0. ASCIMER PROJECT OVERVIEW

0.1 CONTEXT

0.2 TEAM

0.3 OBJECTIVES

1. FIRST YEAR ACTIVITIES

2. INTELLIGENT TRANSPORT SYSTEMS

3. ITS IN PUBLIC TRANSPORTATION
It is crucial to manage growing cities in ways that support and drive economic growth and competitiveness while achieving social cohesion and environmental sustainability.

Cities Global Challenges:
- Ageing population
- Pollution
- Climate change
- Traffic Congestion
- Lack of affordable housing
- Urban sprawl
- Rising cost of urban infrastructure
- Poverty
- Social Tensions

Initial UE Main Action Fields

Smart City Concept

- Integral Socioeconomic Development
- Cross-sectoral ICTs
- Public Services and Utilities
- Energy & Environment
- Transport & Mobility
- Urban Development & Planning
The overall purpose of this project is to develop a comprehensive framework to help public and private stakeholders to make informed decisions about smart cities investment strategies and to help them to build the skills to prioritize, implement and develop those strategies.

At the same time, an on-going goal will be the characterization of Mediterranean City challenges and the development of a transferability strategy of Smart City projects.
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**Working definition:**

“A Smart City is an integrated system in which human and social capital interact, using technology-based solutions. It aims to efficiently achieve sustainable and resilient development and a high quality of life on the basis of a multistakeholder, municipality based partnership.”

**Concept & Challenges:**

ASCIMER. ASSESING SMART CITY INITIATIVES FOR THE MEDITERRANEAN REGION
SMART CITY GOALS

• Achieve a sustainable and resilient development.
• Increase the quality of life of its citizens.
• Improve the efficiency of the existing and new infrastructure.

TECHNOLOGY FACTOR

• Use of New Technologies, specially ICT, as a mean to achieve its objectives. Technology as tool for the improvement of the city.

MAIN ACTORS IN SMART CITY PROJECTS

• Government and city authorities: municipally based.
• Public-private partnerships.
• Citizen participation

SMART CITY AS A SYSTEM

• Holistic approach
Smart City Dimensions

- specific aspects of a city
- where Smart Initiatives impact
- Integration to achieve smartness

- Smart Governance
- Smart Economy
- Smart Mobility
- Smart Environment
- Smart People
- Smart Living

Main sources:
European Parliament (2014) Mapping Smart Cities in the EU
What does a project need to be Smart?
Smart City Projects should help Southern and Eastern Mediterranean cities to **solve their current challenges avoiding the problems that the Northern cities are already facing**.
### Smart Governance
- SGo1. Participation
- SGo2. Transparency and information accessibility
- SGo3. Public and Social Services
- SGo4. Multi-level governance

### Smart Environment
- SEN1. Network and environmental monitoring
- SEN2. Energy efficiency
- SEN3. Urban planning and urban refurbishment
- SEN4. Smart buildings and building renovation
- SEN5. Resources management
- SEN6. Environmental protection

### Smart Economy
- SEC1. Innovation
- SEC2. Entrepreneurship
- SEC3. Local & Global interconnectedness
- SEC4. Productivity
- SEC5. Flexibility of labor market

### Smart People
- SPE1. Digital education
- SPE2. Creativity
- SPE3. ICT-Enabled working
- SPE4. Community building and urban life management
- SPE5. Inclusive society

### Smart Mobility
- SMO1. Traffic management
- SMO2. Public Transport
- SMO3. ICT Infrastructure
- SMO4. Logistics
- SMO5. Accessibility
- SMO6. Clean, non-motorised options
- SMO7. Multimodality

### Smart Living
- SLI1. Tourism
- SLI2. Culture and leisure
- SLI3. Healthcare
- SLI4. Security
- SLI5. Technology accessibility
- SLI6. Welfare & Social inclusion
- SLI7. Public spaces management

#### Sources:
- State of the art
- Web research
- On-line Survey
- Field Visits
## Projects Catalogue: Project & Challenges

### Smart City Project Actions

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Projects Catalogue:

**Project actions**

- ENERGY EFFICIENCY
- RENEWABLE ENERGY SOURCES
- URBAN PLANNING AND URBAN REFURBISHMENT
- SMART BUILDINGS AND BUILDING RENOVATION
- ENVIRONMENTAL PROTECTION
- NETWORK AND ENVIRONMENTAL MONITORING
- RESOURCES MANAGEMENT
- SMART
## Smart City Project Actions

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2. INTELLIGENT TRANSPORT SYSTEMS

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ITS = ICT applied to Transport

Intelligent Transport Systems (ITS)

“advanced applications which without embodying intelligence as such aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and ‘smarter’ use of transport networks”

(DIRECTIVE 2010/40/EU)

- ITS → contribute to build a truly integrated and user-friendly transport system
Directive 2010/40/EU on the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport.

**OBJECTIVES**

- Establish a **Framework**
- Setting **common priorities**
- Development of **specifications** and **standards**
Directive 2010/40/EU on the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport

Specifications

• Aims: compatibility, interoperability and continuity of ITS solutions

• Binding measures (requirements, procedures, or any other relevant rules)

• Functional, technical, organisational, service-provisions issues

• Based on existing standards (where appropriate)
Directive 2010/40/EU on the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport

• 4 Priority Areas

(I) Optimal Use of Road, Traffic and Travel Data

(II) Continuity of Traffic and Freight Management

(III) Road Safety and Security

(IV) Linking Vehicle and Transport Infrastructure
Directive 2010/40/EU on the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport

• 6 Priority Actions

a) the provision of EU-wide multimodal travel information services;
b) the provision of EU-wide real-time traffic information services;
c) data and procedures for the provision of road safety related minimum universal traffic information free of charge to users;
d) the harmonised provision for an interoperable EU-wide eCall;
e) the provision of information services for safe and secure parking places for trucks and commercial vehicles;
f) the provision of reservation services for safe and secure parking places for trucks and commercial vehicles
EU-wide Multi-Modal Travel Information

EU-wide Real-Time Traffic Information

Free Safety-Related Minimum Traffic Information

Interoperable EU-wide eCall

Information Services and Reservation Services for Truck Parking
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Why public transport?

Public transport: penetration vector of ITS technologies in cities
Best Practices of ITS in Public Transport

- Fleet management
- Integrated management of traffic and PT
- Multimodal travel planners
- Intermodal services coordination and interchanges facilities
- Ticketing
- Real time information
FLEET MANAGEMENT (I)

- Operation through a centralized control centre
- Based on a two-ways communication protocol: the vehicle provides real-time information to the control centre (via AVL system) which in turn produces guidance instructions to each bus.
- Different EDI (Electronic Data Interchange) protocols support this continuous communication.
Best Practices of ITS in public transport

FLEET MANAGEMENT (II)

- **Benefits:**
  - Optimization of bus operation
  - Maintain *headways* between vehicles
  - Alert any *incidents* in the service: quick actions can be taken
  - Deliver *real-time information* to travellers at bus stops, via web or via smartphone.
  - Improvement of quality of service

- Very common in large cities, with big fleets
FLEET MANAGEMENT - Examples

• Craiova (RO):
  o PT system: 3 trolley tram lines and 17 bus lines
  o Introduction of infomobility tools for fleet management

  ➢ Implementation of AVL system on 80 buses and 27 trams and installing 20 info panels for travelers in the main station and in several bus stops.

  ➢ It enables: monitor schedule adherence of bus in service; monitor fuel consumption; Real time inform drivers about advance/delay at each bus stops; set up of a data base with records of bus service to verify the quality of service

  ➢ Benefits: increase the reliability of the PT system, provide better access to real time route information, improve the company management and optimise the energy consumption.
FLEET MANAGEMENT - Examples

• San Sebastian (SP):
  o CTSS-DBUS operates a fleet of 120 buses over 27 regular routes (plus night and special services)
  o New expert planning and fleet management system
    ➢ HSDPA-3G communication technology for the data exchange between the buses and the central information system.
    ➢ optimises the number of buses and drivers required in each case, while providing optimal working conditions for drivers.
    ➢ Results: drivers’ planning timetables now more optimized; reduction of operating costs by 2.5%
    ➢ Installation of 22 security cameras in the buses, connected to an advanced onboard computer, improving the security and the physical integrity of drivers and passengers.
INTEGRATED MANAGEMENT OF TRAFFIC AND PT

- Coordination of ITS systems for controlling bus services and traffic.
- Needs a common platform where traffic and PT control centres are linked and coordinated.

Main benefits:
- Promotes **reliability** in bus services (priority in traffic lights, and bus lanes)
- Anticipating information on congestion or incidents on bus line to allow changing itineraries
- Improve the quality of service
INTEGRATED MANAGEMENT OF TRAFFIC AND PT - Examples

• Toulouse (Fr): Bus priority system
  - PT network: 77 urban bus lines, 2 underground lines, a tramway line and a bicycle rental scheme in the city
  - Objective: improve the competitiveness and the attractiveness of the Bus Network towards the Car use
  - Equipment of 2 bus lines with a priority request system (radio priority system). It gives green light to the arriving bus.

Results:
  - Improved regularity and journey time
  - Reduced average bus waiting time at traffic lights by 52% (9” less)
INTEGRATED MANAGEMENT OF TRAFFIC AND PT - Examples

• Edinburgh (Sc): Greenways scheme
  o PT network: 110 bus lines and a tram system to the airport
  o Problem of traffic congestion
  o Greenways scheme to restore the balance of car use and PT.

  – Bus lanes painted green, highly visible
  – Large explanatory road signs
  – An electronic detection system at 25 traffic signals, giving buses priority at traffic lights
  – New parking and loading bays established
  – More cycle lanes provided (priority for cyclists at traffic lights)
  – More bus shelters and bus stop information
  – More pedestrian crossings and raised level crossings, together with traffic calming measures
INTEGRATED MANAGEMENT OF TRAFFIC AND PT - Examples

- Madrid (Sp): CITRAM
  - Management Centre for the Madrid Public Transport
  - Supports decision-making and public transport coordination
  - It helps to achieve technological integration and guarantee interoperability between the different systems and operators.

GOALS
- Coordination among all modes of PT in major events
- Intermodal information in real time to PT clients.
- Technological integration and information management to support decision-making.
- Continuous monitoring of the status of the PT system.
Best Practices of ITS in public transport

**SGAF - Supervisor gráfico**
Graphic supervisor

- Localización de vehículos en tiempo real
  Vehicle real time location
- Instalaciones georeferenciadas
  Georeferenced facilities
- Representación gráfica de incidencias
  Graphic representation of incidents

**CCTV - Supervisor intermodal**
Intermodal supervisor

- Integración de sistemas de CCTV
  CCTV systems integration
- Supervisión simultánea de centros intermodales
  Simultaneous supervision of multimodal station
- Video embarcado
  Onboard video

**GEIS - Gestor de incidencias**
Incident manager

- Gestor de incidentes basado en web
  Web-based incident manager
- Información de afecciones al servicio
  Information of services disruptions
- Gestor de quejas y sugerencias
  Complaints and suggestions manager

**SGI - Sistema de Gestión Intercambiadores**
Interchanges Management System

- Alarma estado de las instalaciones en tiempo real
  Facility status alarm in real time
- Seguimiento de tráfico y ocupación de dársenas
  Monitoring of traffic and platform occupation

**SGIP - Información al usuario**
Passengers Information System

- Información multimodal al usuario
  Users multimodal information
- Gestión de paneles de todo el sistema
  Screen management of the whole system

**GES - Gestión de la seguridad**
Security/Safety management

- Gestión automática de alarmas
  Alarm automatic management
- Mayor seguridad para clientes y conductores
  More security for customers and drivers
CITRAM: Public Transport Management Centre in Madrid
MULTIMODAL TRAVEL PLANNERS

• There is a need for further integration of the different modes of transport to make mobility more efficient and user-friendly.

• Key pillar of the ITS Action Plan: optimal use of travel and traffic data to foster multimodal travel

• It seamlessly integrates information for different modes: comprehensive door-to-door information for users enabling well-informed travel decisions.

• Front-end-back-end computer systems which provide a traveller the best itinerary.

• They supply timetable, routing and other travel information.
MULTIMODAL TRAVEL PLANNERS – Examples

• Transport Direct (UK):
  
  o **Online** journey planner and information services, covering travel by both **car and PT** throughout England, Scotland and Wales. Also includes car park finder, cycle planner and domestic flight times.
  
  o 160 million travel information requests and helped spectators plan their routes to the London 2012 Olympic Games.
  
  o 2004-2014
  
  o **timetable data freely available** to web developers – emerged a number of journey planning websites, offering similar services to Transport Direct:

  ✷ AA route planner (for car journey planning); Cyclestreets (for cycle journey planning); National Rail enquiries (for train journey planning); RAC route planner (for car journey planning); walkit.com (for planning walks)
MULTIMODAL TRAVEL PLANNERS – Examples

• Wisetrip (http://wisetrip.travel):
  o EU project (FP7)
  o **Main goal**: develop and validate an **innovative mobility service platform**, which provides multi-modal travel information sourced from various connected journey planners and is accessible by travelers before and during the journey at any place and time through various mobile or fixed terminals.
  o **Features:**
    • easy and flexible interface
    • personalized trip services
    • Carbon footprint of trips

http://wisetrip.travel/enwisetrip/index.html
MULTIMODAL TRAVEL PLANNERS - Examples

- **EU Spirit** ([http://eu-spirit.eu](http://eu-spirit.eu)):
  - International door-to-door travel planner
  - Based on existing local, regional, and national travel information systems which are interlinked via technical interfaces.
  - Calculation of an itinerary between stops, addresses or points of interest in different European regions.
  - Also, total travel times, information about fares and links to additional important local information sources
INTERMODAL SERVICES COORDINATION AND INTERCHANGE FACILITIES

- Passenger Intermodality: use of different modes of transport in a combined trip chain with a seamless journey
- Coordination of different PT modes and operators is enhanced by the employment ITS
- Not only infrastructure solutions (Interchanges or intermodal centres), but also operational control
- Integration of alternative modes with other
INTERMODAL SERVICES COORDINATION AND INTERCHANGE FACILITIES - Examples

• MUGI service - Gipuzkoa (Spain):
  o Integrated fare system, 2013
  o Includes all PT modes within the region of Gipuzkoa
  o Users of the transport card MUGI can access the bicycle service (Dbizi) in San Sebastian
  o MUGI users can access the car-sharing service within the municipality of Elgoibar (electric vehicles)
INTERMODAL SERVICES COORDINATION AND INTERCHANGE FACILITIES - Examples

• Madrid Interchanges (Spain):
  • Four basic principles
Best Practices of ITS in public transport

INTERMODAL SERVICES COORDINATION AND INTERCHANGE FACILITIES – Examples

• Madrid Interchanges (Spain):
  o CCTV for registration number recognition (bus identification)
  o GPS and WIFI for services locating, controlling and informing.
  o Passenger counting for mobility control (CCTV in real time)
  o CCTV cameras for safety and security
  o Automated systems for security, traffic control and maintenance.
  o Communication networks own designed.
  o CITRAM
Call a bike (Germany):

- Innovative **bike hiring service** offered by German Railways
- Designed for **one-way trips** (they can be integrated in a trip chain with long distance rail or regional and urban PT)
- Discounts for DBCard owners
- Started in Munich (2001), now also in Berlin, Cologne, Frankfurt, Stuttgart
- Advanced **returning process**: users can leave the bike where they want and only have to inform the service by mobile
**TICKETING**

- **Fare integration is a key issue for reaching a seamless transport system**

- **Integrated ticketing = multimodal ticket for a journey, regardless the number of transport modes used**
  - Attractive and user-friendly multimodal transport system
  - Incentive to encourage travellers to combine several forms of transport

- **Renewal of existing ticket validation systems: new forms of electronic ticketing on mobile devices (smart cards, mobile phones...)**

- **Provision of very useful information to managers and planners**
**TICKETING**

- **Smart card - Bolzano (Italy):**
  - **PT network:** consists of bus, rail and cableways
  - A contactless card (the AltoAdige Pass) introduced in 2012
  - The more they travel on PT, the less they pay: fidelization
  - Travelled kilometres counted from the check-in to the check-out. One km travelled on PT can cost:
  - New functionalities added to the card: people travelling with a bicycle or with an animal can pay the corresponding additional fee by selecting the relative option during the check-in.
  - People and users have positively reacted to the new system
Best Practices of ITS in public transport

**TICKETING**

- **Interoperability card - Andalusia (Spain):**
- **Since 2006, the possibility of using the travel card in all Andalusian metropolitan areas.**
- **Common technology for taking advantage of scale economies.**
- **Integrated Fare System which allows savings between 25-40% for transport card users over single ticket users.**
**TICKETING**

- Via-movil in Tenerife (Spain):
  - new app to travel by tram and bus
  - enables to pay and validate (fares adapted to users mobility needs).
  - Payment at anytime, anywhere ... all under fully secure payment platform.

http://www.via-movil.es/
NFC (Near Field Communication) TECHNOLOGY

- Technology that enables smartphones and other devices to establish radio communication with each other by touching them together or bringing them into proximity, typically a distance of 10 cm or less.

- It provides the ability to read tags (SIM with NFC), accessing different services:
  - Ticket validation
  - Contactless payment: online recharging
  - Check number of trips available, expiration dates
  - Real time information
  - Incidents within the PT network
  - Calculating the most effective route
  - Other (non-PT services): Buy tickets (museums, cinema…); weather information; parking services
Best Practices of ITS in public transport

NFC (Near Field Communication) TECHNOLOGY

• NFC in Valencia (Spain):

• first Spanish city to use mobile phones to access public transport: payment with smartphone since 1st July 2014 in urban buses (EMT) and FGV railway operators.
  
  - Orange and Vodafone: mobile operators (Movistar in process)
  - La Caixa: financial institution
  - PToperators: EMT and FGV
  - Compatible mobile

• https://www.youtube.com/watch?v=W8fkj-p1U4w
**Real-time Information**

- Providing travellers with accurate information before and during the journey will not only benefit individuals; it will also lead to efficiency gains for transport operations and for the transport network as a whole.

- One of the features most valued by users: big expansion in recent years

- Information provided:
  - Waiting time for the next service
  - Other PT services in correspondence to a bus stop
  - Reports on incidents

- Transport authorities make all existing data on PT available to the general public, especially developers: expansion of new applications

- [http://opendata.emtmadrid.es/](http://opendata.emtmadrid.es/)
REAL-TIME INFORMATION

• Multimodal real-time information in Madrid (Spain):

• PT system in Madrid region consists of 5 modes: metro, urban buses, metropolitan buses, light rail and commuter railways; 5 main intermodal hubs connecting these modes

• Objectives of the measures implemented (within the EBSF project):
  
  o To promote the PT use and help the user on the modal choice (bus or train) by providing multimodal real time information to the users, along the A6 corridor in:
    
    ✓ the bus stops
    ✓ on board the bus
    ✓ the web and the mobile via SMS
  
  o Underground vehicle location using radiofrequency systems (WiFi) as support for the advanced traffic management in the interchange station.
Best Practices of ITS in public transport

REAL-TIME INFORMATION

• Multimodal real-time information in Madrid (Spain)

Devices to provide real time info to users
– 4 panels (screens) on 4 different stops in Majadahonda
– 1 more stop provided with Bluetooth
– Screens in the interchange

Buses
– More than 30 buses equipped

Backoffice
– Multimodal integrator center
– Integration with highway info
– Integration with suburban railway info
– Integration of incidents information

Test: October 2011 – March 2012 (6 months)
REAL-TIME INFORMATION

• Real time countdown system in London (UK):
  - Countdown service providing real time bus information for all 19,000 London’s bus stops, being the largest system in the world
  - Information available via internet, smartphones, text messages
  - Information about: Bus arrival time, service disruption and links to London Underground services
  - Signs at bus stops comply with disability guidelines
  - Together with the iBus system (AVL system installed in all London's 8000 buses to provide passengers with audio visual announcements and to trigger priority at traffic junction)
  - Benefits: Reduction of the operational costs, more reliable transfer of bus information, greater accuracy of information (95% accurate)
Best Practices of ITS in public transport

REAL-TIME INFORMATION

• VAO, Traffic Information Austria:
  o high-quality, Austrian-wide, intermodal traffic information system
  o One traffic information service for all instead of many different ones
  o Information about: car routing, public transport routing, bicycle routing,
    Bike & Ride, Park & Ride, hire bikes, car sharing etc.
  o VAO supports its users in the choice of transport mode, information
    about traffic obstructions, traffic jams and road works and includes
    these in the route calculation.
  o Project VAO 2 already in progress: include flight data & additional
    sharing concepts (car sharing), and additional end-user services

http://www.verkehrsauskunft.at/
¡THANK YOU FOR YOUR ATTENTION!

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