



# ICT in Dry Port (Freight Village) Management

Eng. Angelo Aulicino

Eng. Fabrizio Fioravanti, Ph.D.





## **OUTLINE**

- What a Freight Village is
- Overview of Interporto Bologna
- CT for Internodal Terminal
  - Tracking and Tracing of goods over the Internet
  - IT Automation for Railways "SHUNTING"
  - IT Automation for Railways "GP\$ Monitoring"





## WHAT IS A FV

A Freight Village is a defined area where all the activities relating to transport, logistics and distribution of goods, both for national and international transit, are carried out by different operators

The **FREIGHT VILLAGES** are transport realities that could offer the required infrastructures to support the:

Territorial planning
Rationalization of the infrastructures
Transport quality
Intermodality development





## **OUTLINE**

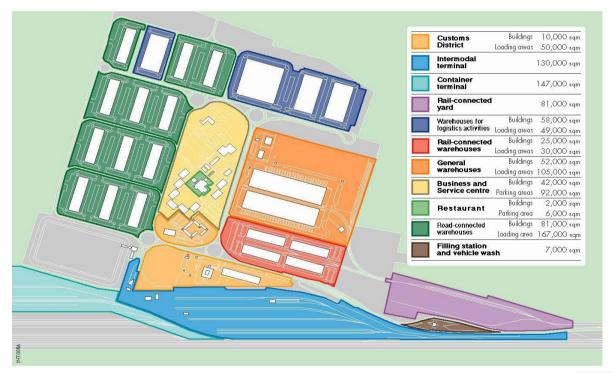
- What a Fraidt Vilaco is
- Interporto Bologna ... an overview
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## WHO WE ARE

The Bologna freight village is an integrated system of infrastructures aimed at carrying out all transport and intermodal activities







## **INFRASTRUCTURES**

# Total Surface 4.270.000 sqm

- Warehouses with raised docking bays
- Warehouses with rail-road interchange
- Large-sized warehouses
- Public warehouses for storage
- Intermodal terminals

## **SERVICES**

- Customs District
- Post Office/Public telephones/Bus service/
- Restaurant/Banks
- Areas for parking and loading/unloading operations
- Filling station with vehicle washing facilities





**FIGURES** 

Road Transport 2.200.000 TONN

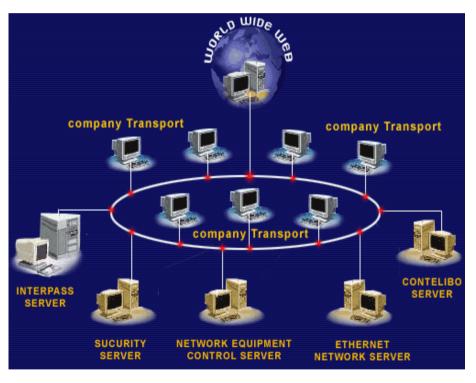
Rail Transport 1.900.000 TONN

n° Lorries 930.000
n° Trains 7.000
n° **Transport & Logistic Companies** 100
n° Employees 1.500





## TELEMATIC NETWORK



- Data transmittal on fiber optic (7km)
- Access to the economic databases present in the market
- Information services supplied by the Public Administration
- E-mail services
- Centralization of security, burglary, fire services, etc.
- Exit control of heavy cargo vehicles with the "Interpass" service.





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# ICT for Intermodal Terminal







# Interporto Bologna Experience





# Strategy & Methodology

The projects originated from the needs of INTERPORTO BOLOGNA (as a Logisitcs Platform) and the requirements risen within the Bravo Project.

Hence main objectives have been defined:

- Optimization of information flow between different actors involved in intermodal transport;
- Develop core IT services following an international approach (new/different railway undertakings operating within the same Intermodal Terminal);
- Try to convey results of implementation of new IT services to Bravo Project Partners;





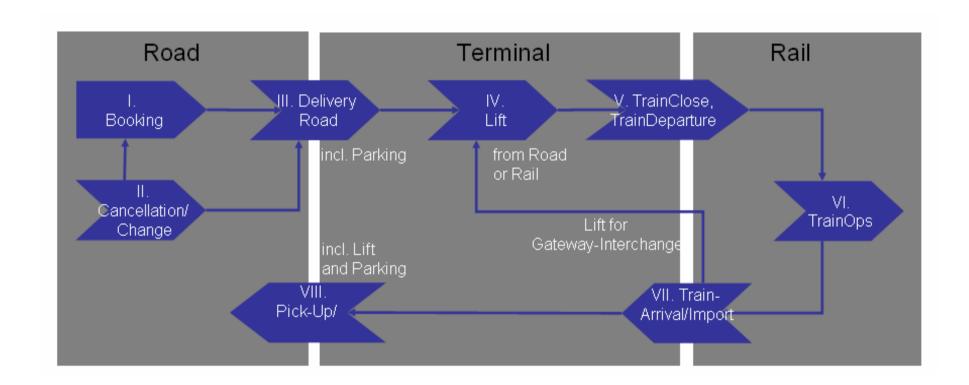
# **Process Analysis**

- The first step for evaluating IT adoption starts with terminal analysis:
  - Identification of operators
  - Identification of processes
  - Identification of document flow
  - Identification of services to operators
  - Identification of optimization in process and automation





# **Process Analysis**







# **ICT Systems**

## Must be:

- Flexible: that is, accessible via web-services, via web page, etc
- Expandable: that is, modules can be added in the future and integrated in the current system
- Mobile: that is, it allows mobile operators on the field to communicate with the system





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  - TMove





Tracking & Tracing

TTI
project for Tracking
and Tracing of goods





# **TTI Project**



Ist Phase: Creating new web services to be offered the companies/actors of Interporto

2<sup>nd</sup> Phase: Trying-out the RF-ID technology as far the supply-chain activities

The operators involved are all National Couriers: Bellesia, Combitrans, Nieddu-Trail, Saves.





# TTI Project

### **Objectives**

The TTI project aims at offering new tracking & tracing services, using internet, to operators inside Bologna Freight Village, to their affiliates and to end users.

The system has been conceived to trace goods by a Web Portal (WP) and to allow to modify the delivery status.

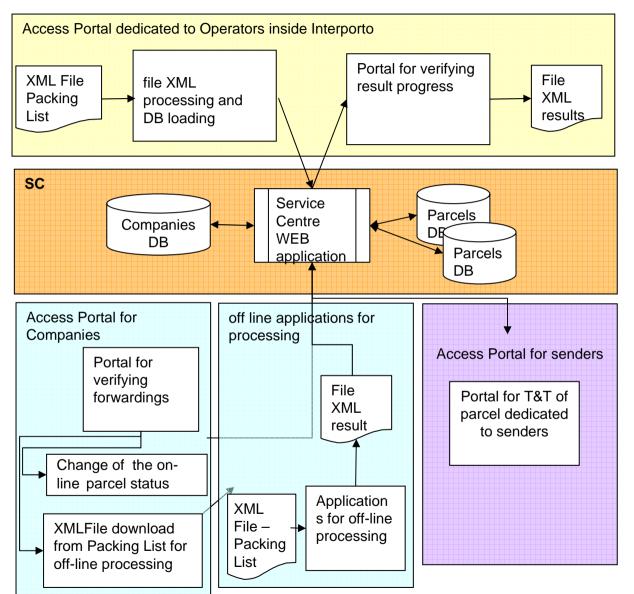
The WP web portal is only the visible ring of a longer list of services offered by a real Service Centre (SC). The SC offers a data / exchange service and allows the companies to:

- Send data concerning delivery status to SC using a xml standard format
- Collect a xml data exchange file containing the delivery result from SC.
- Offer affiliates the possibility to exchange and entry/modify the data (offering a on –line and off-line service mode);
- offer their clients the access to the delivery status;

The strenght of this system is that it can work without changing the existent IT System of companies involved using a data exchange standard.



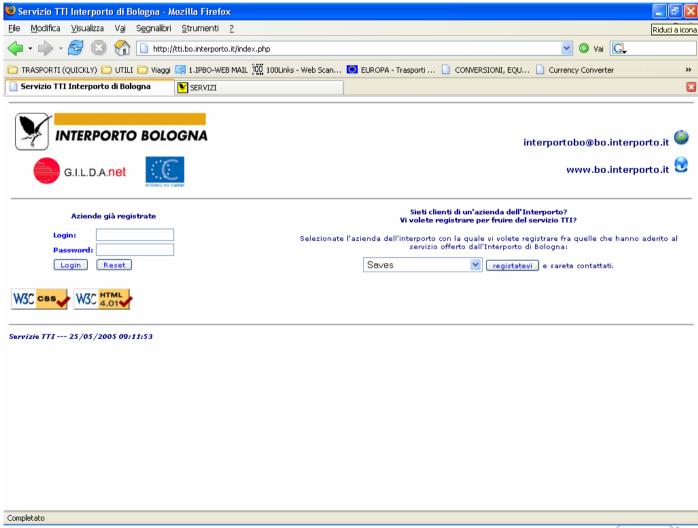




System Framework













interportobo@bo.interporto.it

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www.bo.interporto.it

Sezione Visualizzazione spedizioni per TTI Administration user (admin)

Esci Menu Indietro

Dal (GGMMAAAA) 1105200!

Al (GGMMAAAA) 1205200!

Numero di Risultati trovati: 1-20 su 750

Pagina Precedente --- Pagina successiva --- Visualizza Tutte

								Cerca
Id		Azienda	Corrispondente	Mittente	Destinatario	Provincia	Numero bolla	Ultimo esito
730	83 (	SAVES	SAVES01500108	T.S.E C.TO BINNY SMIT	H MINERVA 2000 SRL	F01	01015054680 (11/05/2005)	Consegnato definitivamente (16/05/2005)
730	84 9	SAVES	SAVES01500090	T.S.E C.TO BINNY SMIT	H MOBILBIMBI	AN	01015054681 (11/05/2005)	Consegnato definitivamente (13/05/2005)
730	85	SAVES	SAVES01500089	T.S.E C.TO BINNY SMIT	H L'ALBERO DELLE MELE	MI	01015054683 (11/05/2005)	Consegnato definitivamente (17/05/2005)
730	86 :	BAVES	MTN-PD	T.S.E C.TO BINNY SMIT	H AUCHAN MESTRE	VE	01015054684 (11/05/2005)	Consegnato definitivamente (17/05/2005)
730	87 :	SAVES	SAVES01500089	T.S.E C.TO BINNY SMIT	H LIBRERIA MILANO	MI	01015054685 (11/05/2005)	Consegnato definitivamente (17/05/2005)
730	88 :	BAVES	MTN-FI	T.S.E C.TO BINNY SMIT	H MAGAZZINO ESSELUNGA	FI1	01015054686 (11/05/2005)	Consegnato definitivamente (17/05/2005)
730	189	SAVES	MTN-PD	SAVES01001374	POLBIC INSTITUTE	VE1	01015054827 (11/05/2005)	Consegnato definitivamente (16/05/2005)

Interporto Bologna SpA

























#### Dettaglio bolla per TTI Administration user (admin)

Esci | Menu

Indietro

Azienda Interporto SAVES Corrispondente

Dati Mittente				Dati Dest	tinatario	Dati Bol	la	Dettagli Spedizione	
Nome	T.S.E C.TO B	BINNY	SMITH	Nome	AUCHAN MESTRE	Numero	01015054684	Numero Bancali	
Riferimenti	957 10-05-2	2005		Indirizzo	V DON TOSATTO 22	Data	11/05/2005 12:17:00	Peso	120
				Località	MESTRE VE	Note	TASS 16.5 PREAVV VOL 0.86 1 BC REND	Volume	0,86
								Colli	1

#### Storia della spedizione

#### Codice Data e Ora Descrizione

Note

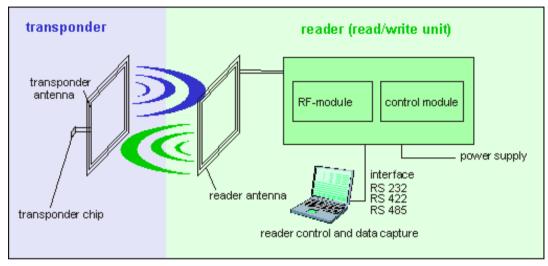
- 17/05/2005 Consegnato definitivamente
- 16/05/2005 Consegna prevista
- 12/05/2005 Partito dal magazzino di mittenza

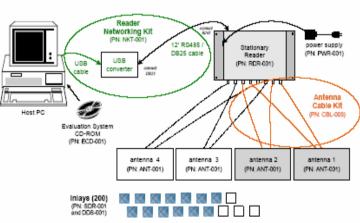
Servizio TTI --- 25/05/2005 12:36:53





# **TTI Project**





### Limits:

- high Costs for Transponders and devices
- deciding if using the standard frequency (13.56 Mhz)
- Convincing operators to use RF-ID







# IT Automation for Railways "SHUNTING"





## Introduction

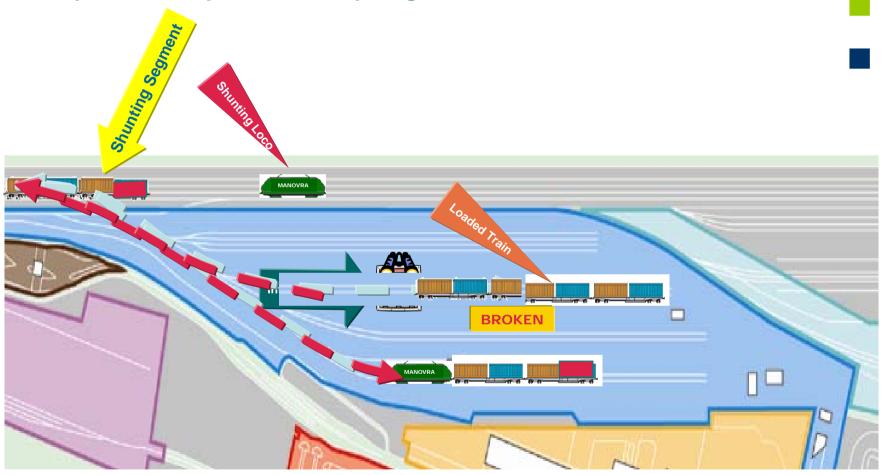
- Bologna Freight Village (BFV) decided to improve its railway IT infrastructure;
- After the study of the BFV processes some test application have been defined;
- A detailed analysis of the requirements has been carried out;
- Test applications are now under development and test.





## **SHUNTING in TERMINAL Area**

## **Operation Sequence for stop wagons**







## Shunting Automation (ShunTer)

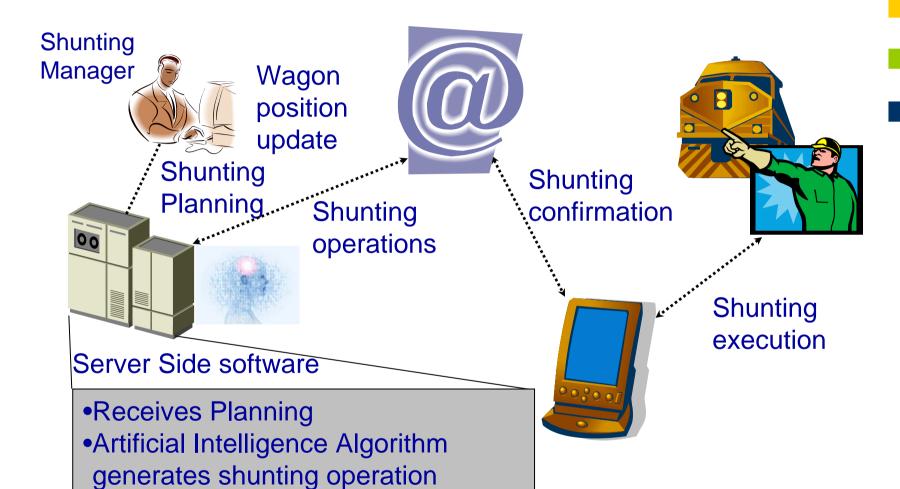
- Requirements
  - Generate shunting operation in situation where more than one train has to be composed;
  - Allow to set up priorities for trains;
  - Minimize the number of shunting operation;
  - Consider current way in which shunting is performed;
  - Consider shunting among different terminals inside the same freight village





mobiles

## **ShunTer Architecture**



Shunting sequence is transferred to





# **ShunTer Operation flow**

Initial position of wagon is inserted

Shunting order is received and formalized

Artificial
Intelligence
Algorithm find
an optimal
solution for
order

Shunting
Sequence is
sent to
mobile
devices

Shunting operation is executed

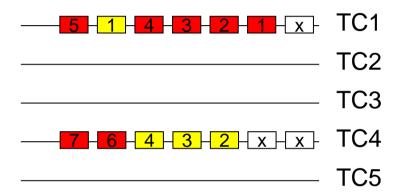
Shunting operation is confirmed or modified on the mobile

Position of wagon is updated









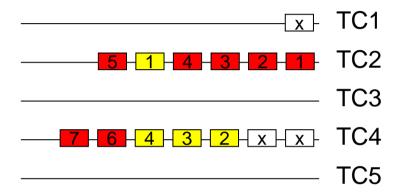
## Shunting Order:

Compose RED train on TC2 (high priority)









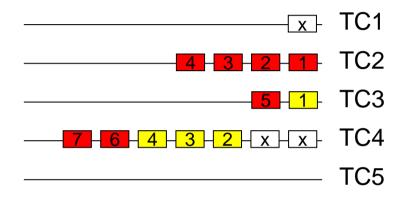
## **Shunting Order:**

Compose RED train on TC2 (high priority)









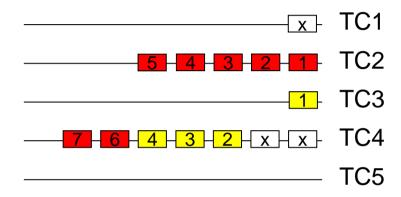
## **Shunting Order:**

Compose RED train on TC2 (high priority)









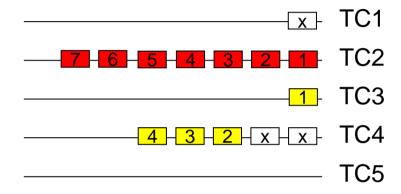
## **Shunting Order:**

Composition on TC2 (high









## **Shunting Order:**

Compose train on TC2 (high Compose train on TC3 (low prio





## ShunTer benefits

- Shunting automation allows to reduce the number of movement that each locomotive have to perform for completing a shunting order reducing composition time and fuel consumption.
- The position of each wagon inside BFV will be monitored in real time with the information that can be associated to that wagon (type, length, weight, if it is empty, braking, etc).
- People that manages shunting can have in each instant a snapshot of the real situation of the tracks with the associated wagons, allowing an easier management of the shunting process and having a clear view of what is happening in case of problems.







# IT Automation for Railways "GPS Monitoring"





### **GPS Monitoring System (SiMoG)**

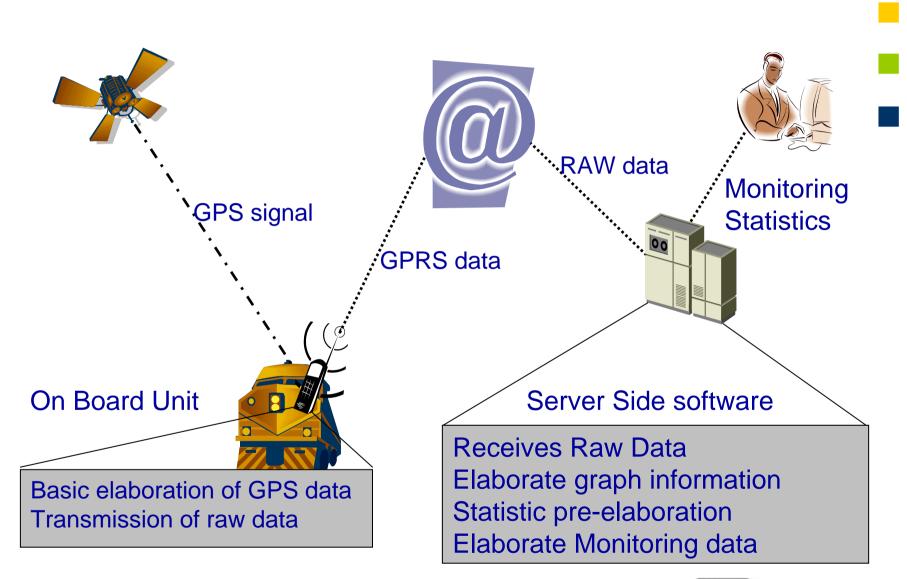
## Requirements:

- Monitoring of locomotive position (for security reason);
- Monitoring of locomotive speed (for security reason);
- Generation of statistics related to paths, timetables, and several other parameters;
- History of alarms.





### **SiMoG Architecture**







# **SiMoG operations**



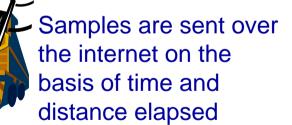


Operator can monitor in real





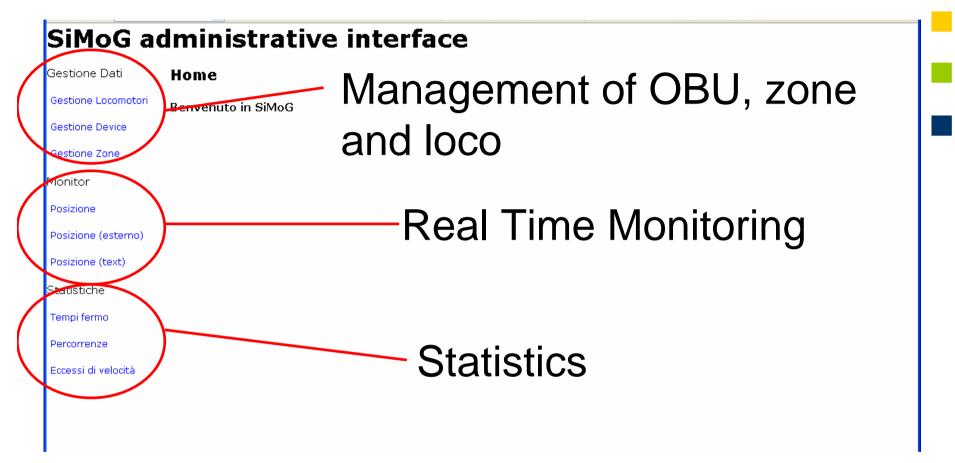
1 sample per



Raw data are elaborated and information on statistics are generated. Real time Monitoring data are updated

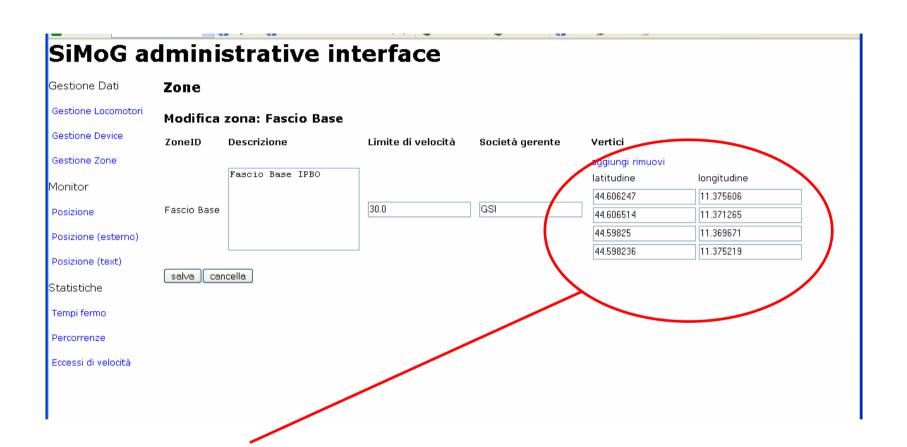












Definition of AREA inside the FV in terms of GPS data





#### SiMoG administrative interface Posizione (text) Gestione Dati Gestione Locomotoria Locomotori Gestione Device Loco data, if any Locomotore Zona Velocità Data Gestione Zone Ultimi allarmi Monitor Locomotore Zona Data Tipo Posizione OutBoundZone 10 Ottobre 2006 | 12:35:15 LOG\_OFF prova2 Posizione (esterno) OutBoundZone 10 Ottobre 2006 | 12:26:29 LOG ON prova2 Alarm history Posizione (text) OutBoundZone 9 Ottobre 2006 | 14:36:49 LOG\_OFF prova1 OutBoundZone 9 Ottobre 2006 | 14:26:30 LOG\_OFF prova1 Statistiche LOG\_OFF prova1 OutBoundZone 6 Ottobre 2006 | 17:31:4 Tempi fermo LOG\_ON prova1 OutBoundZone 6 Ottobre 2006 | 17:24:51 Percorrenze SPEED prova1 OutBoundZone 6 Ottobre 2006 | 17:22:17 SPEED Fascio Base 6 Ottobre 2006 | 17:21:15 Eccessi di velocità prova1 LOG\_OFF prova1 OutBoundZone 6 Ottobre 2006 | 17:9:55 LOG\_ON OutBoundZone 6 Ottobre 2006 | 17:3:56





#### SiMoG administrative interface

Gestione Dati

Gestione Locomotori

Gestione Device

Gestione Zone

Monitor

Posizione

Posizione (esterno)

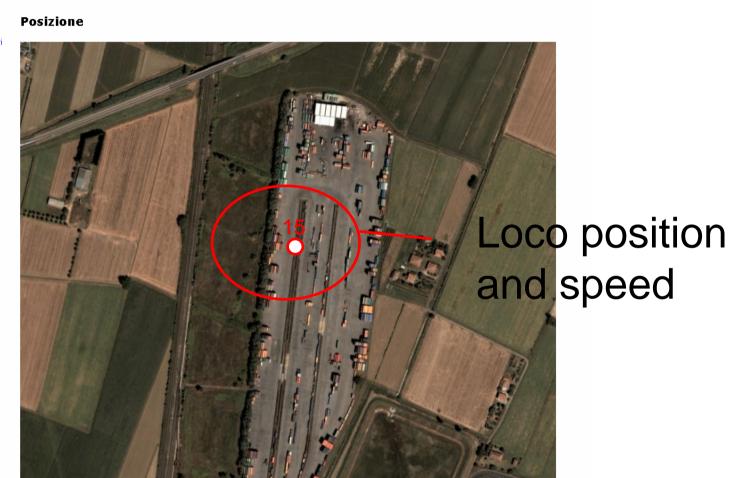
Posizione (text)

Statistiche

Tempi fermo

Percorrenze

Eccessi di velocità







#### **SiMoG Benefits**

- Monitoring of locomotive from with a GPS system will allow BFV to have a real time monitoring system for security reasons that monitors if a locomotive is exceeding the speed limit for a certain zone or if two locomotive are operative in the same zone.
- The collection of raw GPS data and the evaluation of such data allows to extract statistics that can be relevant for short term planning and also for medium-long term planning.
  - Short term planning can be improved by monitoring in several weeks how the turns of shunting people can be reorganized on the basis of the real activity of the locomotive.
  - Medium and long term planning is improved by analyzing the time slot of inactivity of locomotive that allows the freight village to organize new trains or to accept new trains.



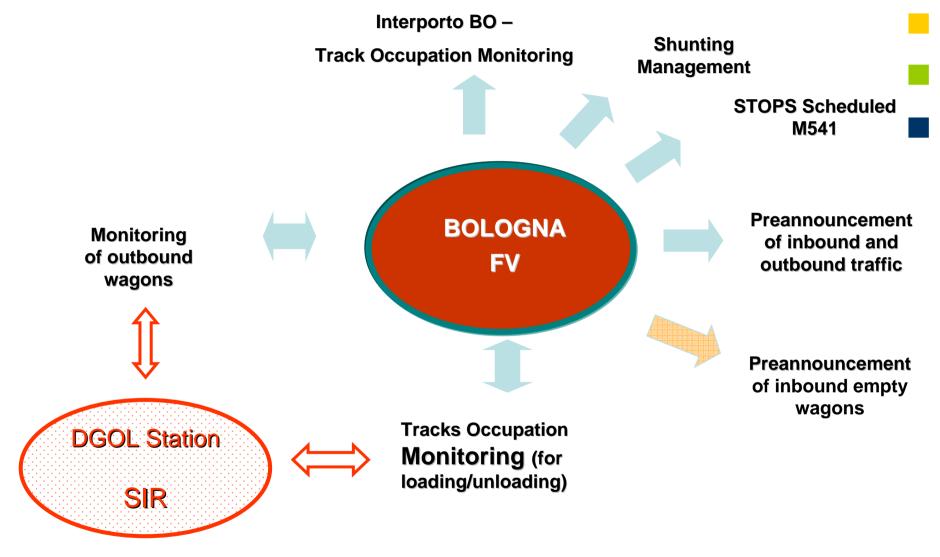




# TMove IT Systems to support the management of railway operations











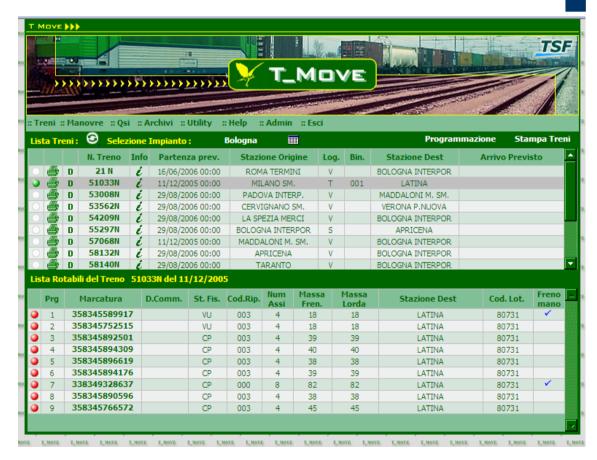
- Trains and wagons with final destination IPBO, are monitored from departure to their stop on the track for loading and unloading operations
- Real time evaluation of ETA, details on the full delay on route.
- Composition of the train : type of goods, wagons allocation, wagon features

#### Planning:

- Shunting (loco used, shunters workshift)
- Loading/unloading operations and related production activities
- Stop riduction time at siding



Planning and yard management







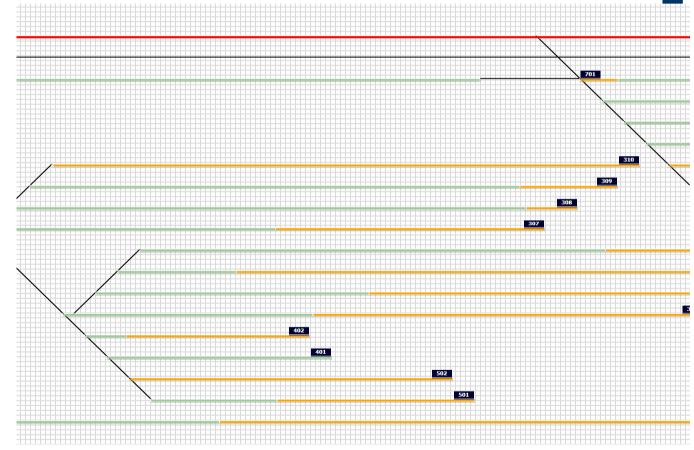
Monitoring and Traffic Management

Planning and yard management

#### The picture shows:

- >Tracks
- siding tracks for loading and unloading operations

The tracks occupation is updated in real time starting from the shunting operations up to arrival and departure time.







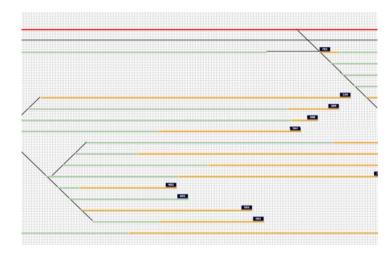
Monitoring and Traffic Management

Planning and yard management

For each wagon placed on tracks are available:

- ➤ technical information (type of wagon, length, tare weight, axles
- ➤ Commercial information (type of good, weight, dangerousness)
- ➤ Stop time Duration on siding tracks

Data are available also via GPRS-PDA for the operators











# Thanks for your attention

