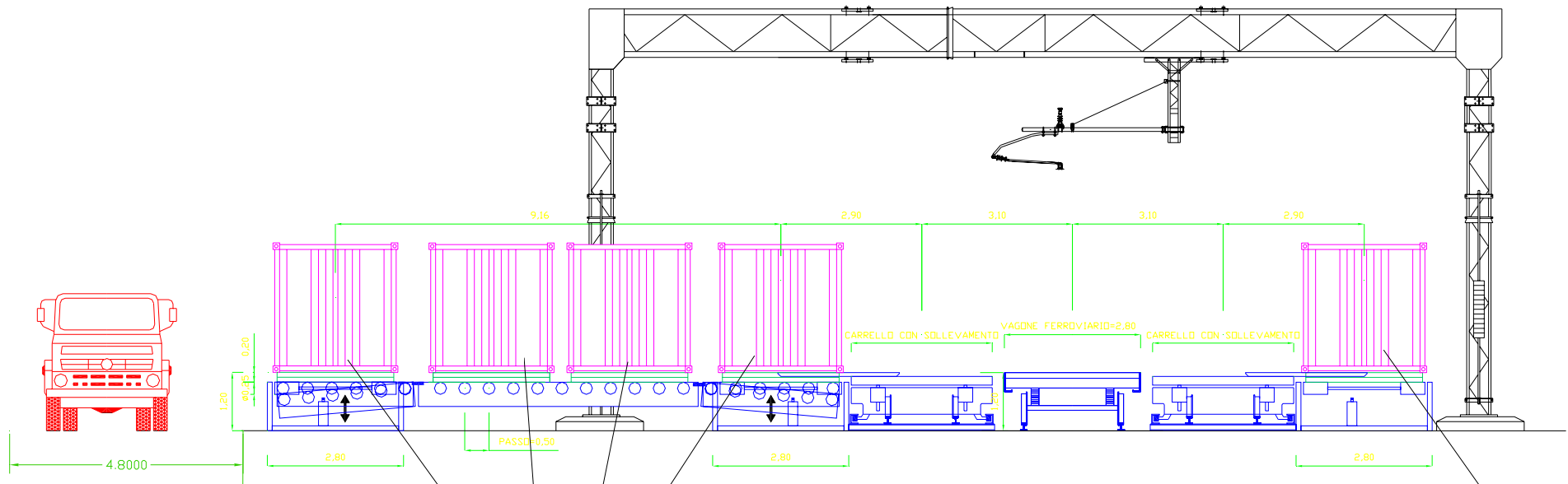






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6/10/10

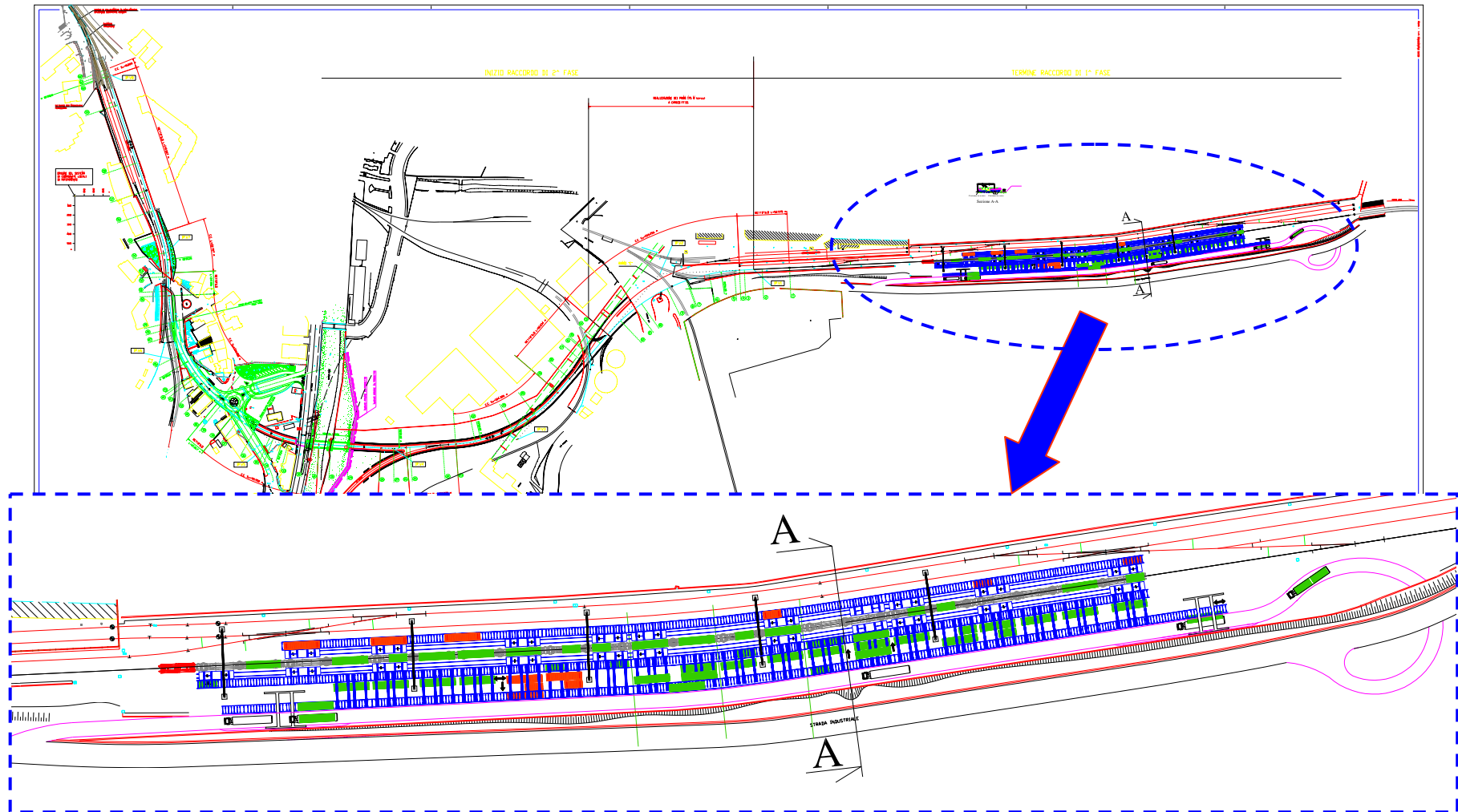
Metrocargo terminal



CONTAINERS TO LOAD

DOWNLOADED CONTAINERS

Metrocargo terminal

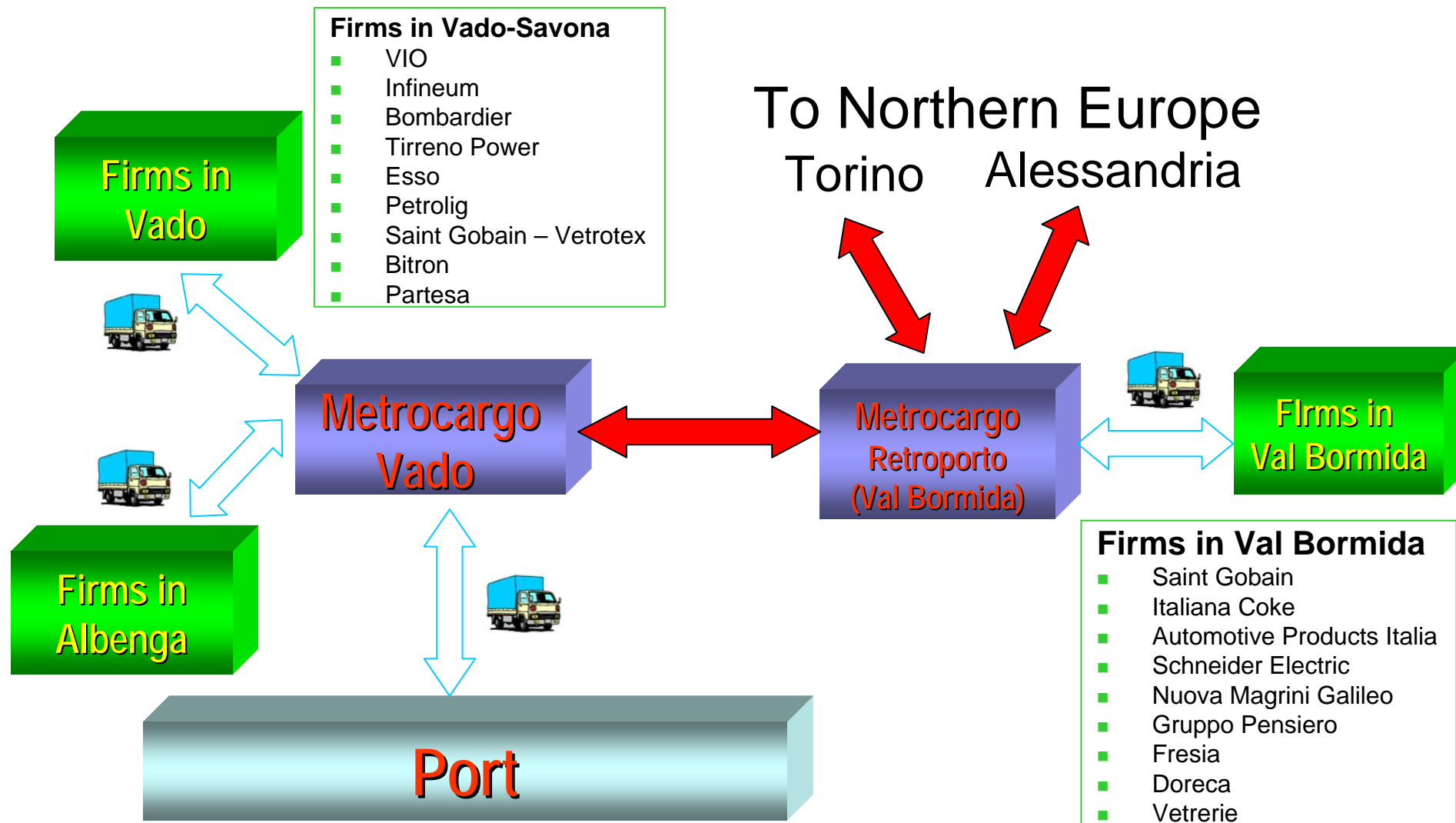


Terminal features

■ Max holding capacity:	76 TEUS
■ Max handling capacity:	130 TEUS
■ Loading/unloading front:	300 m
■ Terminal width:	30 m
■ Surface:	9.000 m ²
■ Number of loading machines:	10
■ Loading/unloading time:	30'-40'

- | | |
|---------------------------|--------------|
| ■ Shuttle trains per day: | 15 |
| ■ TEU's handled per day : | 1.000 |

Distributed traffic



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