



ITAPA 2013, Putting IT together

**THE IMPACT OF INTELLIGENT  
TRAFFIC SYSTEMS IN OPERATION -  
SPAIN**



**indra**



# GLOBAL PORTFOLIO FOR TRANSPORT & TRAFFIC

## Traffic & Transport

- Over **40 countries** in the world control the traffic on their motorways, tunnels, cities and roads with Indra systems.
- Over **100 cities** around the world entrust the management, safety and development of their transport networks to Indra
- More than **3,000 km** of High Speed Railways controlled by our systems
- Over 3.000 air traffic control Installations - **40 % of European air traffic operation** is managed by Indra products

## T&T - Our main portfolio



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Improvement of Traffic Safety in Spain thanks to application of ITS systems

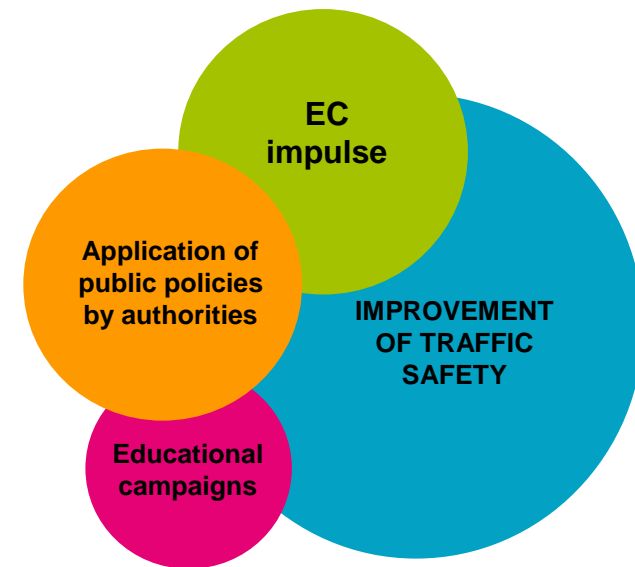
# CONCERN FOR TRAFFIC SAFETY

## EC IMPULSE

- **White Book of Transportation** of the European Commission for 2000-2010.
- **Goal: Reduce the number of casualties in EC up to 50%** on that period: 40.000 casualties and 1,7 million injured.
- **Impulse on actives policies** of road safety
- **Funding:** framework R+D programs focused on improvement of road safety
- **EC - European multimodal transport information, management and payment system** till 2020 – 20% reduction in emissions, 20% improvement in energy efficiency and 20% increase in renewables by 2020.

## POLICIES IN SPAIN

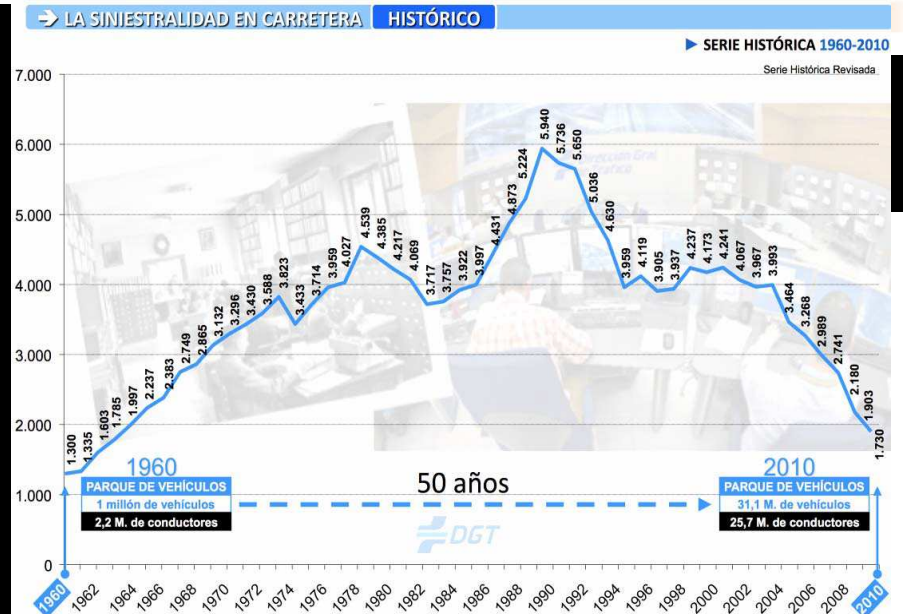
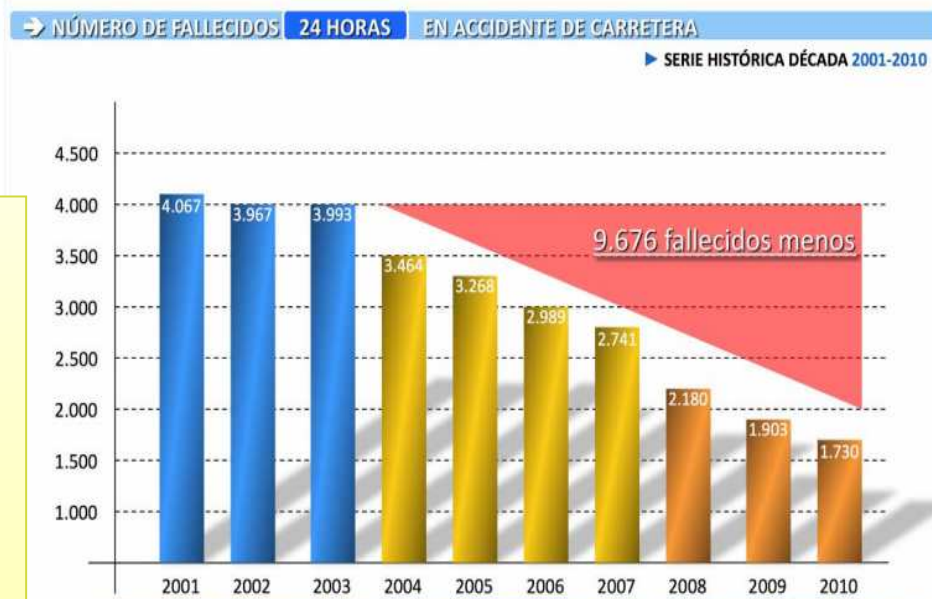
- **Review and adaptation of Traffic Law** (Alcohol limits, Speed limits, Driving license based on points, traffic offenses are considered felony, increase of penalties, .....).
- **Educational campaigns** on media
- **Investment on technology** on enforcement, speed enforcement system: automatic systems to detect traffic violations, automatic processing of infractions, mobile devices for traffic police, .....).
- **Improvement of infrastructure** done by prediction models and incentives to support the substitution of old vehicles.



Improvement of Traffic Safety in Spain thanks to application of ITS systems

# RESULTS: DRAMATIC INCREASE OF TRAFFIC SAFETY

- Decrease of traffic victims since 2003.
- **2012, 1304 victims vrs. 1300 in 1960 ( 30 x less vehicles )**
- Impact of highway construction, ITS, traffic law...
- Similarities to Slovakia



## BENEFITS OF IMPLEMENTATION OF ITS SYSTEMS FOR SOCIETY

### Driver / Citizen:

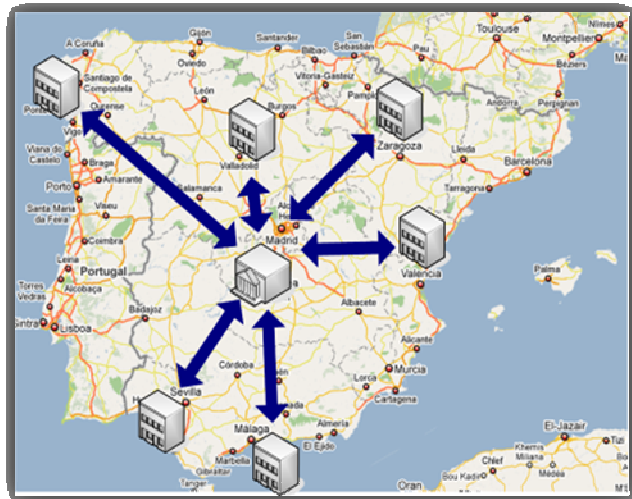
- Increase of **traffic safety**, reducing the risk and seriousness of accidents
- Improvement of **mobility**, better driving conditions
- **Travel time Savings, Energy, Costs, pollution**
- New **innovative services** bound to ITS are implemented... the prerequisite for future



### For Authorities / Government:

- **Achievement of goals** imposed by EC on traffic safety
- **Reduction of gas emissions** and pollution due to the global decrease of average speed on highways.
- **Improvement of the perception of services** provided by the Government / Authority
- **Reduction of operation costs**
- **Data collection** of real traffic tendencies, applicable to planning of new infrastructures

## ROAD NETWORK IN SPAIN

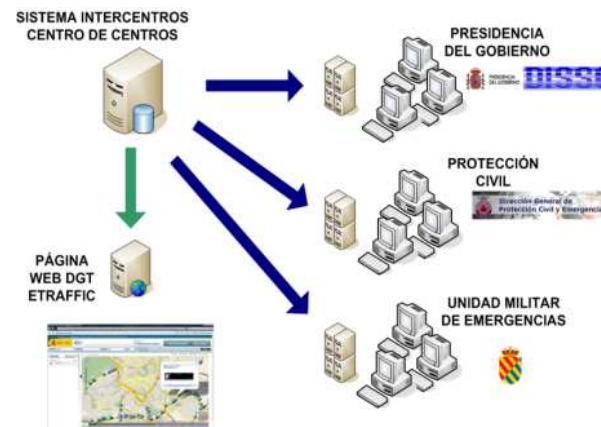
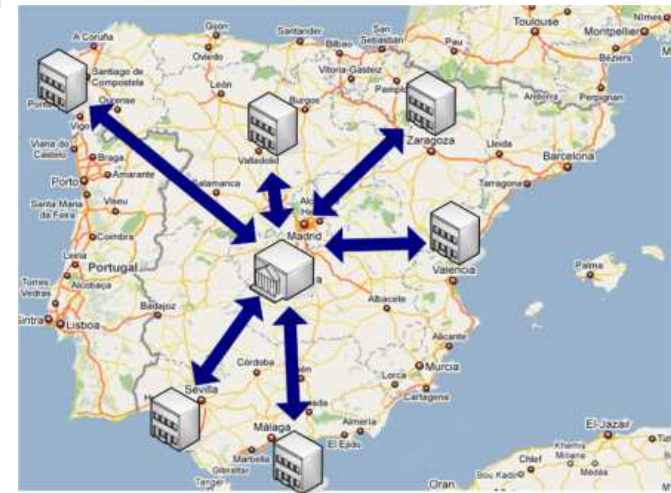


- DGT is the main Spanish Traffic Authority
- Responsibility of 70 different roads and more than 10.000 Km and 7 control centers
- More than 20.000 field devices (detectors, VMS, Cameras, SOS Phones, weather stations, speed radars) under the same ITS platform
- Real-time information sharing between control centers.
- Open standards for providing integration environment and a single source of data for traffic information
- Communication with foreign traffic authorities, SCT & Basque country authority

Integrated approach: National ITS system in Spain

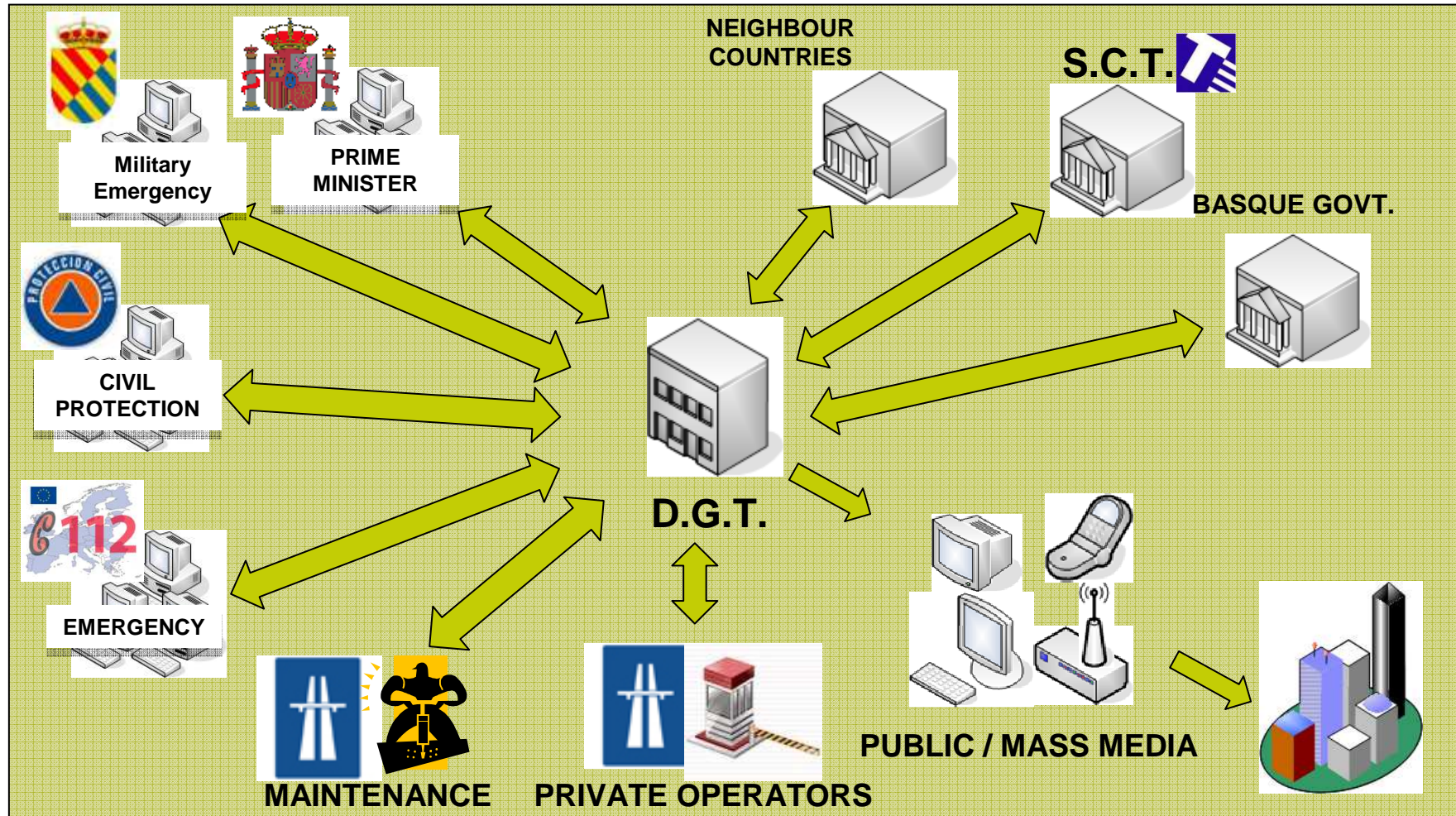
# CENTRALIZED TRAFFIC CONTROL CENTRE IN MADRID

*“One of the largest centralized ITS Control Centres in Europe”*



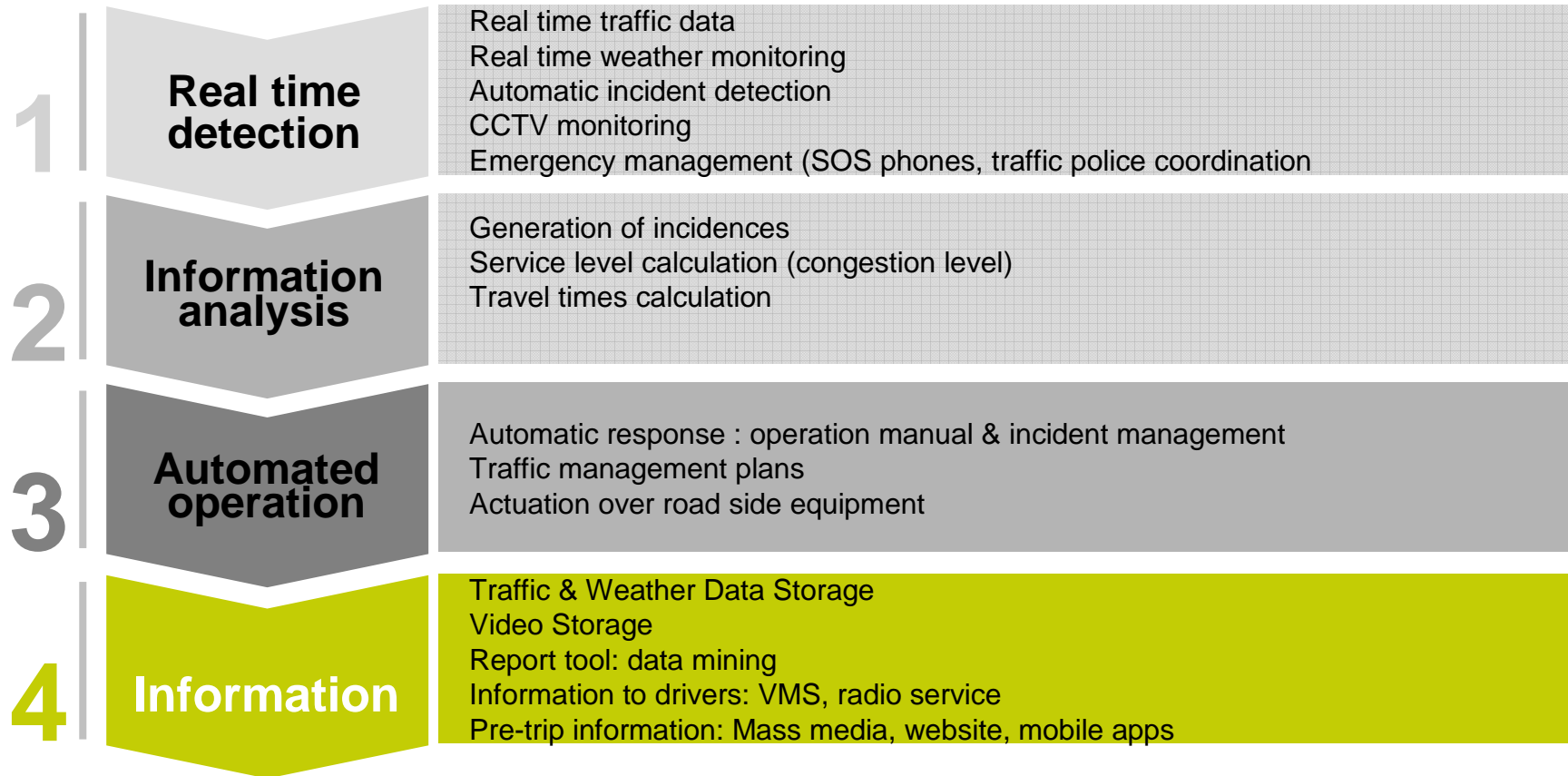


# INTEROPERABILITY WITH THIRD PARTIES



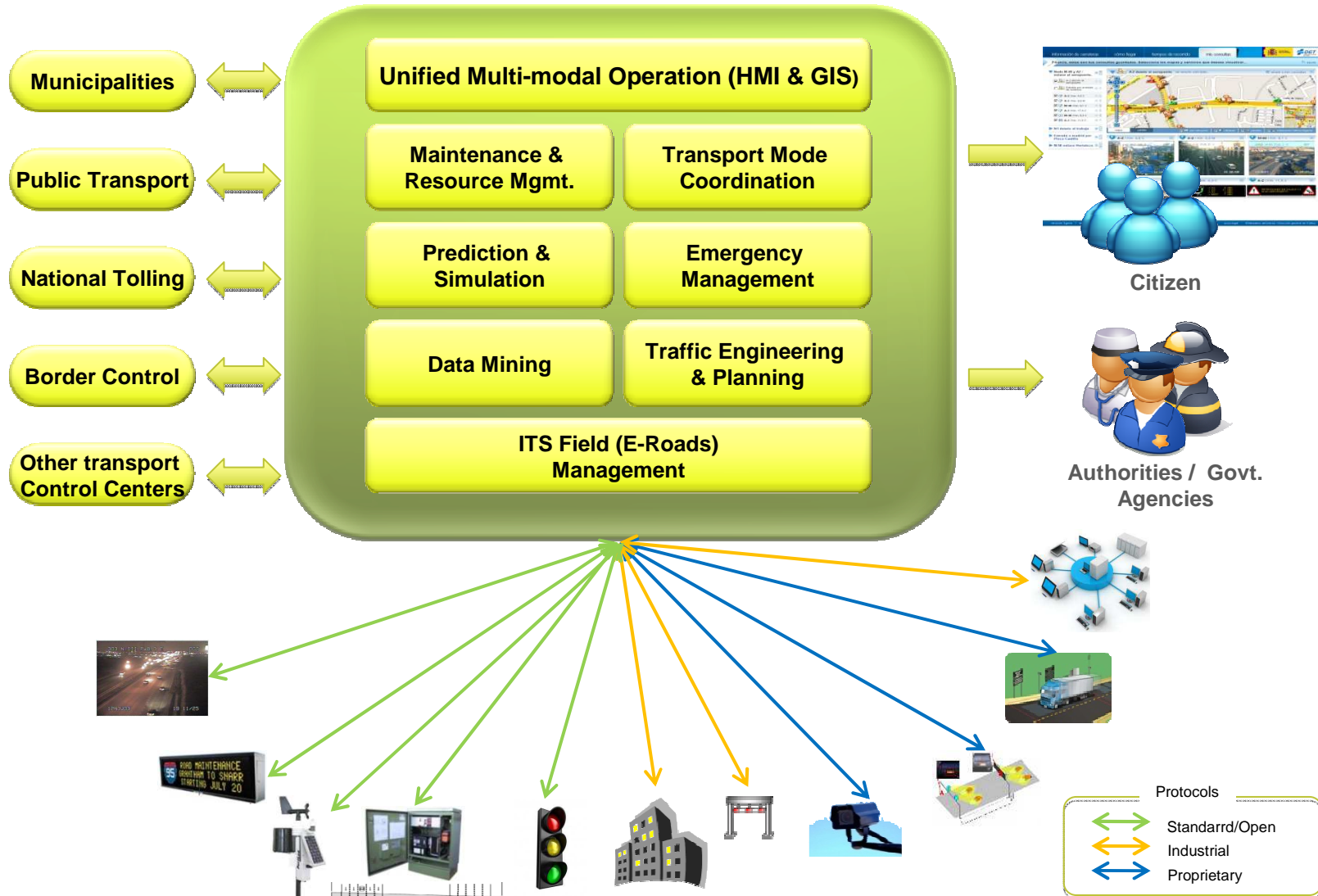
# INTEGRATED ITS SOLUTION

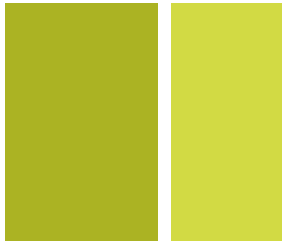
## Basic functionalities for traffic control



Integrated approach: National ITS system in Spain

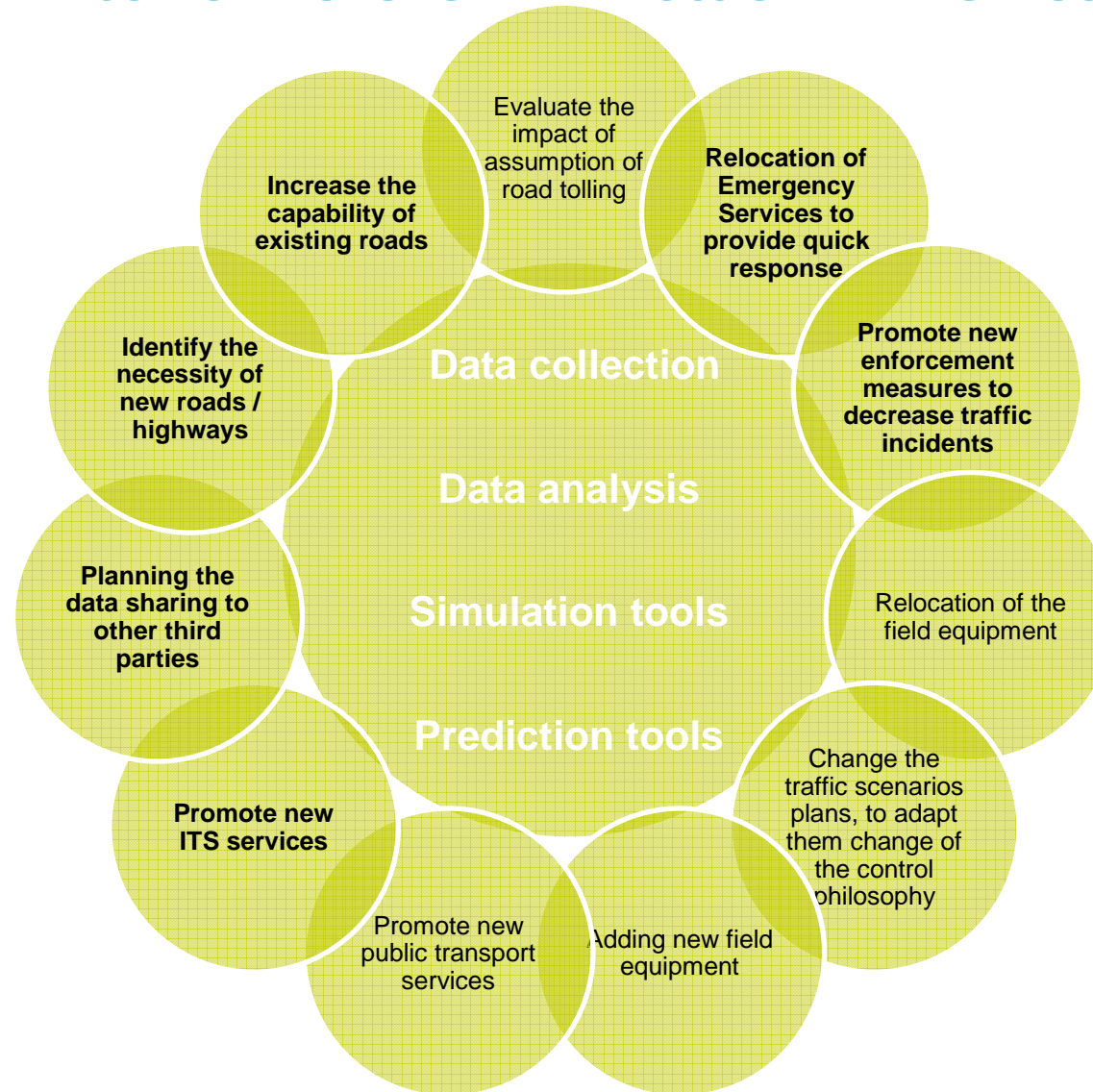
# INTEGRATED ITS SOLUTION





# UPGRADING INFRASTRUCTURE

## SUPPORT TO LONG-TERM DECISION MAKING PROCESS



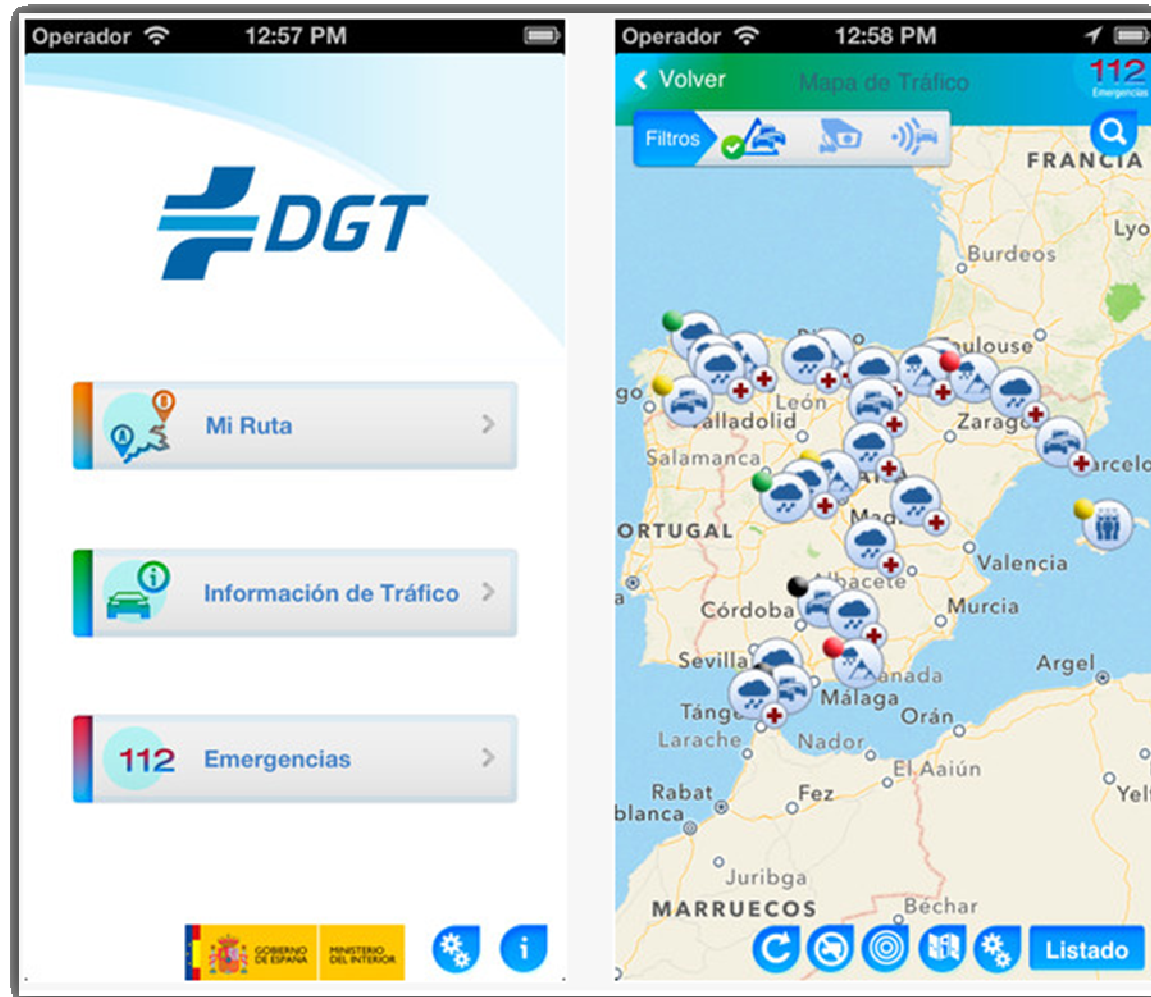
Innovation and benefits of using an integrated approach

# REAL TIME TRAFFIC INFORMATION



Innovation and benefits of using an integrated approach

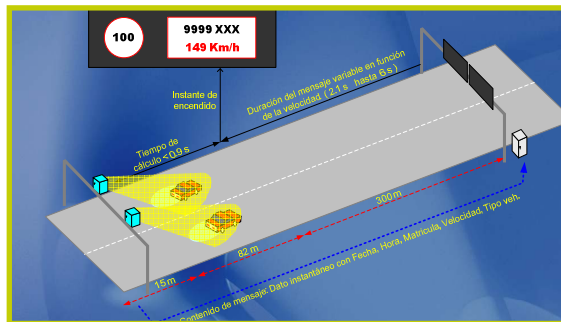
## REAL TIME TRAFFIC INFORMATION ON MOBILE APPS



Innovation and benefits of using an integrated approach

# SPEED ENFORCEMENT: INTEGRAL MANAGEMENT

Developed and operated by INDRA



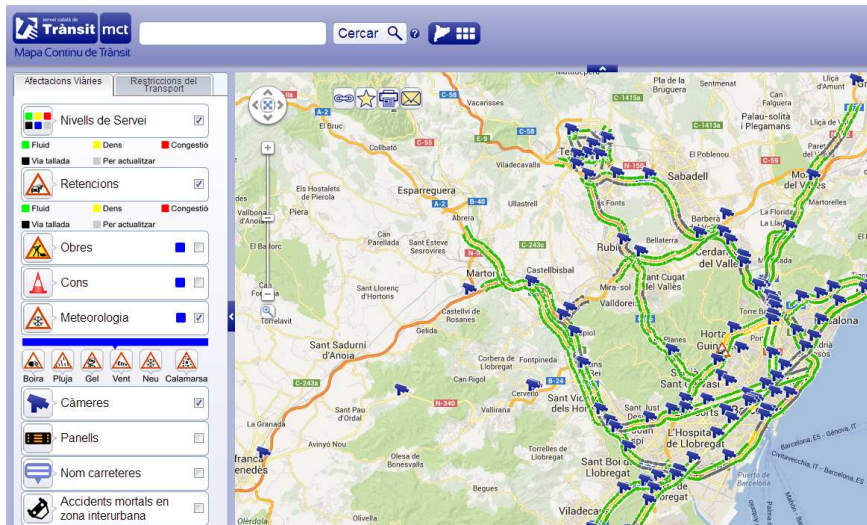
**CDTA (National Violation Process Center):** Management of all violations detected from the automatic speed enforcement systems in the Spanish road network, in operation since March 2008.

- More than **3 Million violations/year**. Notification time: **less than 48 hours by email and 1 week by postal services.**
- CDTA implements a control procedure with the following phases:
  - Detection of the violation (direct connection to speed radars);
  - Automatic transmission of all data to the computer data management center;
  - Automatic identification of the violator through consultant to the general national vehicle register;
  - Automatic generation of the fine and the fine notification
  - Automatic communication of the fine notification to the violator

Innovation and benefits of using an integrated approach

## Smart Mobility: Multimodal Transport

### Comparison between different Mass Transit Services & Private Cars



#### Benefits for citizen, government

- Allow the user plan their trip on real-time scenarios
- Saving people's time, energy, costs
- Incorporate real time public transport data

#### Description

The main tasks are to:

- propose automatically the best trip to users, including public transport, according to existing traffic conditions
- include short-term prediction techniques in the trip time calculation



Innovation and benefits of using an integrated approach

# Smart Mobility - Ciudad 2020

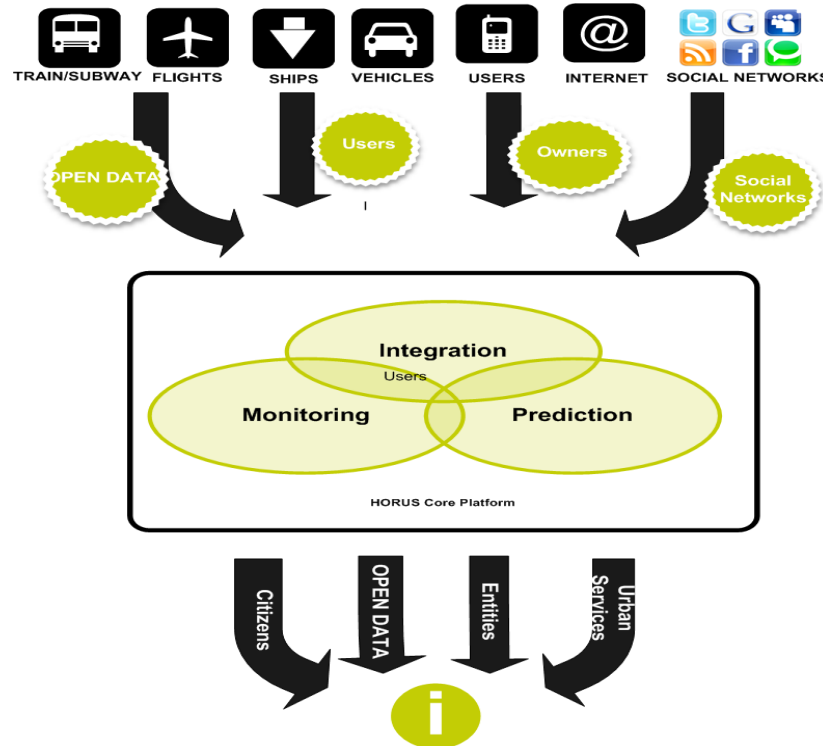
## Global Mobility - Malaga City Implementation

Intelligent Technological multimodal platform, designed for surveillance and prediction of mobility and transport information:

- ✓ Based Intelligent Traffic Systems
- ✓ Citizen – protagonist and beneficiaries of this project
- ✓ Providing citizens bespoke Travel information
- ✓ Integration with other city services
- ✓ Developing new services : simulations,



### “Multimodal Transport Improvement”



- ✓ Internet and wireless enables transport data from underground, train, bus, vehicles, ferries
- ✓ Huge data volume (Big Data) to be combined in a smart way - tweeting

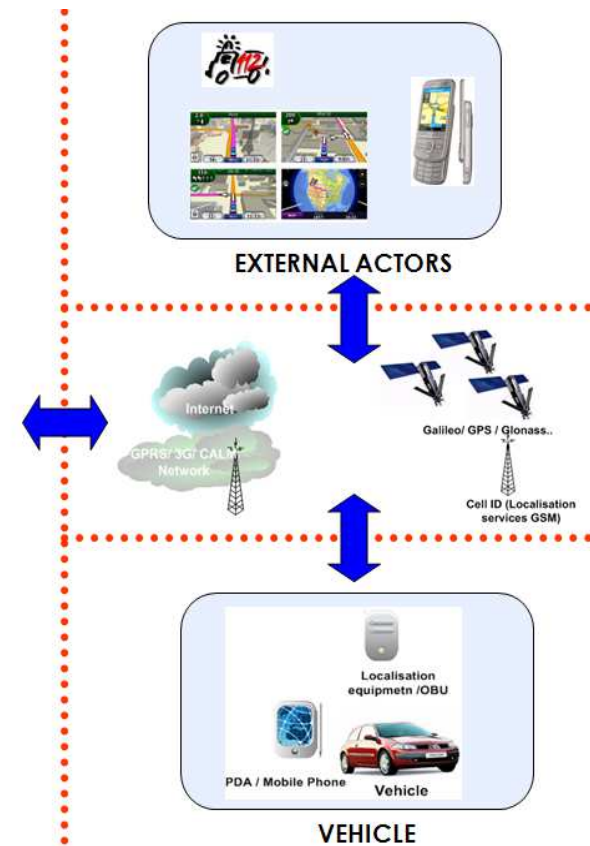
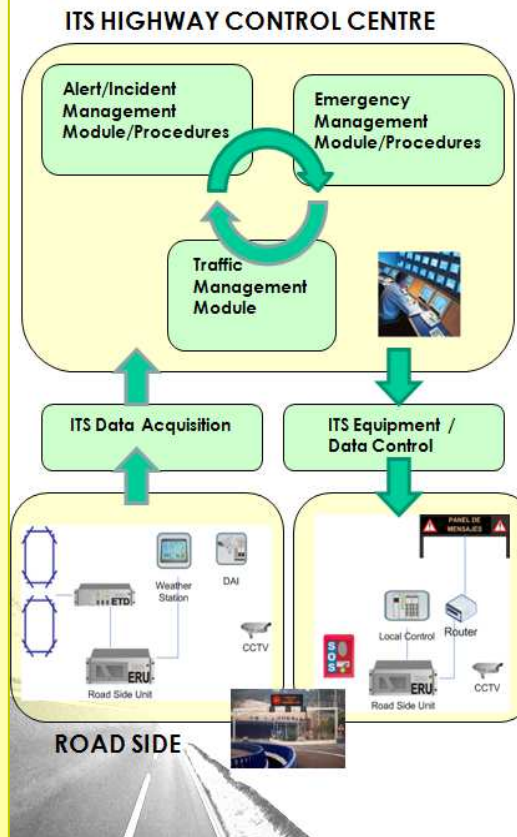
# Innovation and introduction to V2I/I2V technologies

**Integrated ITS solutions allows innovative solutions to allow vehicles and drivers take an active role in road infrastructure management systems.**

Innovative and reliable services have been deployed and tested under different projects. All these services can be extended with the introduction of **Infrastructure-to-Vehicle (I2V/V2I)** and **Vehicle-to-Vehicle (V2V)** technologies, that take advantage of the use of smart phones, Advance GPS terminals, OBUs or specific OBUs to transmit traffic information from vehicles to control centres and vice versa

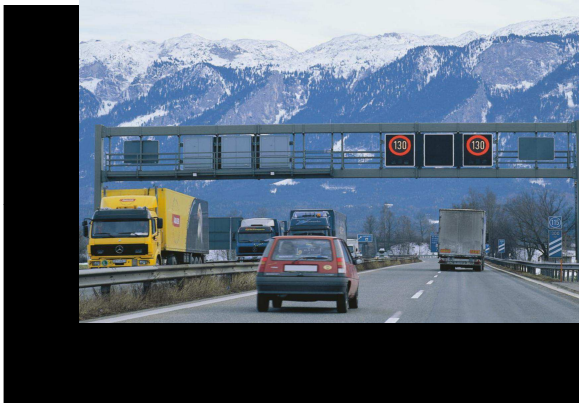
**On the next slides we will focus on some tested ITS innovative applications:**

- ✓ **Emergency Management – e Call**
- ✓ **Intelligent Congestion Control**
- ✓ **Dynamic Route Planning**
- ✓ **Special Vehicle Tracking**
- ✓ **Border Control**



## Intelligent Congestion Control

### Component 1: Automatic Lane Control System (Reverse, HOV lanes)



#### Expected effects

- Less variation in vehicle speeds and less congestions
- Minimizing the manual operations and facilitating the work of traffic engineers and operators
- Reduction of travel time and energy consumption
- Reduction in the number and severity of primary and secondary accidents

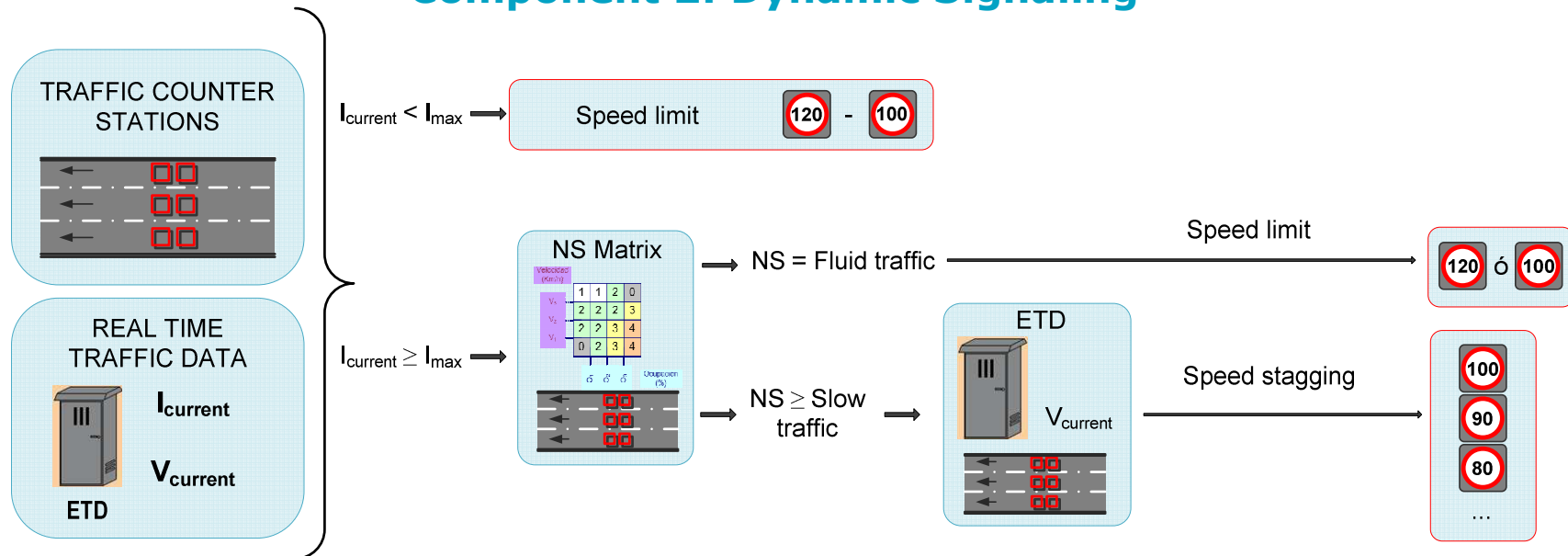
#### Description

This service offers improvements in the following areas:

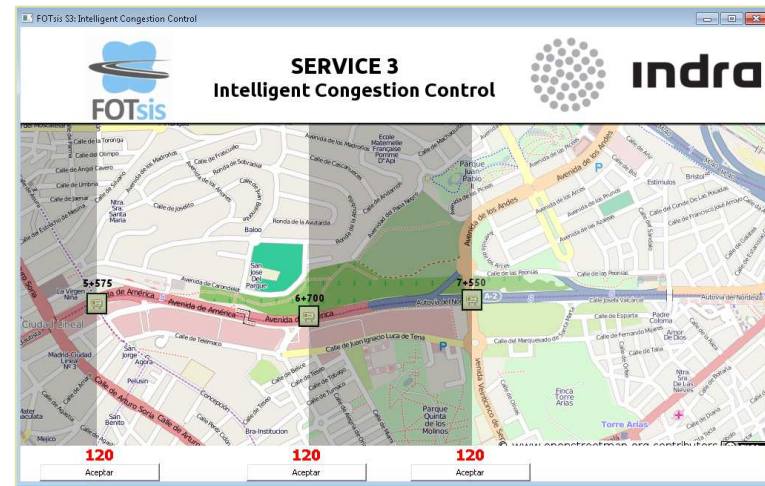
- New incident indicators for faster and more efficient incident detection
- Combination of algorithms for harmonized control decisions
- Optimization procedures with a dedicated objective function for automatic calibration of the model parameters

# Intelligent Congestion Control

## Component 2: Dynamic Signaling



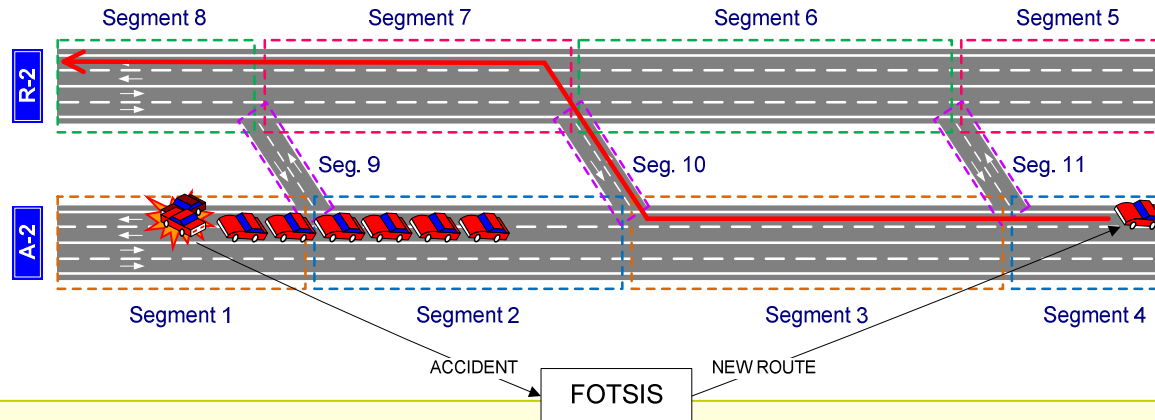
- ✓ Real-time traffic information gathered from the highway
- ✓ An active coordinated speed control is automatically activated when slow traffic conditions are detected
- ✓ Proposed speed limits are collectively broadcasted via VMS



Innovation and benefits of using an integrated approach

## Dynamic Route Planning

### Network Optimization and Strategy Management



#### Expected effects

- To improve the load balance in the traffic network and the route guidance by incorporating traffic management strategies and predictive algorithms in the traffic flow.

#### Description

The main tasks are to:

- propose automatically the best re-routing strategies to the users and the operators
- Trip times are collected from vehicle detection infrastructure and onboard devices
- Real-time dissemination of information to drivers by all available media

# Border Control

- ✓ **Border control** system using ANPR
- ✓ Data storage and processing.
- ✓ **Traffic flow analysis** within the territory with additional LPR or GPS tracking to study the movements
- ✓ Data traffic processing from the borders
- ✓ Alarm Management.
- ✓ **Blacklist** Management.
- ✓ Reports

Tránsitos			
Nacionalidad	Entradas	Salidas	Total
Portugal	2.450	2.177	4.627
España	1.827	1.785	3.612
Francia	62	76	128
Reino Unido	39	43	82
Alemania	28	37	65
Países Bajos	38	21	59
Andorra	15	9	24
Luxemburgo	10	13	23
<b>Totales</b>	<b>4.969</b>	<b>4.256</b>	<b>8.825</b>





**indra**

## **Ivan Baľa**

Executive Director and Chairman of Board of Directors  
Indra Slovakia, a.s.

[ibala@indracompany.com](mailto:ibala@indracompany.com)

Apollo Business Center II  
Prievozska 4, blok A  
821 09 Bratislava  
T +421258229111

[www.indracompany.com](http://www.indracompany.com)

