METROCARGO ®

An innovative system for intermodal freight transport

PRESENTATION TO EIRAC – ERRAC

Brussels, 9th October 2009

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

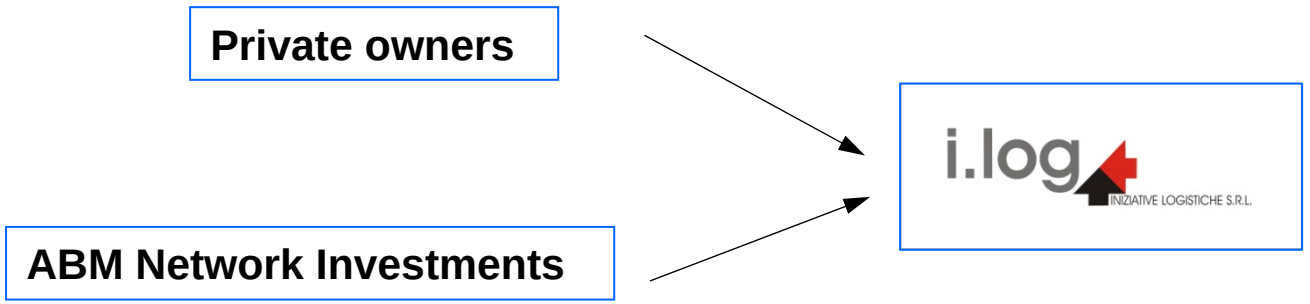
i.log INIZIATIVE LOGISTICHE S.R.L.

metrocargo

Who are

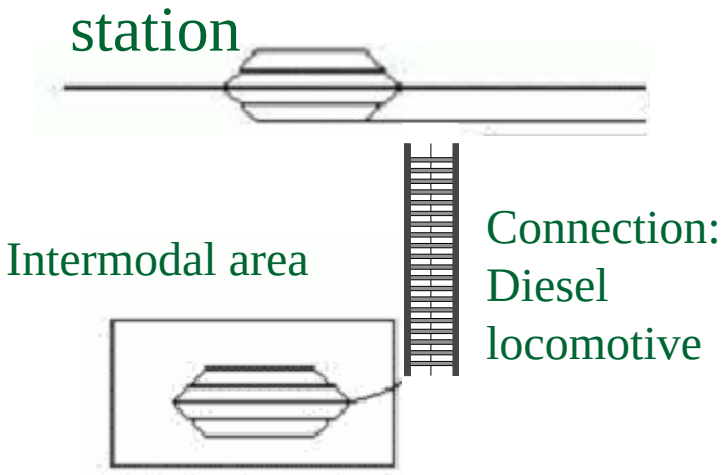
I.LOG was founded in 2004 to promote and develop innovative logistic initiatives, engineering and software development.

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.



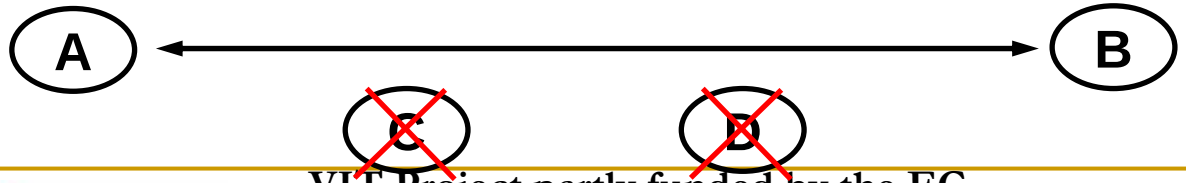
Traditional intermodal terminal

Traditional Handling time :
10 – 12 hours per train



Today intermodal terminals are off-line. Trains must be shunted away from the electrified track using diesel locomotives, pulled to a loading yard, loaded, and brought back to the regular track by diesel traction. This operation usually takes 10–12 hours, with significant shunting costs (up to 70/100 euro per unit)

This situation doesn't allow to do intermediate stops in intermodal terminals because it has high costs and high times!



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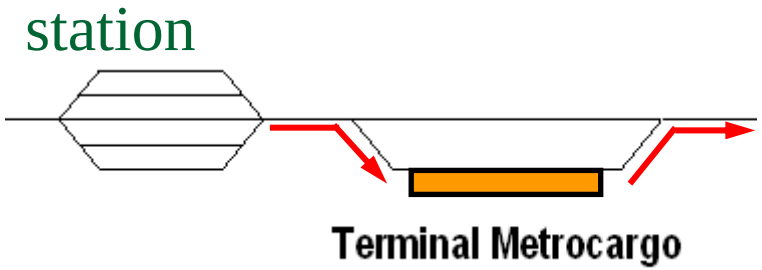
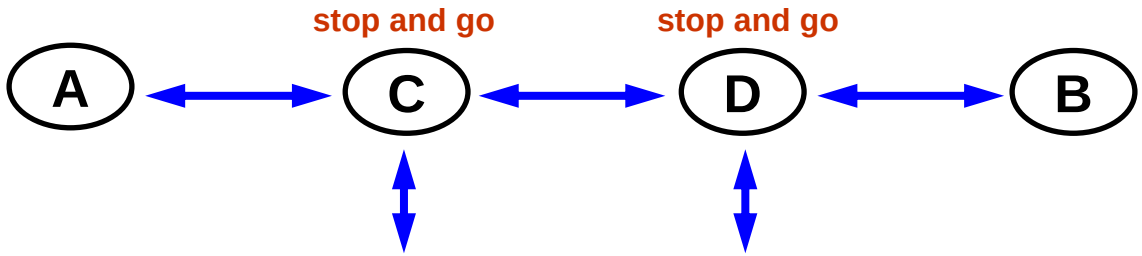
Metrocargo in network

Metrocargo Handling time:
30 minutes per train



With Metrocargo® the loading unloading activity takes about 30 minutes. The trains remain under the electrical track and automatic handling permits the safety movements of containers.

Metrocargo allows to do intermediate stops with a great reduction of costs and times!



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Metrocargo in network

is a new way to innovate intermodality: it applies to cargo the same concept used for passengers, setting-up a network of shuttle trains that run on a fixed time plan, loading containers and swap bodies.

It allows to load horizontally on the train, under the electric feeding line, without modifications of wagons and containers, and permits the reduction of times and costs, using trucks only for the final door transport.

- **INNOVATIVE DEVICE**

is a technical solution especially a solution for **network** and **port-inland connections**.

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

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Metrocargo development

- The mechanical solutions were satisfactoriry 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

http://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)

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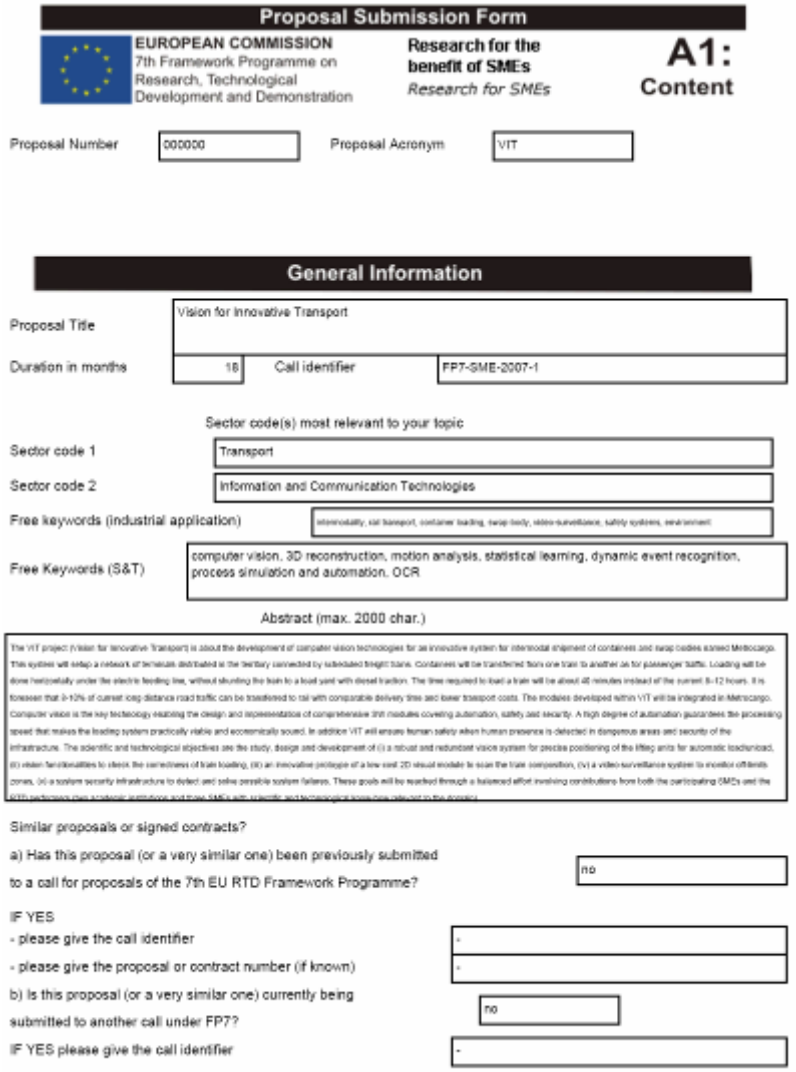
VIT Project

- 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
Research for SMEs

A1: Content

Proposal Number	000000	Proposal Acronym	VIT

General Information

Proposal Title	Vision for Innovative Transport		
Duration in months	18	Call identifier	FP7-SME-2007-1

Sector code(s) most relevant to your topic

Sector code 1	Transport
Sector code 2	Information and Communication Technologies
Free keywords (industrial application)	intermodality, rail transport, container loading, swap body, video-surveillance, safety systems, environment
Free Keywords (S&T)	computer vision, 3D reconstruction, motion analysis, statistical learning, dynamic event recognition, process simulation and automation, OCR

Abstract (max. 2000 char.)

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 named 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 45 minutes instead of the current 8-12 hours. It is foreseen that 8-10% of current long distance road traffic can be transferred to rail with comparable delivery time and lower transport costs. The modules developed within VIT will be integrated in Metrocargo. Computer vision is the key technology enabling the design and implementation of comprehensive ITS modules 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 security 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 arms for automatic load/unload, (ii) vision functionalities to check the correctness of train loading, (iii) an innovative prototype of a low cost 2D visual module to scan the train composition, (iv) a video-surveillance system to monitor off-limits 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 SMEs and the RTD performers (two academic institutions and three SMEs with scientific and technological know-how relevant to the project).

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?	no
IF YES	
- please give the call identifier	-
- please give the proposal or contract number (if known)	-
b) Is this proposal (or a very similar one) currently being submitted to another call under FP7?	no
IF YES please give the call identifier	-

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 developped 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

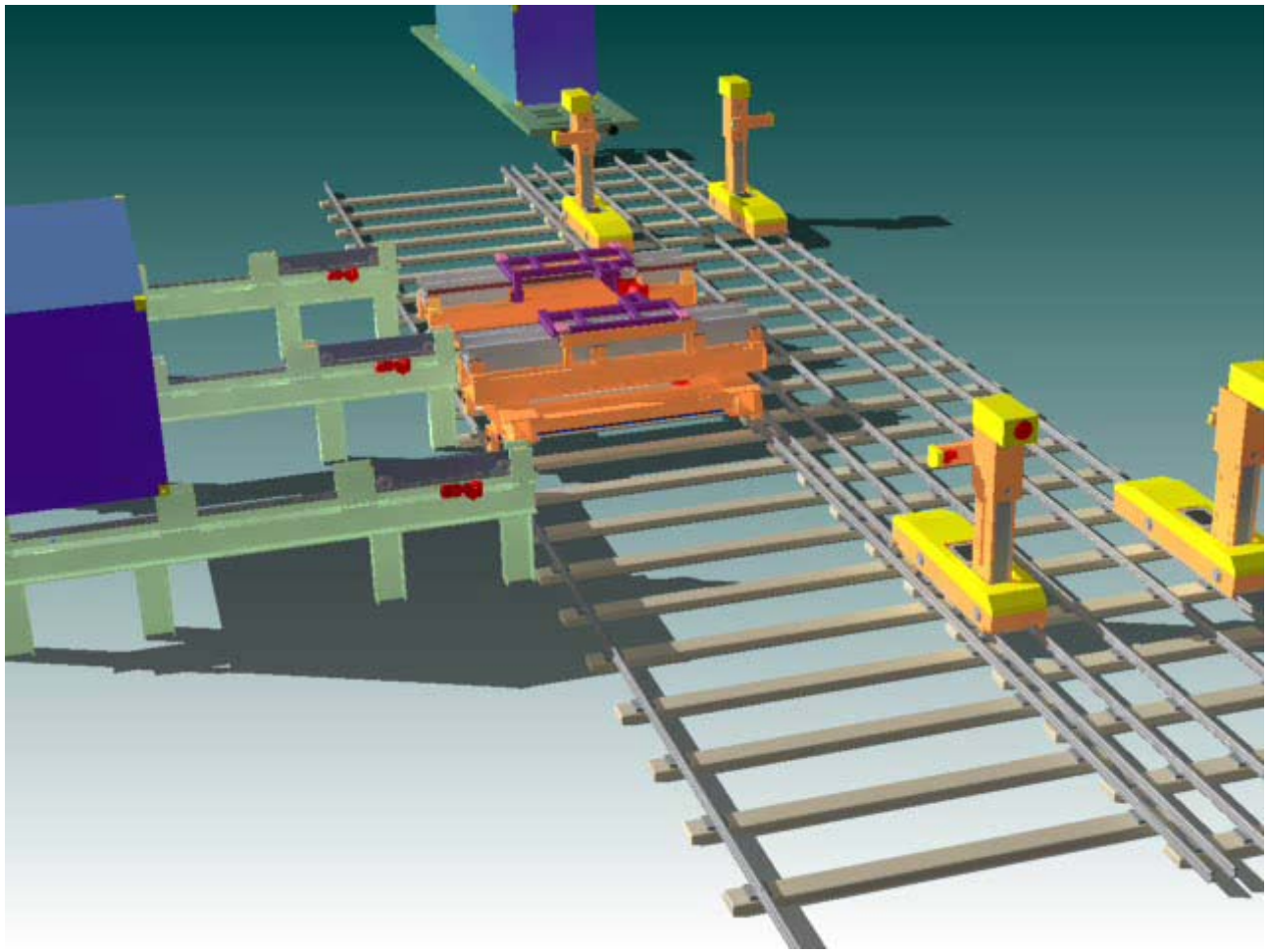
Metrocargo Plant

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 horizontaly container on sorting platform.

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

Metrocargo Plant



Metrocargo video

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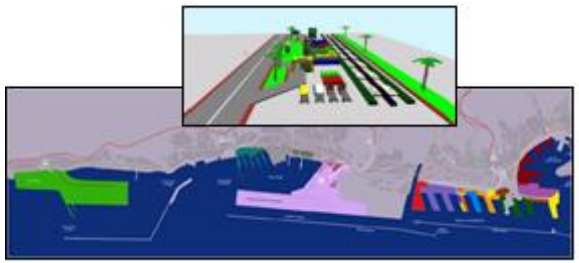
automazioni s.r.l.

Innovative technical device Metrocargo®

Applications

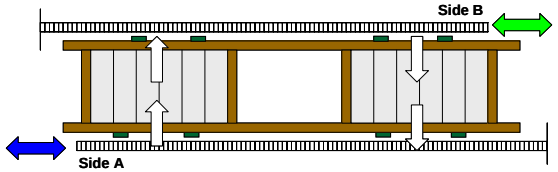
Network

Port-Inland Connections



City Logistics

Transfer Between Different Gauges



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It allows to load horizontally on the train, under the electric feeding line, without modifications of wagons and containers, and permits the reduction of times and costs, using trucks only for the final door transport.

Innovative logistics network

Current problems of intermodal rail freight:

- Large volumes needed (**from A to B**)
- Regular schedules
- Recurrent destinations
- Large areas needed
- Direct links (**without intermediate stops)**

Intermodality - in the actual concept of multicustomer relationship - is too rigid for SMEs .

The intermodal transport, to and from the ports, is carried out only with full trains towards few destinations

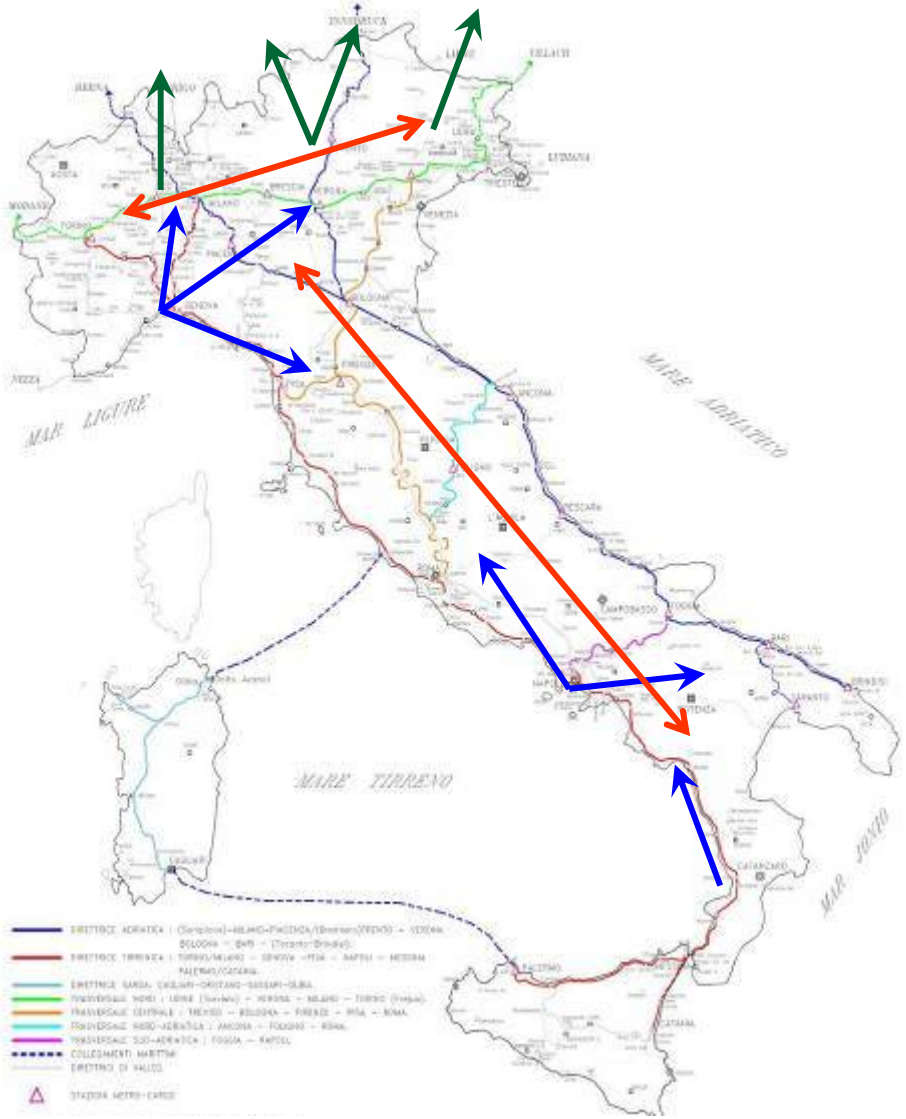
Current problems of intermodal rail freight

For example in Italy….

Nowadays only strong relations are served:

- Harbours
- Intermodal centers
- Main lines (few volumes)

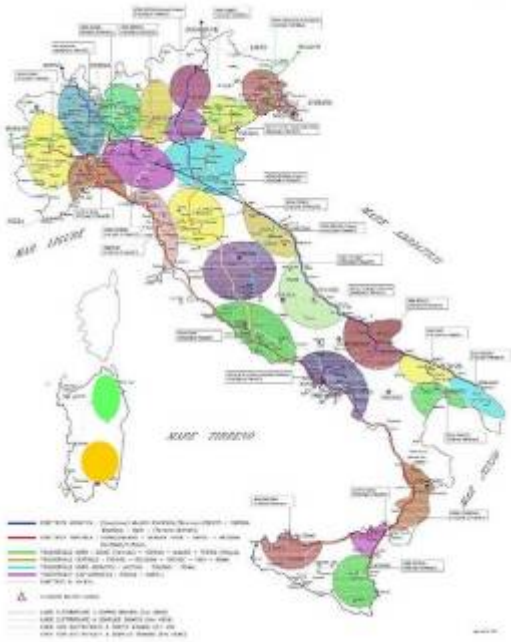
and transport is best done by trucks.



Innovative logistics network

In Italy:

Metrocargo network needs 20-25 terminals to cover the 90% of the territory.



In other Countries:

Metrocargo network development is easier because it requires only a few points to cover the territory.

A solution for intermodal european corridor

The intermodal corridor between nord Europe and Balkan Countries can use Metrocargo network through Piacenza, Rome and Bari in Italy, and other locations to be identified in nord Europe.

Metrocargo network in Italy

The Italian network has been already studied.

We present:

- Startup of Metrocargo italian network
- Economic financial results
- Steady situation

The project can be activated through phases in Italy and extended to the other european countries, depending on opportunities and alliances with the other logistic operators.

Start-up of the Metrocargo italian network : Tirrenic line

- **Starting Scenario**
  - 8 lines with 20 trains /day
  - 7 input /output terminals
  - 4 Metrocargo transit terminals
  - 20 trains per day

- **Results**
  - 700 ITU / day
  - Average loading/unloading time in Terminal: 30 min.
  - Max total transport time: 24 hrs
  - Max waiting time in terminal: 8 hrs
  - Average loading of trains: 70%

Scenario 1

Start-up of the Metrocargo italian network : Tirrenic line
Economic / financial results

- 150.000 UTI/year moved;
- Start-up with 15 Mil €
  on 30 Mil € of total investments
- ROE: 5%
- Operative CASH FLOW : positive at the 3° ye
- Turnover 150 Mil €/year

We can estimate that 30% of the financial requirement can be obtained from public investments; this opportunity will improve the economic/financial parameters.

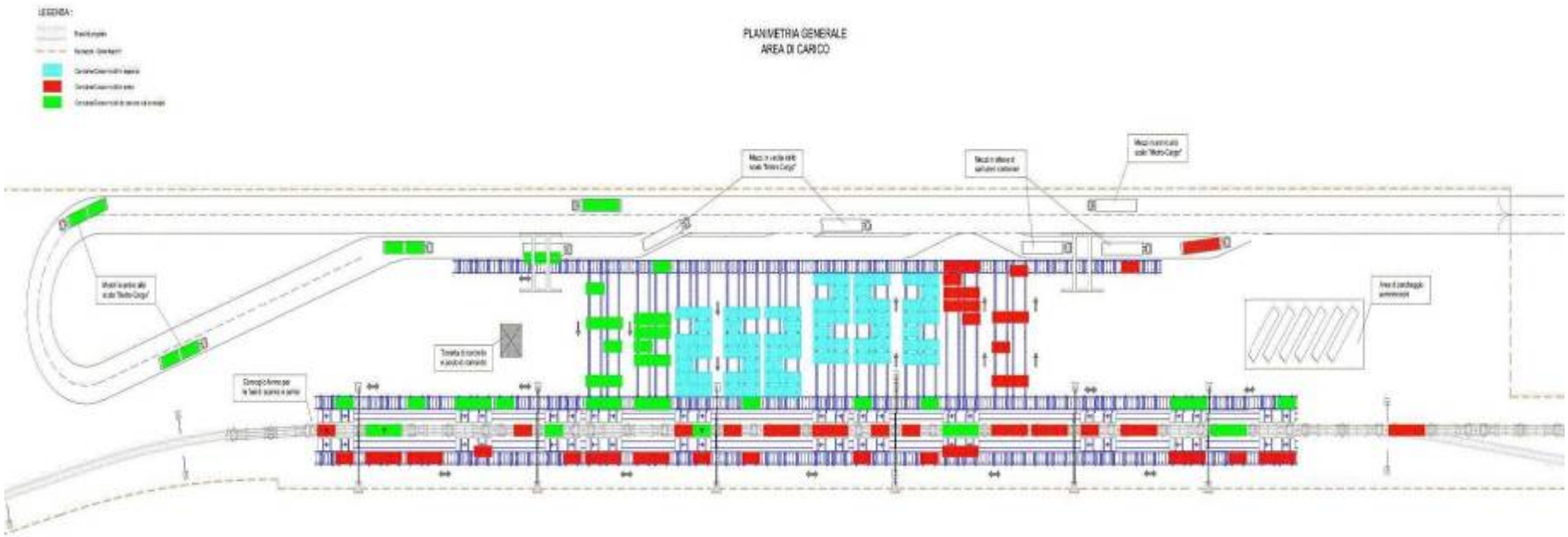
Metrocargo network in Italy in a steady situation

Indicators are :

- 50.000 further trains per year on the rail network;
- 1.500/2.000 new qualified jobs on the territory;
- 5 - 8% transport cost reduction;
- 300 million euro of investments.

Investments

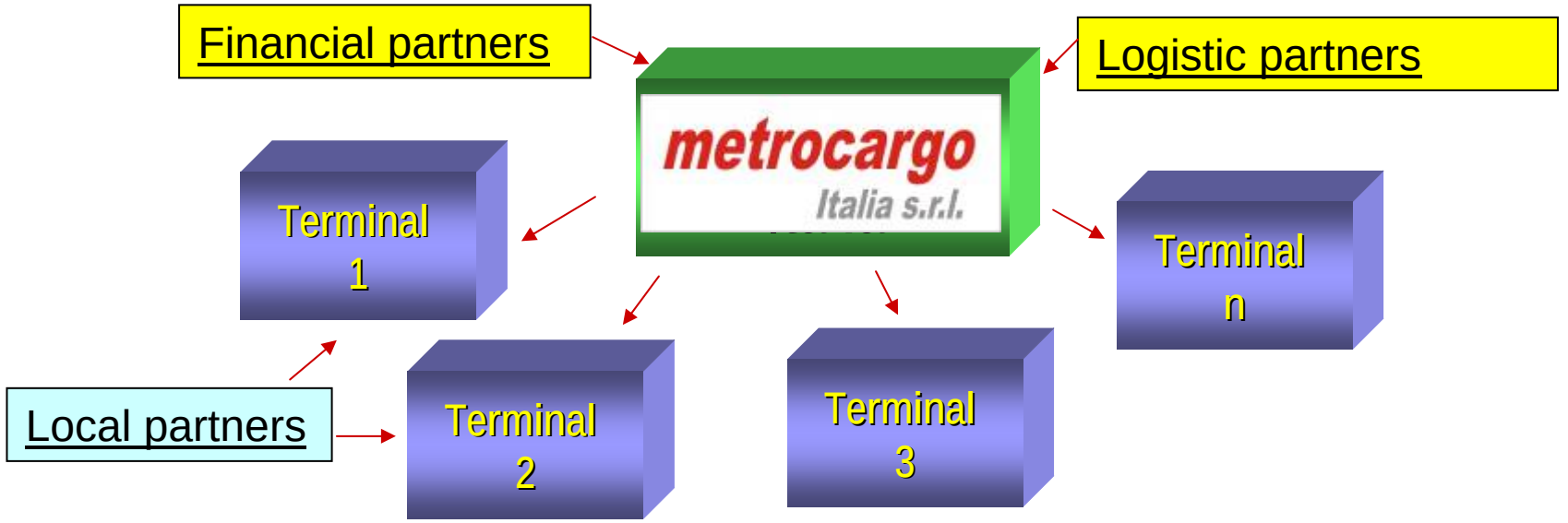
- A single terminal requires: 5 to 15 M€ according to size
- Terminals have a modular structure and it's possible a gradual expanding, parallel to the flow increases,.
- Terminals can be located in dismissed railroad areas
- All types of existing railway cars and load units can be used



Network – corporate scheme

The initiative joins more companies and organizations. For the Italian market:

- Metrocargo Italia is the coordinator of the whole network.
- Metrocargo is going to be participated by financial partners and can be also participated by strategic logistic partners.
- Each terminal will be a company with local partners (public and private).
- Metrocargo will have a participation in each single terminal.
- Additional companies support the terminal building, network running & services**.**



Metrocargo® solution for APM TERMINALS in Vado Ligure

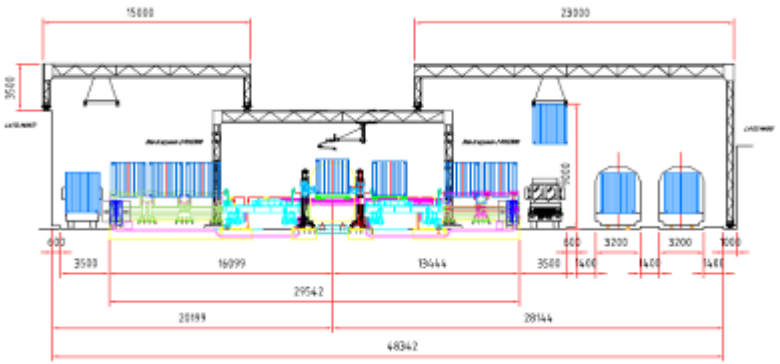
APM TERMINALS

Metrocargo® terminal features

- used surface	21.400 m²
- 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**



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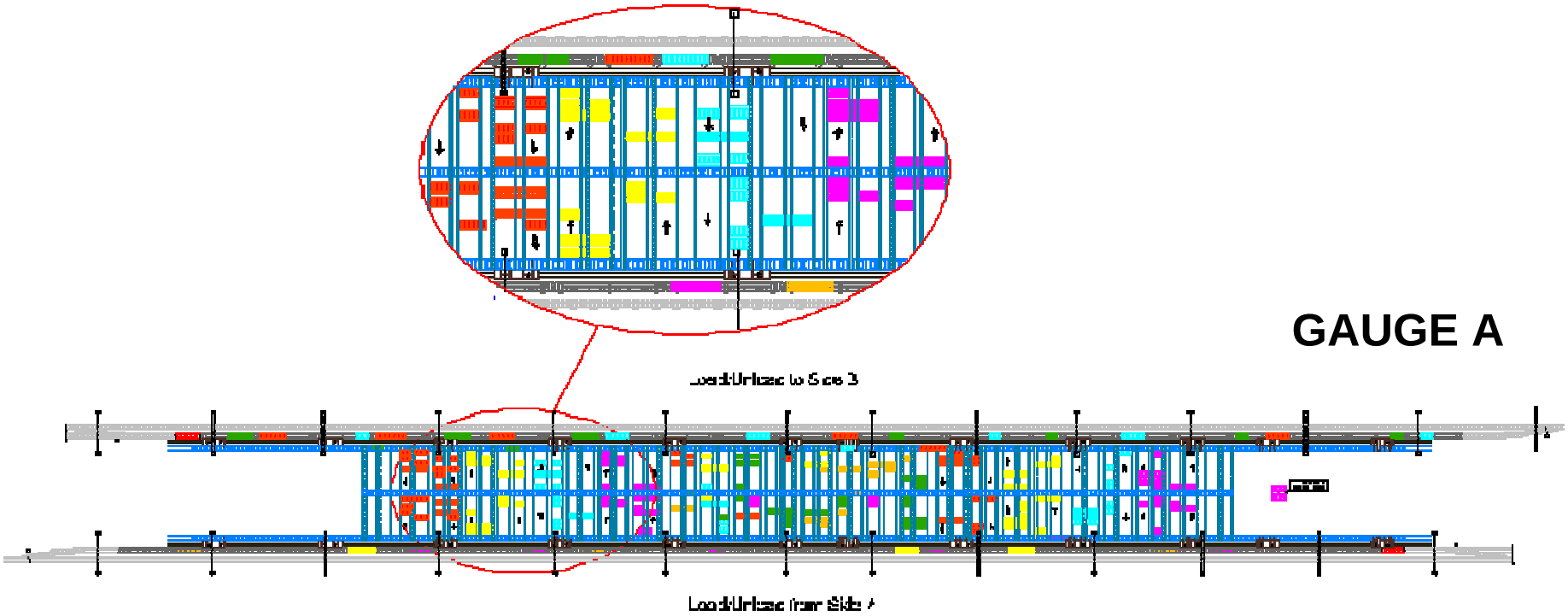
Example different gauges

Metrocargo can be used between different railway gauges.

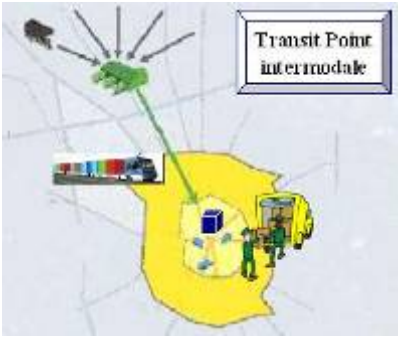


GAUGE A

GAUGE B

Metrocargo City

Only 12 m



The innovative concept permits:

- to pickup goods outside the city and set up them into swap bodies
- to use railroads to enter directly inside the center of the cities
- to load swap bodies, without cargo breach, directly on the vehicles
- to delivery goods inside the cities with low pollution impact and traffic
- to transport outside the cities goods and garbage

I.Log with FINMECCANICA are developing a new system for Milan city based on Metrocargo technology.

FINMECCANICA

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Metrocargo steps

Start marketing

Prototype construction

Metrocarrgo Automazioni establishment

Metrocargo Italia establishment

I.Log Iniziative Logistiche establishment

2004

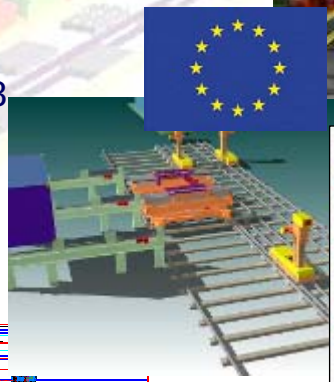
2005

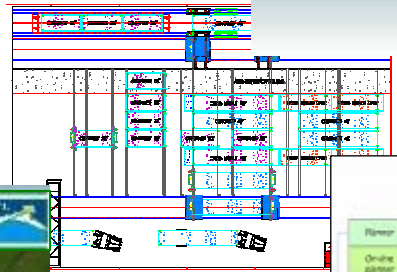
2006

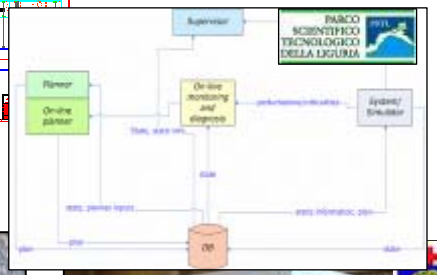
2007

2008

2009







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Press Review

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