SUITS

BUILDING SMALL-MEDIUM LOCAL AUTHORITIES' CAPACITY TO IMPLEMENT EMERGING TRANSPORT TECHNOLOGIES

Workbook of participant

MODULE 1

SUITS
Capacity Building Programme
Outline of the course

Welcome session

1. Introduction
2. Emerging Transport Technologies (ETT)
3. Value for S-M cities
4. Successful case studies or Best practices of SUITS cities on such topics
5. Innovative financing, procurement, partnership
6. Process and implementation aspects
7. Available tools and guidelines

This material is result of WP5 of SUITS project.

1 Introduction

TERMINOLOGY

The following terms will be extensively used throughout the course:

SUITS: Supporting Urban Integrated Transport Systems: Transferrable tools for Authorities

CBP: SUITS Capacity Building Programme

SUMP: Sustainable Urban Mobility Plan

LAs: Local Authorities

S-M cities: Small-medium size cities, i.e. cities with population ranging between 50,000 and 250,000 residents in their urban centre

ETT: Emerging Transport Technologies

More terms…

CSO: Civil society organisation | **NGO**: Non-governmental organization
V2I: Vehicle to infrastructure | **V2V**: Vehicle to vehicle | **GHG**: Greenhouse gas
PVD: Probe Vehicle Data | **RSU**: Road Side Unit: | **EV**: Electric Vehicles
IT: Information Technologies | **ITS**: Intelligent Transport Systems
VRU: Vulnerable Road User

SUITS Supporting Urban Integrated Transport Systems:
Transferable tools for authorities

Funded under: H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

Topic: MG-5.4-2015 - Strengthening the knowledge and capacities of local authorities

Funding scheme: RIA - Research and Innovation action

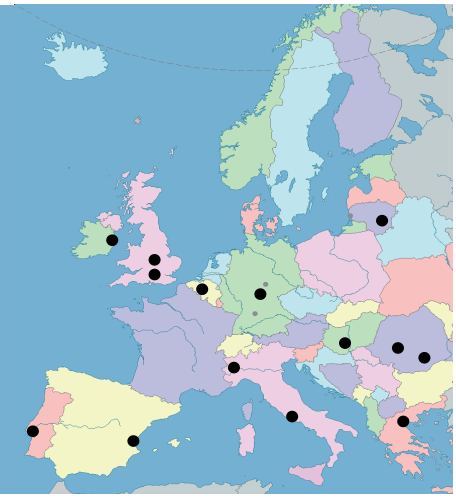
Coordinator: Coventry University

Total cost: appox. EUR 4M

Duration: 4 years (From Dec 1st 2016 to Nov 30th 2020)

22 Partners (see map)

Project Website: http://www.suits-project.eu/



COORDINATOR

UK: Coventry University

PARTICIPANTS

UK: Arcadis, Transport for West Midlands

Italy: Politecnico di Torino, RSM, Eurokleis, Citta di Torino

Ireland: Interactions

Greece: Lever, Sboing, Makios, Municipality of Kalamaria

Spain: ITENE, INNDea

Romania: Integral Consulting, Municipality of Alba Julia

Portugal: VTM

Hungary: Logdrill

Germany: Wuppertal Institute, Technische Universistat Ilmenau

Lithuania: Smart Continent

Belgium: SIGNOSIS

Course Framework: SUITS Project

Main objectives of SUITS Capacity Building

Overall aim: To increase the capacity of S-M local authorities to develop and implement sustainable, inclusive, integrated and accessible transport strategies, policies, technologies, practices, procedures, tools, measures and intelligent transport systems that recognize the end-to-end travel experiences of all users and freight.

Support Small Medium Local Authorites in developing SUMPs by:

- Transforming them into **learning organizations**.
- Make transport departments **resilient and responsive to new challenges and changes**.

Without capacity building and the transformation of transport departments into learning organisations, training materials will not provide the step change needed to provide innovative transport measures.

Expected outcomes of SUITS project

Transformation of transport planning departments in Small Medium cities into change agents. Through development of:

- A validated **capacity building programme** for transport departments.
- Resource-light **learning assets** (modules, e-learning material, webinars and workshops), based on stated needs.
- **Decision support tools** to assist in:
  - procurement,
  - innovative financing,
  - engagement of new business partners,
  - handling of open, real time and legacy data.
- **Better Integration/use of freight and passenger data**.

Course Framework: SUITS Project

Modules

Module 1 "Building S-M LAs' capacity to implement emerging transport technologies" (ITS, Electric mobility, CAVs etc.)

Module 2 "Building S-M LAs' capacity to introduce innovative transport schemes" (MaaS, Uber, Business Models etc.)

Module 3 "Building S-M LAs' capacity to implement urban transport safety & security measures for all/vulnerable users" (passenger and freight vehicles etc.)

Module 4 "Building S-M LAs' capacity to implement urban freight transport measures" (SULPs, Crowdshipping, cargo bikes etc.)

Module 5 "Data collection and analysis tools for integrated measures"

Module 6 "Innovative Financing, procurement and business models"

Modules 1/3/4	Delivered as classroom courses
Module 2	Delivered as classroom course and webinar/e-learning
Modules 5/6	Delivered as e-learning courses/webinars

Module's purpose

Overall module's aim: To increase the capacity of S-M cities, to implement and monitor Emerging Transport Technologies (ETT) throughout policymaking, budgeting, designing and facing the current challenges when implementing these measures.

THIS COURSE AIMS TO:

- **Increase the understanding** about the value of ETT in our cities, the effects/ cost of lack of urban mobility regulations, the economy of the city and about the concept and methodology for developing ETT while being able to recognize or find out the needs of urban transport users.

- **Build specific skills** regarding how success of the measures can be ensured
  - By convincing stakeholders and by overcoming financial, legal, administrative and technical barriers.

SPECIFICALLY, THE COURSE IS DESIGNED TO:

- **Strengthen cooperation** between LA's staff.
- **Advance local priorities** on emerging transport technologies.
- **Offer** concrete practical **tools** and **guidance** to better implement these technologies.

Key aspects of the problem

Conventional transport technologies in cities most cases result in:

- **Environment** (noise, air quality, visual quality)
- **Road flows- levels of congestion**
- **Fuel Consumption**
- **Safety**

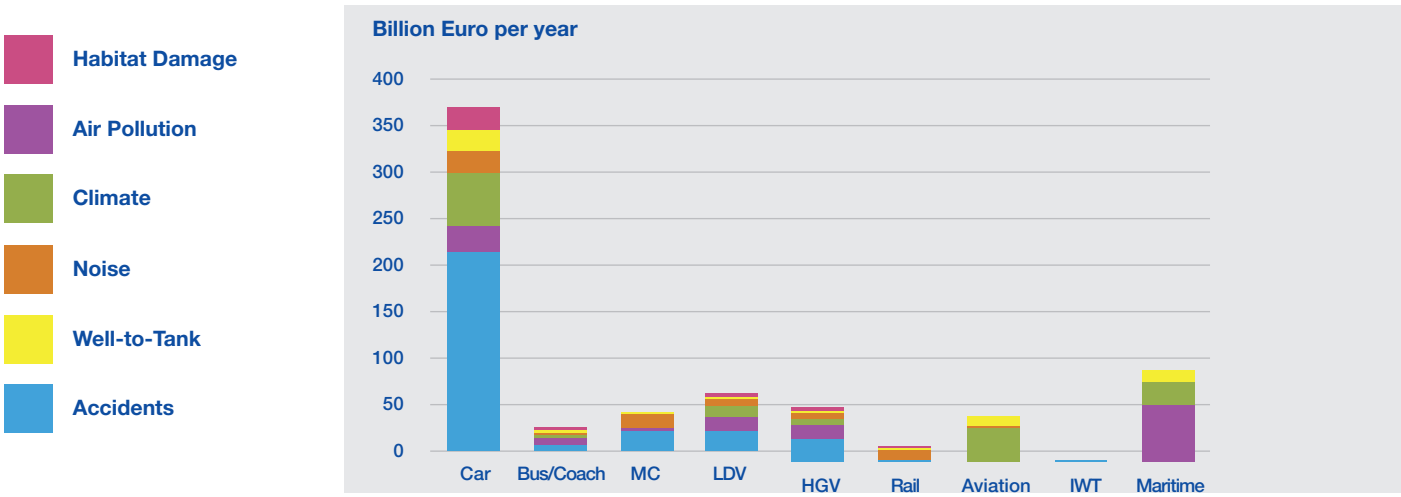
Lower capacity of LAs

ASPECT OF THE PROBLEM:

Road traffic is responsible for the largest share of air pollution from transport sector (71 % of overall transport CO2 emissions). [1]

KEY CONSIDERATIONS:

A wide range of **Emerging Technologies** are rising nowadays in the urban mobility. It is important to focus on the real need of each city to finance and introduce the most suitable tools to increase the urban sustainability.



Total external costs per transport mode for EU28 in 2016 [3]

EXTERNAL COST OF TRANSPORT

≈**59%** (€ 425 billion estimated) of total external cost of transport due to the use of **Car**, **Bus/Coach** and **Motor Cycle** (EU28 in 2016). [2]

≈ **27%** of overall external cost in EU28 (2016) stands for **road congestion** (total delay costs € 270 billion estimated). [2]

≈ **€ 210 billion per year**, the **accident cost** estimated only for car while the **total** accident cost for the rest of road means of transport is about **€ 60 billion**.

…while the extent of the **overall external costs of transport**, is estimated at around **€ 1 000 billion** (€ 981 billion) **annually** (almost 7% of the gross domestic product of the 28 EU Member States) through **air pollution**, **climate**, **habitat damage**, **well-to-tank**, **noise**, **congestion**, **accidents**. [3]

HOW TO DETERMINE COSTS

For retrieving cost estimates for specific countries and traffic situations there are plenty of methodologies and approaches.

The components (e.g. value of time, cost of fatality) needed for each country- case study, vary in time and also depends on the individual economy of each country.

The aim is for every interested S-M city, to use some tools and methodologies in order to calculate these costs.

APPROACH	DESCRIPTION
External Transport Cost Calculator [4]	Calculates the precise external costs of the urban freight transportation
Handbook on External Costs of Transport [5]	Gives guidance on how to determine costs about air quality, accidents etc. (accompanied by excel calculators)
Guidelines to estimate the external marginal accident cost [11]	Report of experts advisors that propose strategy on calculating the accidents cost in transport sector

ISSUES NEED TO BE ADDRESSED FOR MOBILITY IN URBAN AREAS [7]

- **External congestion cost** (Air Pollution/Air Quality, Noise and nuisance levels)
- **Fatalities**
- **Casualties and injuries**

KEY CONSIDERATIONS:

- Framework that includes cooperative systems, dynamic traffic management, restrictions and ways to enforce such actions in order to ensure the seamless operation of urban transport system.
- Promotion of eco-friendly vehicles.
- Coordination and cooperation between authorities and private stakeholders.

EXERCISE A

Identifying weaknesses of the urban transport modes

Description of material
One table with 2 column where can be identified the weaknesses of urban transport modes.

Please use sticky notes to write down weaknesses that the modes of transport face in your city.

TEAM NAME

URBAN TRANSPORT MODE	WEAKNESSES
CAR	
PUBLIC TRANSPORT	
BICYCLE	
WALKING	

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2 Emerging Transport Technologies (ETT)

This chapter provides:

a brief description and the **key elements** of indicative **Emerging Transport Technologies (ETT)**.

ETT aim to **reduce negative impacts** of urban mobility operations and help overcoming barriers to apply efficient and sustainable urban measures.

Therefore ETT focus on:

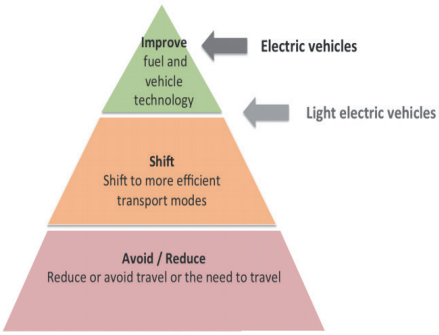
- Increasing **energy efficiency**, to therefore improve the **sustainability and livability** of cities.
- Improving **reliability of systems**, increasing **user satisfaction**.
- Increasing **safety and security**, reducing the risk of road injuries and fatalities.

Emerging Transport Technologies (ETT)

A) CLEAN FUEL AND E-VEHICLES [1], [2]

The aim is to substitute vehicles with conventional gasoline or diesel drive by vehicles with **low-carbon** or **carbon-free drive**.

These may be **electric vehicles**, **natural gas or hydrogen fuel cell vehicles** Alternative drives are suitable for **passenger cars**, **for two-wheeled vehicles**, for **light commercial vehicles** and **buses** → lower kilometer-specific energy consumption and CO2 emissions.



Clean vehicles include fuels and technologies that offer substantial emission reduction potential in terms of local air pollutants and greenhouse gas (GHG) emission.

CNG - Compressed natural gas: Usually lower GHG emission and noise pollution compared to petrol or diesel.

Biofuels - Liquid or gaseous fuels produced from organic matter: Reduction of several local air pollutants but can lead to higher emission of ultrafine particles affecting human health.

Electricity: Zero tailpipe emission + GHG emission reduction potential varies depending on electricity production.

B) COOPERATIVE SYSTEMS [3]

They allow **communication between traffic lights** (and other infrastructure elements) and **vehicles (V2I)** but is also refers to the communication systems **between vehicles (V2V)** → contributes also to the future operation of autonomous vehicles.

Cooperative systems could cover all sorts of areas. The intelligent traffic lights, as part of it, are able to **monitor the traffic**, anticipate traffic levels and **communicate with oncoming vehicles** in order to inform them of the **time remaining** before the lights turned green or red and to stay green longer if this helped to improve the flow → This system allows more cars to pass through the junction by keeping the light green for longer.

Intelligent traffic lights → can monitor and react to oncoming vehicles → potential to reduce congestion and idling → help to **improve traffic flows, reduce CO2 emissions.**

C) TRAFFIC INFORMATION SYSTEMS

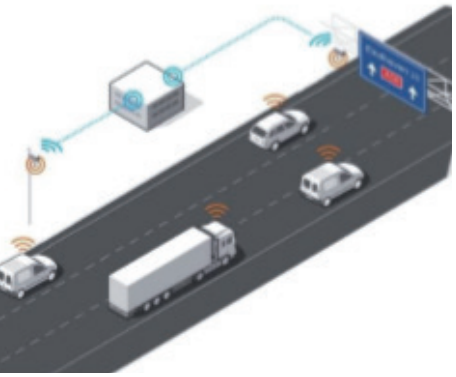
1. Dynamic Traffic Management [4]

It provides information about real-time traffic conditions and other mobility parameters. It may concern all mobility modes (car, public transport, walking, cycling, multimodal) and may use many different ways to diffuse it (mobile phone, road signs, etc.). Some examples for a number of recipients:

- **Drivers** through mobile phones (mobile applications, Bluetooth, SMS). For example information about incidents, routes, and parking.
- **Public transport passengers**. The information can be a) on-board for upcoming stops, destination, weather forecast, advertisement, news, b) on stops where electronic signs can inform the passengers about arrivals, delays, incidents, timetables, etc., c) through mobile and website applications.
- **Freight operators** through signs, website and mobile platforms about preferred routes and parking bays.

Multimodal journey planning services - MaaS (via applications or websites) combine information systems in order to inform travelers about a range of transport options tailored to their specific requirements while facilitating cross border and interregional multimodal journey planning.

2. Probe vehicle data [5], [6]



- Probe Vehicle Data (PVD) is data generated by vehicles and communicated to the infrastructure → The collected traffic data (traffic conditions, road surface conditions and the surroundings) can be used as input for **operational traffic management** (e.g., to determine the traffic speed, manage traffic flows by informing drivers, where the danger of accidents accumulates).
- For long-term tactical/strategic purposes (e.g. road maintenance planning) and for **traveler information services**.
- Driver assistance technologies that are installed on modern vehicles know their own positon, speed and direction and sometimes other vehicle properties (e.g. collision sensors, ABS, windscreen wiper status, etc.) → This data can be communicated when a vehicle is in range of a RSU. **This data will provide the road authority with information about traffic, road surface and environment conditions** which can be used further in traffic management.

D) PEDESTRIAN ASSISTANCE SYSTEMS

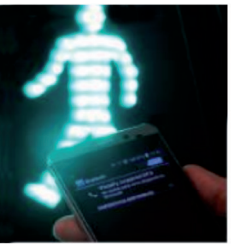
1. High-tech pedestrian crossing design [7]

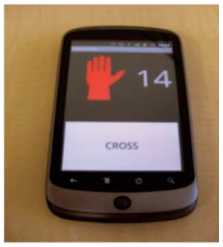
A new approach in the design of crossings help to **prevent accidents between pedestrians and drivers** → pedestrians and drivers are now **less aware of one another** thanks to smartphones and in-car infotainment systems.

Three ways in which a driver is alerted to the presence of a pedestrian:

- A **thermal imaging camera inside the cars** detects a pedestrian approaching the crossing.
- When someone is detected, LED **warning lights** that are embedded in the asphalt either side of the crossing are **illuminated** (these are visible up to 50 metres away but are not bright enough to adversely disturb the vision of the driver).
- Once the vehicle is 30 metres or less from the crossing, a blinking electronic sign illuminates to warn the pedestrian.

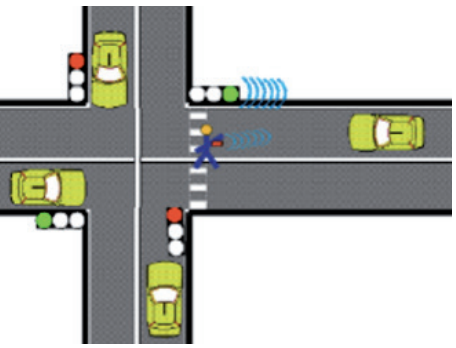
2. Multi-media Integration for pedestrians' varied needs [8], [9]





- This Pedestrian Crossing Solution caters for the "standard pedestrian".
- **Smart-phones** offer the potential for individualized solutions that cater for pedestrians having "non-standard" crossing needs; the Smartphone display could show different information (derived-but customized from the normalized reference dataset) to that of the crossing signal.
- Other media (acoustic, tactile) could also be exploited. **Hand-held devices**, and **headsets** with **linked to mobile apps**, are being developed and tested. All of this will become more feasible once Pedestrian Crossing Solution technology is more-widely deployed.

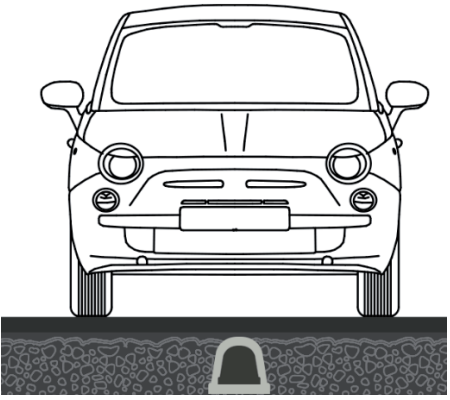
3. Cooperative traffic light for VRUs [10]



- The cooperative traffic light for vulnerable road users (VRU) → **warranting priority or additional crossing time** (i.e., extending the green light phase or lessening the red phase) based on **pedestrian characteristics** (or on special conditions, such as weather).
- This C-ITS service has several benefits → it intends to increase VRUs safety, enhance traffic flow and comfort of VRUs, as well as reduction of emissions rates as a result of decreased car usage.
- The service provider offers a priority crossing for VRUs at intersections. **The provider equips VRUs with a code** to activate the app, which runs in the background and **interacts with traffic lights** at intersections.

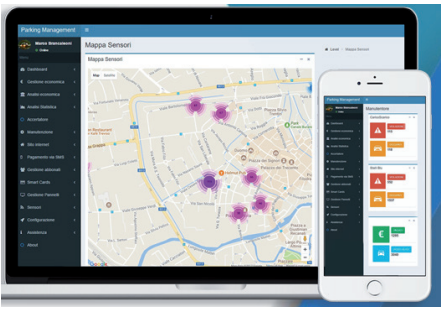
E) NEW SYSTEMS AND APPLICATIONS FOR PARKING MANAGEMENT

1. Parking sensor [11]



- The **sensor**, once positioned and calibrated, **allows to detect the presence of vehicles parked in the parking space**.
- The technology **tracks the changes** in the earth's magnetic field generated by the presence of a calibrated iron mass of an object such as vehicle.
- The free/busy status is then transmitted by radio, by a communication network, to the central server.
- From the central server (i.e. POLIS management software) will process by combining data with any payment transaction and make them available to all stakeholders.

2. Management software [12]



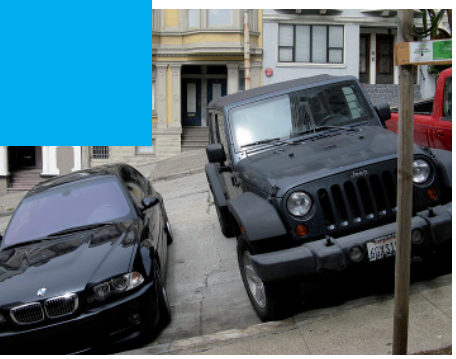
- The software is one of the main parts of Smart Parking Systems because it can analyze and manage all input data entering in the system in real time.
- Information are available on any type of terminal (PC, notebook, smartphone, tablet) and they can be distributed and customized for every specific stakeholder.
- All information is saved, about car lots and about the activities of the system's stakeholders, like parking controllers.

3. The parking meter [13]

Thanks to the technology of the system **the parking meter** allows a **payment for consumption** → users won't never support a payment higher than the actual period of parking.

It is easy to use by everyone:

- Enter the car lot number.
- The tariff in displayed on the monitor.
- It is possible to pay with coins, credit cards and debit cards (ATM).
- It is possible to use cards given by the Parking Management Company or Local Administration that allow holders (specific categories such as subscribers, residents, businessmen, moms with children, disabled people, etc.) to avail of their dedicated services.



4. Demand-responsive pricing (policy) [14]

Reducing traffic by **helping drivers find parking** benefits everyone → **More parking availability** makes streets less congested and safer.

- Works by using smart pricing so that drivers can quickly find open spaces.
- **Demand-responsive pricing** encourages drivers to park in **underused areas and garages**, reducing demand in overused areas. Through this system, demand-responsive pricing works to readjust parking patterns in the city so that **parking is easier to find**.

EXERCISE B

Analyzing weaknesses of the urban transport system and proposing transport technologies to counter them

Description of material

One table with 2 columns. The first column refers to the weaknesses that each mode of transport faces, as seen by the users. The second column refers to the transport technologies that can contribute to the mitigation of the identified weaknesses.

Please fill in the following matrix with the weaknesses face in your city and the transport technologies that can tackle those weaknesses.

TEAM NAME

WEAKNESSES	TRANSPORT TECHNOLOGY

Further Reading

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3 Value for S-M cities
(Challenges, Benefits and Beneficiaries)

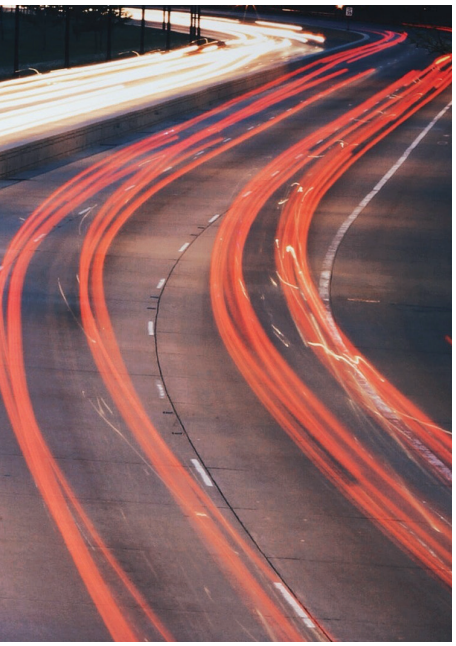
This chapter presents:

- Some of the **benefits** ETT bring to the city, how these benefits are linked with strategic city goals and how they could be identified in a systematic way with **Social Impact Assessment tool**.
- The wider **added value** of ETT in a city taking also into account their relevance to local, national and EU strategies.
- The main **beneficiaries and stakeholders** of the ETT and how LAs could convince them to support technologies implementation.

Benefits of ETT

DIRECT POSITIVE EFFECTS [1], [2], [3]

- Reduced costs due to the reduced fuel consumption, reduced travel time, less vehicles damage (for all users - public transport) → Reduction of CO2 emissions.
- Less congestion due to more efficient management of traffic conditions especially through cooperative systems or parking management.
- Reduced noise (with eco friendly vehicles) and better management of public space.
- Increase traffic safety especially for VRUs.
- Increases users satisfaction.



THESE BENEFITS CAN BE ALL TRANSLATED INTO ECONOMIC GROWTH SINCE: [1], [2], [3]

- Compliance with European legislation (by avoiding environmental fee, eligible for EU funding).
- Less external transport costs (i.e. less insurance costs from accidents and pollution) etc.
- "Smart" city concept may attract private investment, tourists etc.

Global approach is required in order to achieve aforementioned benefits.

→ Benefits ETT

Following table shows EET contribution to deal with different environmental, social and other city challenges [1], [2], [3], [4]

CHALLENGES / TECHNOLOGIES	HEALTH CHALLENGE	CONGESTION CHALLENGE	SAFETY & SECURITY CHALLENGE	PARTICIPA-TION CHALLENGE	STRATEGIC PLANNING CHALLENGE	GLOBAL CLIMATE CHANGE CHALLENGE
CLEAN FUEL AND E-VEHICLES						
TRAFFIC LIGHTS OPTIMIZATION						
TRAFFIC INFORMATION SYSTEMS						
PEDESTRIAN ASSISTANCE SYSTEMS						
NEW SYSTEMS AND APPLICATIONS FOR PARKING MANAGEMENT						

Very strong Correlation | Strong Correlation | Low Correlation | Very low Correlation

Social Impact Assessment

Transport Technologies impact all aspects of societies and human lives and more specifically dense urban centres.

↓

Transport needs to be inclusive, accessible and make a positive contribution to quality of life.

↓

Towards sustainable development, impacts assessment methods are needed regarding short and long-term social, health and wellbeing factors.

''Social Impact Assessment is the process of analysing, monitoring and managing the social consequences of development." (Vanclay, 2003).

Issues: Factors, Samples, Social Groups, Data Collection Bias, etc.

Impact Assessment Dimensions

- **Environmental impact** is defined as "any changes to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects".
- **Economic impacts** are defined in terms of the "effects on the level of economic activity in a given area" (Weisbrod & Weisbrod, 1997).
- **Social impacts** have been defined as the effects which characterize and influence the community's social and economic wellbeing (Canter et al.1985).

Additionally in methodologies such as **WebTAG a 4th dimension** is integrated separately and includes Health Impacts.

WebTAG is an online tool of the UK Department for Transport's web-based multimodal guidance on appraising transport projects and proposals.

IMPACTS		SUMMARY OF KEY IMPACTS	ASSESSMENT			
			QUANTITATIVE	QUALITATIVE	MONETARY £ NPV	DISTRIBUTIONAL 7 PT SCALE/ VULNERABLE GRP
Social	Commuting and other users		Value of journey time changes (£) Net journey time changes (£) 0 to 2 min | 2 to 5 min | > 5 min			
	Reliability impact on Commuting and Other users					
	Physical activity					
	Journey quality					
	Accidents					
	Security					
	Access to services					
	Affordability					
	Severance					
	Option and no-use values					

Overview of factors to be considered by type, source and level of human needs based on SUITS WP7 [5]

SOURCE	THEME	SUB THEME	IMPACT
PROVIDER BASED	Presence of infrastructure	Structurally	Visual quality
			Historical /cultural resources
			Severance/social cohesion
		Temporarily (during construction)	Noise nuisance
			Barriers and diversions
			Uncertainty of construction
			Forced relocation
	Presence of parked cars		Visual quality
			Use of space
	Presence of transport facilities, services and activities (accessibility) (inc. cost and temporal dimension)	Transport facilities	Availability and physical access
			Level of service provided
			Transportation choice /option values
			Cultural diversity
		Land use/delivery/opportunity	Access to spatially distributed services and activities
USER BASED	Traffic (movement of vehicles)	Safety	Accidents
			Averting behavior
			Safety perceptions
		Environment	Public safety (dangerous cargo)
			Noise levels, nuisance
			Soil, air and water quality
	Travel (movement of people)		Intrinsic value, journey quality
			Physical fitness (active travel)
			Security

Added value: (a) compliance with strategies/regulations (EU, national, local)

Value is added by the fact that ETT are relevant to local, national and EU strategies.

- In a **local** level, ETT could contribute to strategies for the **economic growth of commercial city centres**, the air pollution strategies and the local tourism (visual quality, public safety, low noise levels, air quality protect monuments and attract tourism).
- In **national and EU leve**l, these measures contribute to meet its environmental, health and climate policy goals (e.g. Green Paper [6], swd (2016) 244 European Strategy on Low-Emission mobility [4], Strategic plan 2016-2020 Move March 2016 [7] etc.) and avoid penalties.
- **The alignment of ETT to these policies as part of SUMP could make S-M cities eligible to receive financial support from EU funds.** [8]
- Further support about alignment of this kind of measures with EU policies is provided by EPPOM “Managing mobility for a better future” tools and CIVITAS cities network. [9]

List of EU Policies/Strategies/ Regulations relevant to SS measures

CORRESPONDING DOCUMENT	TOPIC	TYPE OF CONTENT	RELEVANCE TO SUITS (1-5)	RATING EXPLANATION
1. Inventory, modelling and assessment of Emerging Technologies and Trends (ETT) in the transport sector [10]	• Reporting on future and emerging technologies in the transport sector • Monitoring the status of transport research across Europe	European Commission's Transport Research and Innovation Monitoring and Information System (TRIMIS)	4	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
2. COM 2017 283 An agenda for a socially fair transition towards clean, competitive and connected mobility for all [11]	• Urban freight transport • Safety and security • Mobility management • Car independent lifestyles • Data management (evidence & argument) • New and emerging technologies	Commu-nication from the Commission	3	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
3. DIRECTIVE 200850EC on ambient air quality and cleaner air for Europe [12]	• Urban freight transport • Mobility management • Car independent lifestyles • Emerging tranport technologies	Directive	3	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
4. DIRECTIVE 200933EC on the promotion of clean and energy-efficient road transport vehicles [13]	• Urban freight transport • Mobility management • Emerging transport technologies	Directive	3	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
5. DIRECTIVE 201040EU framework for the deployment of Intelligent Transport Systems [14]	• Urban freight transport • Mobility management • Data management (evidence & argument) • Emerging transport technologies	Directive	3	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
6. Strategic plan 2016-2020 Move March 2016 [7]	• Safety and security • New and emerging transport schemes • Mobility management • Car independent lifestyles • Emerging transport technologies	Strategic Plan	3	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size
7. FANTASIE "Forecasting and Assessment of New Technologies and Transport Systems and their Impacts on the Environment" [15]	• New technologies impact on safety, speed, environment • Development and validation of methods assessment	Project by the European Commission-Transport RTD Programme	2	The content is not relevant exclusively for small and medium sized cities but can by adopted by any city regardless of size. Describes the impacts of some of the NETT

Added value: (b) the collaboration of all actors/ stakeholders

Communication, collaboration and coordination between many different stakeholders/actors is needed in many aspects of ETT development and implementation process.

These procedures are essential to arrive to an agreement and wide support but **they also give LA the opportunity to**:

- **create a deeper interaction** with them and **facilitate the development of future projects** action plan,
- **make new synergies** and develop **new ideas** and **projects**,
- ensure constant **collaboration in future projects**.

Maximising synergies should be one of the priorities for S-M cities due to the limited available resources (scarcity of technical staff working with LA, limited financial resources etc.)

How to build collaboration/ identify the stakeholders and actors needs

- Targeted interviews to representatives of stakeholders groups in order to inform them about:
  - municipality plans and objectives,
  - the potential benefit for them if supporting the project implementation,
  - the value of their contribution to the project.
- Running survey with questionnaires to stakeholders groups, asking for their perception of problems and solutions, for expressing their needs and restrictions that may hinder their contribution.
- Public consultation and open meetings to be invited all stakeholders in every implementation stage.

- Frequent inspections in the most busy spots of the road network where issues may be arise.
- Tailored approaches to different stakeholders/actors (i.e. Citizens through questionnaire and public transport operators through short interviews).

Identification of Actors and Stakeholders

- The first step towards the formulation of a framework that ensures integration of all actors and stakeholders of a city in urban mobility decision making is to **identify them and produce an extensive list of them focused on ETT**. This contributes in demonstrating that urban transport can be improved by involving a wide range of stakeholders. Additionally this results in the identification of factors that influence both local authorities and mobility planners-related stakeholders, factors which currently require further investigation.
- Usual **actors** and **stakeholders** for ETT implementation: **Citizens & Visitors, Public transport operators, Vehicle manufacturers, Local Authorities, Central Government, Local business owners, Traffic engineers, IT companies, Research institutes, Freight transport companies**, etc.

Identification of Actors and Stakeholders for ETT based on administrative level

ACTORS AND STAKEHOLDERS	ADMINISTRATIVE LEVEL			
	INTERNATIONAL	NATIONAL	REGIONAL	LOCAL
Citizens & Visitors				X
Public transport operators		X	X	X
Vehicle manufacturers	X			
Local Authorities			X	X
Central Government		X	X	
Local business owners			X	X
Traffic engineers		X	X	X
IT companies				X
Research institutes	X	X		
Freight transport companies			X	X

Clean fuel and e-vehicles [3], [10]
(Examples of challenges and benefits e-vehicles specific)

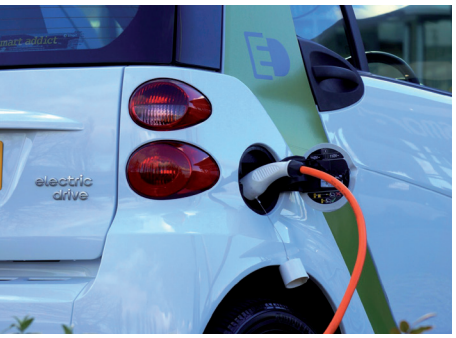
Challenges:

- Stakeholders and the citizens may find it hard to **shift from vehicles** with internal combustion engines to battery electric **vehicles**.
- In many cases, the arguments arise (a) **higher cost** and the relatively **limited financial advantages** for the acquisition of this kind of vehicles, (b) **the time required for the vehicle to charge**, (c) **the access to charging stations**, (d) **the vehicle range** (because of the limited number at this time in most of EU countries).

Responses:

- In the next few years the barriers concerning infrastructure for charging is going to be **eliminated** due to the mandatory character of the measure.
- Clean fuel and e-vehicles offer **lower lifetime cost for their operation** → which often outweighs higher upfront cost.
- Electric or fuel cell powered vehicles **do not emit air pollutants** such as particulate matter or nitrogen oxides. They are also significantly quieter than vehicles with a conventional combustion engine → **Electric power need to be generated by "green" energy**.

Clean fuel and e-vehicles



Groups to be benefited:

- citizens & visitors,
- public transport operators,
- vehicle manufacturers,
- local business owners,
- IT companies.

Cooperative systems [3], [10]
(Examples of challenges and benefits cooperative systems specific)

Challenges:

- The strong car lobby could be against this kind of measures because they increase the direct cost of car use.
- There is a strong dependence of the traffic lights on the internet → risk of breakdowns or hacking.
- The state-of-the-art differs greatly across Europe and different technological standards exist within cities and countries.

Responses:

- The technologies that are going to be used are derived from the already existing equipment inside private cars.
- Can contribute to a general reduction of fuel consumption, time savings and improved air quality.
- This kind of technology is accompanied by a high level of security.

Cooperative systems

Groups to be benefited:

- citizens & visitors,
- public transport operators,
- vehicle manufacturers,
- IT companies,
- research institutes.

Traffic information systems [3], [4], [10]

(Examples of challenges and benefits traffic information systems specific)

Challenges:

- Depending on the data collection method to feed the system with information reactions may arise because of data protection regulation of the country.

Responses:

- There are methods and tools that support anonymised data collection and they can be used. Procurement procedure could set up this framework.
- The importance of the potential benefits may convince people to agree with specific features.

Benefits: The provision of traffic jam warnings, warnings for **road closures or temporary disruptions**, identification of alternative routes for car users, **decrease of waiting time** in bus stops etc.

Traffic information systems

Groups to be benefited:

- citizens & visitors,
- public transport operators,
- vehicle manufacturers,
- IT companies,
- research institutes.

Pedestrian assistance systems [3], [10]

(Examples of challenges and benefits pedestrian assistance system specific)

Challenges:

- Negative reactions may be arisen by users not familiarise with smart phones or other technological devices (elderly, small children etc.).

Responses:

- This kind of measures are complementary with other systems which are dedicated to assist all users and they are not only based on smart phones etc. (LED **warning lights on the crossing**).

Pedestrian assistance systems [10]

Groups to be benefited:

- citizens & visitors,
- public transport operators,
- vehicle manufacturers,
- IT companies,
- research institutes.

Parking management systems and app [3], [10]

(Examples of challenges and benefits Parking management systems specific)

Challenges:

- People not familiar to smartphone applications might not be able to use the system and therefore not to have access to the bays.

- It is sometimes **difficult to involve all relevant private parking garage owners**, but given the number of parking guidance systems in Europe, this is not a big problem.

Responses:

- Complementary panels with variable messages in strategic points in the city could support all drivers and especially those without access to any internet connected device. This is crucial aspect of implementation.
- According to stationary systems **the use of appropriate apps** is now common practice.
- Holistic approach taking into consideration all parking options of the area and developing an integrated plan of parking management.
- The importance of the potential benefits may convince people to adjust.

Parking space management **aims to control both supply and demand** for parking space in an efficient, economical, climate-friendly, environmentally friendly and socially responsible manner.

Parking management systems and app

Groups to be benefited:

- local business owners,
- citizens & visitors,
- public transport operators.

EXERCISE C

Identification of key features for transport technologies

Description of exercise

1. Use sticky notes to fill in the two open Boxes. The first field refers to the benefits of a selected transport technology. The second field refers to the actors/stakeholders/social groups that will be affected (positively or negatively) by the technology.
2. On the left column of T-Chart transfer the actors/stakeholders which would present the most negative reactions to the proposed technology. On the right column, transfer the sticky notes so they can be used as convincing arguments to the stakeholders written on the left corner.

(To perform the exercise focusing on specific city, a city map, mobility data and relevant information are distributed to support brainstorming).

Please fill in the following box with the benefits that you believe the Emerging Transport Technology that you selected can bring to your city.

TEAM NAME

TECHNOLOGY TITLE

BENEFITS FOR YOUR CITY:

Please fill in the following box with the actors/stakeholders/social groups that you believe will be negatively or positively affected by the Emerging Transport Technology that you selected.

STAKEHOLDERS:

Please fill in the T-chart below, according to the arguments that may be expressed by actors in favour/against the implementation of the Emerging Transport Technologies provided to your group.

ACTORS	ARGUMENT

Further Reading

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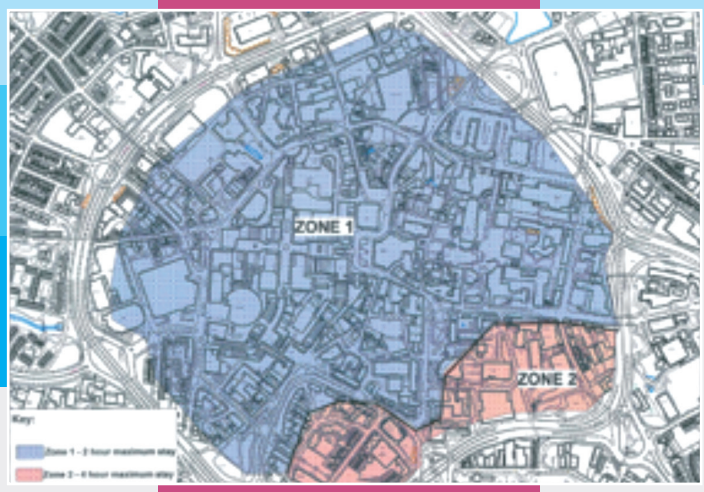
4 Successful Case Studies of SUITS cities and other European cities

This chapter demonstrates:

- **Three case studies - as best practices** - accompanied with the Emerging Transport Technologies used.
- An extensive analysis about **the barriers and the drivers** that every city had to deal with (from the LA's perspective).

Case Study 1	Coventry's traffic and parking management regulations (case study from city participating in SUITS project).
Case Study 2	Ljubljana's cleaner fuel vehicles - CNG busses.
Case Study 3	Rotterdam's electric mobility, electric vehicles and charging Stations.



Emerging Transport Technologies

Traffic and parking management regulations (Coventry)

LOCATION

Coventry, United Kingdom

WHY THIS IS A BEST PRACTICE IN THIS FIELD?

Identifying poorly used bays presents several opportunities for improving the value of the council's on-street assets or increasing overall occupancy levels. Using AppyParking's free award-winning app, drivers can be guided directly to available spaces. Where consistently underused bays are identified; improved signage, in-app notifications, or reduced prices can be used to drive higher usage and higher overall revenues.

The potential for this type of RTA system to be deployed and the benefits for local authorities is being demonstrated through the continued success of AppyParking securing further financial support.

INITIAL PROBLEM AND TARGET GOAL

Target goal: To address the complete end-to-end mobility process by enabling easy parking in Coventry through the use of sensors; integrate finding and parking in a free space with payments; provide management information on how parking spaces are used.

MEASURE DESCRIPTION

Full project name: Real-Time Bay Sensor System

The installation and operation of a real-time bay availability system across all of Coventry's 450 Pay and Display / Disabled bays and 18 Electric Vehicle (EV) charging bays. The system will bring benefits for Coventry's council, motorists and citizens through improved traffic flow, reduced congestion and air pollution. Such results will be achieved through the optimization of the effectiveness of parking enforcement and by increasing positive parking payments and encouraging the use of EVs.

For the City Council, the direct benefits were to include the provision of granular levels of data to enable informed decisions about traffic management, realise cost savings in traffic enforcement, and improve the efficient use of bays to drive increased positive parking revenues. Parking is the second highest revenue generator for city councils, but some councils are losing up to 40% of potential revenues through inefficiencies in their respective systems.

SCALABILITY/ REPLICABILITY

Similar projects were implemented previously on smaller scale real time parking bay availability systems. These trials successfully demonstrated the system's capability, however, due to the scale restriction the opportunity to gather data was limited. Therefore, such projects are scalable and replicable in other urban environments.

IMPLEMENTATION REQUIREMENTS

This initiative was funded through the Department for Transport (DfT) and Coventry's City Council with a total cost of £158,564.00. The cost breakdown is:

£60,000 Investigation, design and scoping

£60,000 Hardware installation

£38, 564 System configuration, testing and go-live

The project cost includes a 5 year data license and 5 year warranty on all equipment, giving guarantees over the projects lifetime costs.

1 Year needed for implementation (design, hardware installation, configuration and testing, integration with external systems).

INDICATORS TO MEASURE SUCCESS AND FINAL OUTCOME / IMPACT

- Drivers can be navigated to the nearest or cheapest available space, dramatically reducing parking times from 20 minutes to 30 seconds.
- Increasing positive parking payments through e.g. smartphones
- Increasing projected P&D revenues
- Optimisation of enforcement by mapping out historical trends, overstay patterns and real-time alerts of vehicles parked in contravention of the maximum stay limit.

- Future connected vehicles integration
- Improving operational efficiencies
- Net return from project investment - £199, 775

SOCIAL GROUPS AFFECTED

The most benefited social groups are the owners and users of electric vehicle by improving their journey experience and encouraging broader adoption of such vehicles. Therefore, the reduction of emissions leads to several benefits for all citizens and the city's air quality. Moreover, disabled groups will be assisted through the provision of real time availability of specific bays.

DATA TO INDICATE FINAL OUTCOME:

As a baseline position in September 2016 when the application for the current round of funding was made, data utilising Coventry as a case study indicated that out of the 36 normal bays and 32 disabled bays:

The monitored bays were used 19,331 times during paid hours (8am – 6pm Mon - Sat) in September 2016.

This was split; 10,727 visits to pay and display bays and 8,604 visits to disabled bays.

Paid bays were vacant 66% of the time from 8am to 6pm. Opportunity revenue from under-utilised paid bays: £850k annually.

There were 896 incidents of vehicles in contravention of max stay times but at present the council were only issuing Penalty Charge Notice's (PCN) in 18% of the cases.

Opportunity revenue for lost parking fees: £67,000.

Opportunity revenue for unissued PCNs: £2 million.

Disabled bays were unoccupied 77% of the time (24/7) and this was 62% during paid hours.

BARRIERS AND DRIVERS

COOPERATION/ COORDINATION ISSUES

Barriers: Often encountering low levels of enthusiasm from internal stakeholders at the local authority level.

Drivers: Regular meetings between AppyParking and Coventry City Council to kick off and sign off project phases. Input from relevant departments and Transport for West Midlands, Jaguar Land Rover when required.

FINANCIAL RECOURSES ISSUES

Barriers: Concerns of issues on breaching of data protection, commercial sensitivities and conflicts of interest with their own developments.

Drivers: Easy to understand finance guidelines, smaller budget, easy to manage and allocate funds appropriately in a timely manner.

PROCESS

Barriers: Installation completed overnight instead of during the day to ensure bay availability to the public and not disrupting scales of economy.

Drivers: Successful installation of sensors and occurred ahead of schedule.

TECHNICAL/DATA RESOURCES

Barriers: Concerns regarding identification of defective sensors, the sensor removal and their impacts on analytics and data.

Drivers: Exploring the options for a backup base station tower and integration with other systems.

STAFF

Barriers: Sometimes difficult to engage key stakeholders that were required at various stages to take ownership of certain actions or address issues when they arose.

Drivers: Clear project plan.

POLITICAL

Barriers: The concepts and technology are difficult to adopt as the knowledge is based on understanding and there is a lack of technology implementation.

Drivers: TfWM and the West Midlands Combined Authority have detailed the project as part of their bid for the CAV Testbed project.

LEGAL

Barriers: Procurement delay due to concerns internally of the council, exemption requests for a sole provider most often come under intense scrutiny and a rigorous appraisal before confirmation of purchase.

Drivers: Processes for all procurement scenarios in place to enable and follow the correct process. Alignment with current road works and legal traffic suspensions and legislations.

SOCIETAL

Barriers: Conflict of interest with wider policy of encouraging greener modes of transport such as walking and cycling.

Drivers: Benefits for Electric Vehicles and vulnerable road users along with reduction of congestion and thus pollutant emissions.

FURTHER INFORMATION

http://www.appyparking.com/index.html

https://www.gov.uk/government/publications/co-operative-intelligent-transport-systems-funding-competition

Emerging Transport Technologies

Cleaner Fuel Vehicles - CNG Busses (Ljubljana)

LOCATION

Ljubljana, Slovenia

WHY THIS IS A BEST PRACTICE IN THIS FIELD?

Ljubljana started using one of the latest and cleanest technologies available for buses on the market and became the first Slovene city that offers CNG buses in public transport.

The new buses feature state-of-the-art technology and significantly improve the quality of urban life in the City of Ljubljana, they will contribute to an improved and healthier environment. Besides upgrading their environmental record, the buses will also offer more comfort and safety for the passengers.

INITIAL PROBLEM AND TARGET GOAL

The quality of life in the city centre was deteriorating because of the poor state of the public transport system and increasing volumes of private cars. In order to put an end to this negative trend, Ljubljana has set an ambitious goal that walking and cycling, public transport and cars should account for one third of all travels each.

The main objectives of the measures were to:

- Promote clean and energy efficient technology;
- Demonstrate energy and emission-saving potential of hybrid and CNG busses;
- Cut fuel costs decreases by 20%.
- Promote the PT operator's environmental friendly image;
- Test 5 hybrid buses and 20 CNG buses and compare results with classic diesel buses;
- Purchase 5 hybrid and 20 CNG buses and put them into service.

MEASURE DESCRIPTION

The city has been striving for environmental sustainability

Due to its central location in the heart of Slovenia, mobility brings great economic opportunities, but at the same time poses challenges to the city's environment.

Ljubljana is constantly modernising its public transport and therefore replacing old and most polluting buses of Ljubljana's public transport operator LPP with the new ones that are environment and user friendly. In this regard, the company purchased 20 new methane buses and 5 hybrid midi-buses, after it has tested several different types of vehicles.

In particular following actions have been taken,

- 20 CNG buses were purchased and tested replacing older EURO 0 vehicles;
- 78 drivers were trained to operate the CNG buses; 26 of those drivers were trained for instructors;
- 20 mechanics were trained for maintenance of the new buses

The present bus fleet of the PT operator LPP comprises 217 urban buses.

SCALABILITY/ REPLICABILITY

Similar projects are replicable as the transfer of experiences and results from this to similar projects is considered possible. Based on the success in Ljubljana, several surrounding towns have expressed their interest to follow a similar model.

IMPLEMENTATION REQUIREMENTS

Regarding the financial cost, the price of each bus is 267,600 EUR, VAT excluded.

Conclusively, the total value of buses is 4,549,200 EUR, VAT excluded, and the city has received a grant amount of 3,400,000 EUR.

The delivery period for the buses from the time the order is placed, is 9 months.

Moreover the overall cost for implementation can be broken down into:

- Purchase of 20 buses = 4,400.000 EUR;
- Charging station including necessary documents = 1,250.000 EUR;
- Upgrade of the service centre = 100,000 EUR;
- Feasibility Study = 25,000 EUR.

INDICATORS TO MEASURE SUCCESS AND FINAL OUTCOME / IMPACT

The majority of the fleet is now modernised 109 buses also having on-board security cameras for safer and more pleasant ride as well as vocal information.

The social groups benefited from such actions are all citizens, tourists and public transport users.

INDICATORS TO MEASURE SUCCESS/IMPLEMENTATION:

The new CNG buses are at least 20% less fuel cost demanding than previous models. Moreover, the new CNG buses fulfil the most demanding exhaust criteria of the EEV standard (Enhanced Environmentally Friendly Vehicle), leading to 80% less air pollution. All in all, the aforementioned measures result to overal improvement of the bus as a transport mode.

BARRIERS AND DRIVERS

COOPERATION/ COORDINATION

Barriers: Due to the need for coordination among all stakeholders, their proper cooperation is considered critical for the successful implementation of the measure.

Drivers: The decision process involved individual departments such as the Municipality of Ljubljana, the Federal Ministry of the Environment and Spatial Planning and two private companies.

FINANCIAL RECOURSES

Barriers: The state financed the purchase of 20 Iveco 12m CNG low-floor buses, which requires local funding.

Drivers: The introduction of a smart electronic city card created the conditions for an integrated payment system for local and regional public transport, which can create additional revenues.

PROCESS

Barriers: Difficulties in obtaining the various required consents and permissions to allow the initiative to proceed.

Drivers: By setting a CG filling station, the city also obtained ideal conditions for the CNG bus fleet.

TECHNICAL/DATA RESOURCES

Barriers: Technical difficulties while building the charging station and more specifically delays in delivery of certain elements.

Drivers: Real-time information on bus arrivals is provided in bus stops locations.

STAFF

Barriers: Training sessions were held to educate drivers and maintenance personnel for the new technologies on CNG buses. Such workshop requires funds and person months to be devoted.

Drivers: Through the training workshops, the operators are able to be prepared in order to prevent accidents and through such processes, new job opportunities arise.

POLITICAL

Drivers: The acquisition of CNG buses falls within the scope of smart solutions aimed at further improving the quality of life of our citizens and increasing politicians' public acceptance.

LEGAL

Barriers: Any barriers that might arise on a legal basis will need to be addressed at a national level and not on a city level.

SOCIETAL

Drivers: By choosing environmentally friendly buses, the city of Ljubljana is following the principles of sustainable mobility and development.

FURTHER INFORMATION

https://civitas.eu/measure/hybrid-and-cng-buses

https://www.ljubljana.si/en/news/first-hybrid-buses-driving-in-ljubljana-next-year/

http://www.eltis.org/discover/case-studies/introduction-gas-powered-buses-ljubljana-slovenia

CIVITAS, ELAN Deliverable no. 1.11-D1, 2012, Implementation status report on CNG buses

Emerging Transport Technologies

Electric Mobility, Electric Vehicles and Charging Stations (Rotterdam)

LOCATION

Rotterdam, The Netherlands

WHY THIS IS A BEST PRACTICE IN THIS FIELD?

Electric vehicles are clean, quiet, and economical. Promoting electric transport improves the air quality in and around the city of Rotterdam, reduces CO2 emissions and noise pollution, and maintains the city's accessibility to eventually enhance the citizens' quality of life.

INITIAL PROBLEM AND TARGET GOAL

Traffic and transport in general, is a major sourse of air-quality and noise pollution in Rotterdam. With its Rotterdam Electric programme, the City of Rotterdam is creating the right conditions to provide the best possible support for the market and to accelerate its development.

MEASURE DESCRIPTION

In 2012 Rotterdam initiated a 12-month project to test the overall feasibility of electric vehicles, during which it monitored 75 electric vehicles and 129 charging points and assessed the performance of fully electric and plug-in hybrid vehicles. Results showed reductions of CO2 emissions by 67% and particulate emissions by up to 20%.

In 2016, the Municipality of Rotterdam put together a comprehensive tender for extending their existing charging station network. An extension of approximately 1.800 charging points in Rotterdam's area was planned and the contract for the deployment, management and operation of the stations was awarded to ENGIE. Focusing on improving the air quality in its metropolitan areas, Rotterdam undergoes a series of initiatives to become a role model region of sustainable urban mobility.

Additionally, Rotterdam has continuously addressed the city's needs for fleet transformation towards clean vehicles including electric garbage trucks, buses, delivery vans, etc. To complement such measures the provision of sufficient charging stations and the financial incentives provided in the national context are critical for the successful and fast adoption of electric vehicles.

SCALABILITY/ REPLICABILITY

The city's actions have great potential for scaling up and currently many city authorities are considering how to accelerate the take up of electric vehicles.

IMPLEMENTATION REQUIREMENTS

The Rotterdam Electric Mobility Programme is being financed as part of the Rotterdam Sustainability Programme in combination with European Research fundings.

Financial incentives at a national level include a €3,000 reduction from the list price and alogn with other municipal subsidied can further decrease the price of the vehicle up to €7,000. Moreover, organisations or people who place a charging station on their own propery can receive a subsidy up to € 1.000 for the station and installation costs and €450 if they use green energy sources.

INDICATORS TO MEASURE SUCCESS AND FINAL OUTCOME / IMPACT

The on-going process of electric vehicle adoption throughout the city has brought major environmental and financial benefits.

INDICATORS TO MEASURE SUCCESS/IMPLEMENTATION:

In the past five years, approximately 1,950 public charging points have been installed. This generated a whopping amount of 13.332.447 kWh charged in the first half of 2016, equals to approximately 7 million driven kilometres.

Due to the increase of electric driving in the Rotterdam area, the emissions of fine dust (PM), NOx, and CO2 have been significantly reduced.

It is calculated that the sum of the emissions of fine dust avoided, or saved, was 5.3 kg in 2013 and this increased to 17.7 kg in 2014. For NOx the total emissions saved in 2013 were 538 kg, and these saved emissions increased to almost 1,100 kg in 2014. For CO2 the saved emissions

increased by a factor of more than 3, from 311 tons in 2013 to 1,130 tons in 2014.

BARRIERS AND DRIVERS

COOPERATION/ COORDINATION ISSUES

Barriers: A co-ordinating mechanism is needed to ensure the seamless operation of electric charging.

Drivers: Through co-operations, the city allows innovations to thrive along with financial blooming.

FINANCIAL RECOURSES ISSUES

Barriers: Through funding, incentives need to be provided to citizens in order to adopt electric vehicles.

Drivers: The development of sustainable financial models and the involvement of local and national stakeholders ensure the program's sustainability.

PROCESS

Barriers: Barriers might arise at the point where there is no supply to cover future demand.

TECHNICAL/DATA RESOURCES

Barriers: Initial barriers that are being currently improved are after sales, break-downs, high costs, reliability and performance.

Drivers: As a result of rigorous and integrated planning and testing, Rotterdam has successfully created one of the largest electric vehicle charging networks.

STAFF

Barriers: Barriers: Expertise and technical staff with appropriate experience is needed.

Drivers: New job opportunities arise with the development of electric charging networks and the provision of electric vehicles.

POLITICAL

Barriers: Politicians need to convince citizens that funding should be allocated as incentives for the adoption of EVs.

Drivers: Supporting eMobility fits with the City of Rotterdam's strategy to increase sustainable transport.

LEGAL

Barriers: The legal framework needs to remain flexible and acknowledge future uncertainties.

SOCIETAL

Barriers: Low income social groups can potentially stay behind in the EV adoption process and social inequalities issues may arise.

Drivers: Inhabitants will be beneficiaries of significant environmental, health and economic benefits.

FURTHER INFORMATION

https://evbox.com/success-stories/rotterdam-city

http://www.eltis.org/discover/case-studies/rotterdam-takes-lead-electrifying-transport-netherlands

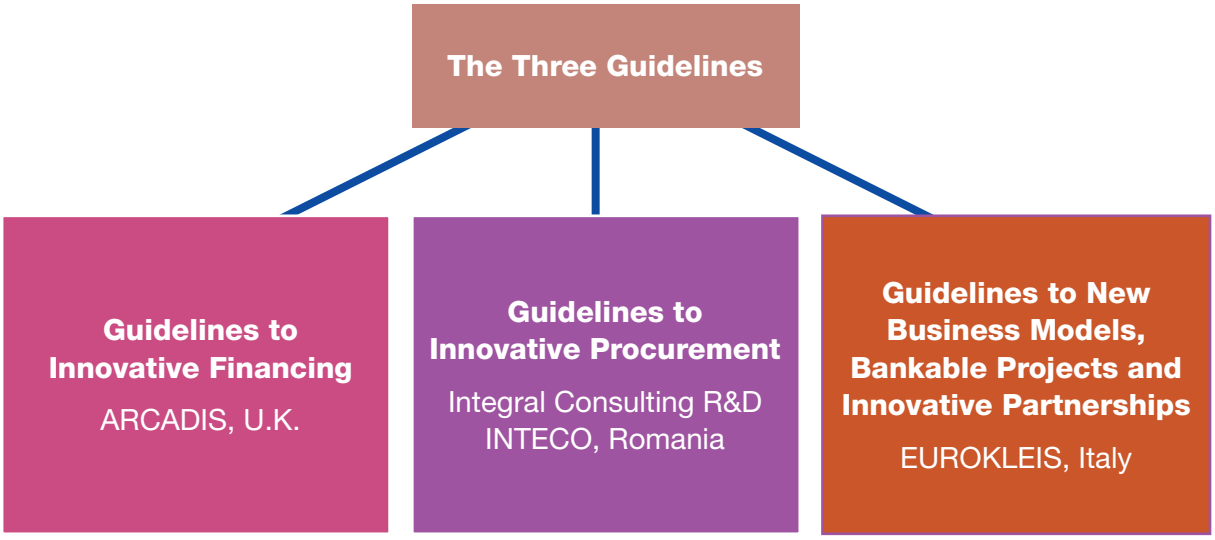
http://www.ppmc-transport.org/rotterdams-commitment-to-electric-mobility/

5 Innovative financing, procurement, partnership

This chapter provides some key points about:

- The available **innovative financing mechanisms** which could be used for ETT implementation. A selection of the most relative to ETT is made.
- The recommended steps for **innovative procurement procedures** which respond to the current needs for implementing mobility measures in general and could be applied to ETT as well.
- The probable **partnerships** that might facilitate the implementation.
- The available **tools** developed within SUITS project in order to support LAs of S-M cities to deal with these issues.

SUITS TOOLS supportive to LAs for Innovative financing, procurement and partnerships: Three Guidelines



Objective of the three Guidelines

Objective: Enhancing the capacities of local authorities and stakeholders through innovative procurement procedures, innovative financing methods, and new business models and partnerships, in support of sustainable mobility development.

What can you expect to find in the Guidelines?

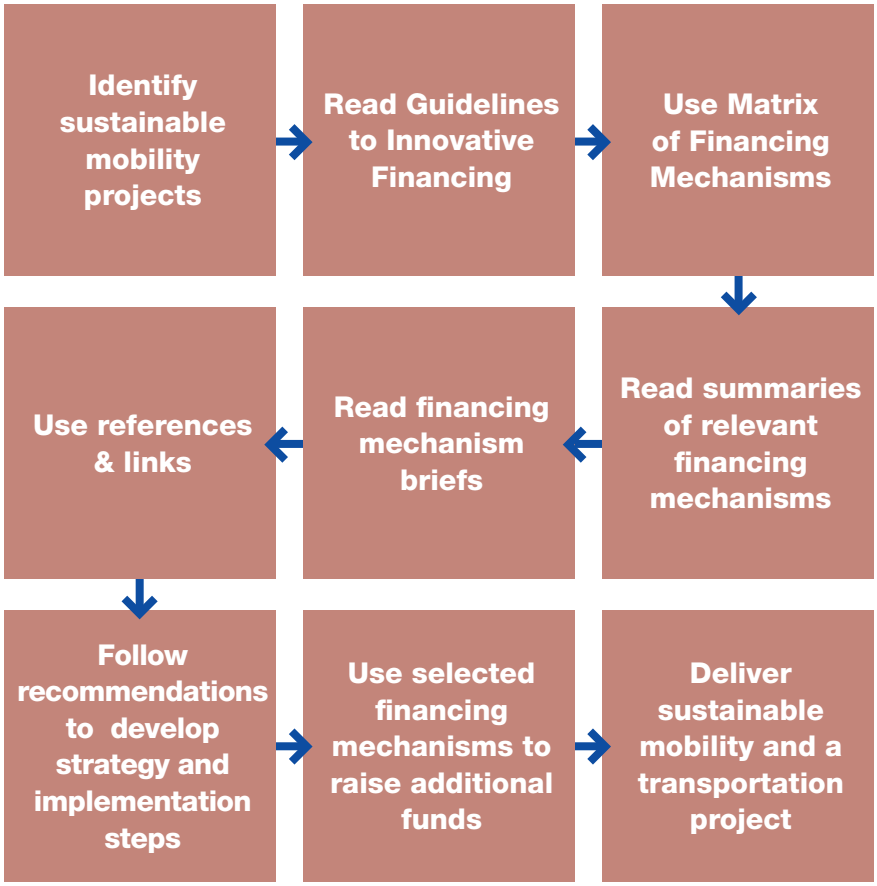
- Presentation of how different transport measures are currently procured and financed, as well as the business models and partnerships used.
- Overview of existing gaps in current knowledge and organisational capacity to implement sustainable transport measures.
- Presentation of new, innovative financing methods, procurement procedures, business models and partnerships which could be used to enhance the capacity of Local Authorities and stakeholders to implement sustainable transport measures.
- Case studies and examples of where and how these methods and procedures have been successfully applied.
- Steps to use these methods and procedures.

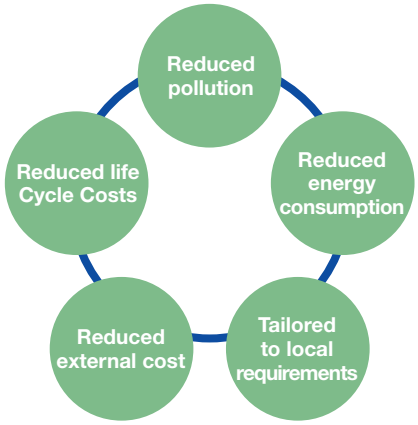
How to make the best use of the Guidelines

Tips for Implementation:

- The 3 Guidelines are complementary to one another and should be used together.
- Local Authorities should set up a team to take control of the implementation of the Guidelines within their organisation. The purpose of this team would be to:
  1) Read the Guidelines.
  2) Decide on the types of sustainable mobility measures in which they want to implement within the local area.
  3) Identify the innovative procedures and methods which are most suitable to each sustainable mobility measure identified, as well as to the local economic, political and social situation.
  4) Use the selected procedures and measures.
  5) Evaluate the success of the use of the innovative procedures and measures.
- Communicate with the authors of the Guidelines. The authors will provide support to the Local Authorities/ other stakeholders to clarify the information in the Guidelines at their request.

Guidelines to Innovative Financing [1]





Guidelines to Innovative Procurement [2]

EU Public Procurement Reform

Underlying principle: "Public procurement must become levers through which the Contracting Authorites can obtain the biggest long-term advantages for the society, generating business opportunities, economic growth, jobs, enhanced sustainable mobility, higher life quality."

Contract Award Criteria

Guidelines to New Business Models, Bankable Projects and Innovative Partnerships

THE KEY OBJECTIVES:

- Provide the knowledge of innovative business models in urban mobility services including sharing mobility, integrated mobility and MaaS.
- Address the main partnership schemes in the field and introduce the new ones.
- Enhance the capacity of creating fundable projects providing the guidance for feasibility analysis.
- Identify: evolving commercially viable business strategies, new forms of partnership and important aspects to prepare bankable documents.
- Improve the administrative and organizational capacity of the urban mobility authorities of S-M cities.

RECOMMENDATIONS:

NEW FORMS OF PARTNERSHIP

- Creation of solid institutional mechanism addressing specific sector policies.
- Integrated approach of financial, technical and business planning.
- Development of efficient project management regarding the business idea and contractual forms.
- Successful implementation depends on recognition of partner's objectives.
- iPPPs require careful consideration of control and management systems through project agreements.

INNOVATIVE BUSINESS MODELS

- The business model innovation foresees the top-down approach. The top management should support and provide the resources for new business opportunity.
- Constant monitoring of market tendencies.
- Constant monitoring technological innovation.
- Consulting the business model analogies and learning from best practices.
- Searching for new investment opportunities for project development.

BANKABLE PROJECT

- Provide the research on different investment programs and financial opportunities.
- Allocate the human resources to develop the bankable documents.
- Ensure that all the necessary feasibility studies are included in the document.

Innovative financing mechanisms [1]

Following slides present innovative financing mechanisms as they have been identified in WP4 of SUITS project and they are most relevant to safety and security transport measures.

Highlighted mechanisms are further described and correlated with the safety and security transport measures presented in chapter 2.

Innovative financing mechanisms [1]

- **Congestion Charge**
- Municipal Green Bonds
- Crowdsourcing
- Stamp Duty Land Tax (SDLT)
- Lottery Funding
- Voluntary Capture
- HGV Charging Schemes
- Work Place Parking Levy (WPL)
- Community Infrastructure Levy (CIL)
- **Advertising, Sponsorship and Naming Rights**
- **Collaborating with other cities, research consortia and private companies**
- Citizen Cooperatives
- Emission Trading
- Planning Obligations / Developer Contributions
- Tax Increment Financing
- Sales Tax
- **Toll Roads**
- **Selling Expertise and Technical Know-how**

Several innovative financing mechanisms can be applied directly to emerging transport technologies with (check the ones in boxes above). All detailed description are available in the Guidelines.

Key points of financing mechanisms more relevant to ETT [1]

ADVERTISING, SPONSORSHIP AND NAMING RIGHTS	
DESCRIPTION	Local authorities can create additional revenues through receiving payments for advertising on public assets, sponsorships and selling or leasing naming rights from various businesses and organisations which must be in line with the guidelines for acceptable content and local policy and legislation
METHODS	Public Transport and part of Infrastructure are suitable for such advertisements
BENEFITS	Successful mechanism and while the revenues are small compared to the total budget costs of each projects, still remain significant
COMMENTS	The amounts received through such mechanisms are dependent on the local market and the total amount of exposure in terms of time

COLLABORATING WITH OTHER CITIES, RESEARCH CONSORTIA AND PRIVATE COMPANIES	
DESCRIPTION	This requires the formulation of a partnership between local authorities, universities, companies and NGO's which makes use of each partner's expertise
METHODS	Cities provide specific data while on the same time they offer demo and pilot sites while they also provide support to other partners
BENEFITS	These projects offer to cities benefits from investments into its infrastructure and capacity building programs along with the benefits derived from pilot projects while on the same time additional funding may be available
COMMENTS	Efforts require political will in order to eliminate constraints and willingness to participate and create a learning network which will eventually enhance innovation and applied research throughout the city

→ Key points of financing mechanisms more relevant to ETT [1]

SELLING EXPERTISE AND TECHNICAL KNOW-HOW	
DESCRIPTION	Cities, local authorities or public administrations, can exploit their ability to sell their expertise and technical know-how for profit
METHODS	Includes selling a form of collaborative knowledge and sharing it for economic profit
BENEFITS	ncrease attractiveness and name recognition or to disseminate good practices in areas of interest
COMMENTS	Can be applied across all sectors of interest

CONGESTION CHARGE	
DESCRIPTION	Applied in numerous larger metropolitan areas and megacities
METHODS	Works by charging people who travel with private vehicles entering or passing through predefined geographical areas that have been identified as congested locations usually during peak hours
BENEFITS	It aims at encouraging shift towards alternative transport modes, more sustainable than private vehicles, such as public transport, active travel, etc. and eventually through revenues derived from the congestion charging to finance new mobility projects while improving environmental conditions

TOLL ROADS	
DESCRIPTION	Is mechanism includes the payment of a fee in order to access or pass a specific area or part of a network. This measure aims to improve environmental conditions and promoting sustainability by lowering traffic volumes due to payment fees and by promoting the public shift towards public transport. Urban toll roads usually are a matter of conflict between the public and local political authorities and are require strong political support for its implementation
METHODS	Revenues generated through tolls are used for maintenance of existing or funding of new parts of the infrastructure, usually large and thus expensive projects.
BENEFITS	This measure aims to improve environmental conditions and promoting sustainability by lowering traffic volumes due to payment fees and by promoting the public shift towards public transport. Urban toll roads usually are a matter of conflict between the public and local political authorities and it requires strong political support for its implementation

Innovative procurement considerations

- European research projects completed after 2004, pointed out innovative aspects to public procurement as well as other criteria which fueled the need for reform in public procurement in sectors such as Transport, Mobility, Energy, Innovation which are all rapidly evolving and determine sustainable development.
- New Directives were produced along with the introduction of laws and regulation of all Member States, in compliance with the changes. The new legal framework contributes to enhancing the efficiency of the public procurement system and foresees more intelligent norms and a larger number of electronic procedures while making it easier for SMEs to participate.

Detailed description is available in the Guidelines [2]

- This can support decision makers at the level of municipalities to identify the range of possible actions and steps necessary to implement the most adequate mobility related measures.
- Still, governance in urban mobility is facing major difficulties among which are the lack of financing and multi-annual long-range budgets, elections, the lack of knowledge / acceptance of certain measures by the population etc. Such changes are instrumental to developing competitive strategies in the field of sustainable urban mobility while allowing public administrations to become more efficient and flexible in relation to the communities' needs.

Innovative procurement steps [2]

1) Select, employ, train, educate procurement management team.
2) Learn about legal framework, of the legislative changes, and specific regulations for various situations and procedures.
3) Develop an annual and multi-annual procurement plan.
4) Develop an evaluation plan and performance indicators.
5) Enhance the exchange of knowledge between public authority and suppliers.
6) Organise centralised public procurement procedures across local / regional / cross-border public authorities having the same requirements.
7) Promote public - private partnerships and the collaboration with the industry.
8) Use public financing for research and innovation in a strategic way in order to improve challenge impacts of public procurement.
9) Use the new 'Innovation Action' and 'Pre-Commercial Procurement' instruments to encourage cities and the innovation community to collaborate.
10) Understand and raise awareness to the importance of innovative procurement and prepare their application.
11) Develop a long-term procurement strategy.

Detailed description is available in the Guidelines [2]

Innovative Public Private Partnerships [3]

IPPP is a new form of partnership where the main actors are:

- public and private organisations,
- civil society organisations (CSOs),
- non-governmental organisation (NGO),
- communities.

These new forms of collaboration enable to identify the opportunities for the design and implementation of the long-term strategies for partnership.

Each actor of the iPPPs has its important role in the alliance.

Detailed description is available in the Guidelines [3]

Innovative Public Private Partnerships - Probable roles allocation [3]

- **State organisations** are usually in charge of the drawing up, financing and implementation of policies and programmes.
- **Public organisations** are usually defined as an important actor who not only has a key roles of supervising, creating incentives and regulatory frameworks, but also developing new opportunities and governance mechanisms to enable the sustainable long-lasting collaboration with the private sector and other forms of organization, in order to optimize outcomes, impact and sustainability.
- **Private sector** has a significant role in the partnership. It contributes to bring the investment and expertise in the alliance having its business for-profit orientation.
- **NGOs, CSOs or communities** may bring their expertise and vision of transport and mobility sector. Establishing an iPPP requires strengthening the capacities of all the actors involved.

Innovative Public Private Partnerships [3]

Benefits of iPPP for mobility local authorities:

- Addressing market needs and tendencies.
- Transferring localized institutional knowledge to the public and private organisations.
- Creation a collective awareness of the innovative solutions created by the alliance.
- Elaboration of the social standards and clarification schemes.
- Enhancement of the possibility of the project to obtain the investments by involving the mobility communities in the consortium.
- If the project addresses green or climate finance, mobility communities' participation may bring innovation and an ethical approach to investments.
- The CSOs or NGOs may gain social relevance and influence and builds capacity for policy monitoring.

Detailed description is available in the Guidelines [3]

Innovative Public Private Partnerships [2]

R&D Partnerships are strategic partnerships between businesses and organizations capable to develop a new product or service (or improve an old one) and other actors who are economically interested in the development of such innovations.

Type of R&D partnerships:

- R&D-Public partnership.
- R&D-Private partnership.
- R&D-PPP.

Benefits of the R&D partnerships for mobility local authorities

- Possibility to develop new product or service, improve the current one or to innovate operations, monitor market requirements and trends.
- Help public or private organisations to advance their business.
- Research and development costs and the risks sharing associated with the investment of time, money and other resources.
- R&D partner may help to assess the market or test the prototype.
- R&D partner provides monitoring of the project results.
- The involvement of the R&D partner may provide an added value in searching of investments due to the expertise that this partner can provide.
- Practical recommendations for developing successful collaboration between:
  - mobility communities and PPP,
  - R&D and other mobility partners,

are described in Guidelines. [3]

Example of CSO involvement in the transport projects:

The CSO was involved in the improvement of the public transport in Germany in Rhine-Main-Area. The Rhein-Main-Verkehrsverbund (RMV) transport association established a passenger advisory board that were represented by individuals and CSO. The advisory board organise meetings four times a year, and has already initiated concrete improvements. [5]

Example of the R&D institutions involvement in the transport projects

Frankfurt RheinMain, major transport authorities and operators, including partners from industry and consultancy, and supported by the Hessen State Government. Namely, ZIV institute was founded at the Darmstadt University of Technology. [6]

Detailed description is available in the Guidelines [3]

Further Reading

1. SUITS CBP: “Guidelines to Innovative Financing” ARCADIS, U.K. 2018.
2. SUITS CBP: “Guidelines to Innovative Procurement” Integral Consulting R&D (INTECO), Romania, 2018.
3. SUITS CBP: “Guidelines to New Business Models, Bankable Projects and Innovative Partnerships”, EUROKLEIS, Italy, 2018.
4. SUITS e- learning course: “Financing, procurement and business models for sustainable urban transport” (*www.nuacampus.org/elearning*).
5. Civitas tool inventory. Application area: Financing, procurement, legal aspects, measure implementation, *https://civitas.eu/tool-inventory?f%5B0%5D=field_application_area%3A927*.
6. Martin, J. and Shchuryk, O. (2018). Course Syllabus Topic Study 2: ITS and C-ITS user services. [ebook] CAPITAL Consortium. Available at: *https://www.its-elearning.eu/assets/courseware/v1/ed6e59d55499f7a01c6659aa6abc5119/asset-v1:Capital+T101+2017_1+type@asset+block/CAPITAL_WP3_ITS2.pdf* [Accessed 26 Mar. 2019].

References

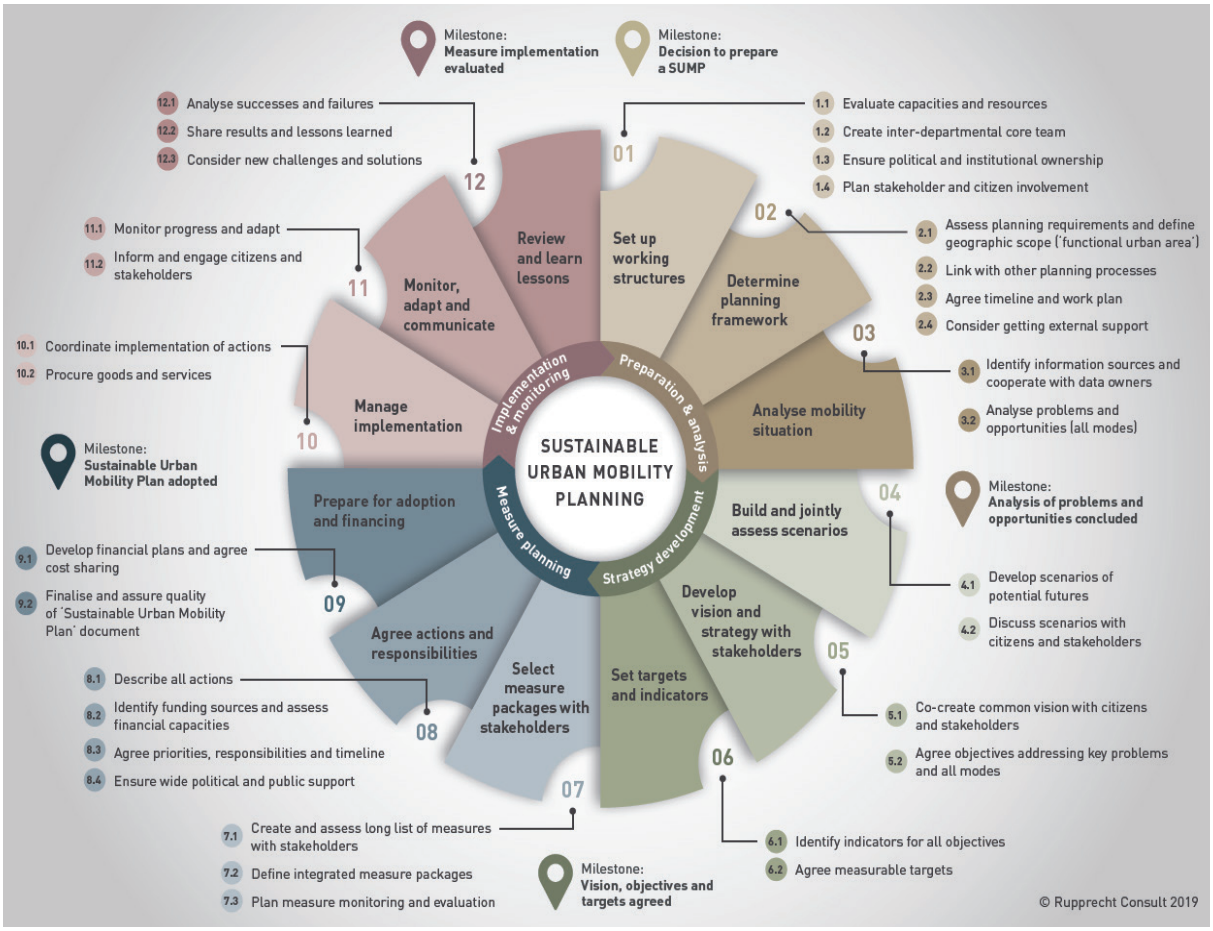
1. SUITS CBP: “Guidelines to Innovative Financing” ARCADIS, U.K. 2018.
2. SUITS CBP: “Guidelines to Innovative Procurement” Integral Consulting R&D (INTECO), Romania, 2018.
3. SUITS CBP: “Guidelines to New Business Models, Bankable Projects and Innovative Partnerships”, EUROKLEIS, Italy, 2018.
4. Reichelt, H. (2010). Green bonds: a model to mobilise private capital to fund climate change mitigation and adaptation projects Climate change is a problem of global proportions, 8.
5. RMV, S. (2019). RMV.DE - Startseite RMV. [online] Rmv.de. Available at: *https://www.rmv.de/c/de/start* [Accessed 27 Mar. 2019].
6. Rolko, K. (2019). Research >> Research Profile. [online] Institute for Transport Planning and Traffic Engineering – Technische Universität Darmstadt. Available at: *https://www.verkehr.tu-darmstadt.de/vv/fg_verkehrsplanung_und_verkehrstechnik/forschung_7/profil/index.en.jsp* [Accessed 27 Mar. 2019].

6 Processes and implementation aspects

- This chapter provides details on the **design and implementation process - stages**. Required data & surveys, potential legal difficulties, milestones, risks, budget, assessment indicators for ETT.
- With regard to handy and automated data collection methods for estimating ETT indicators, reference is made to the SUITS deliverables.

1. Integrate measures in a wider strategic plan: Sustainable Urban Mobility Plan (SUMP)[1]:

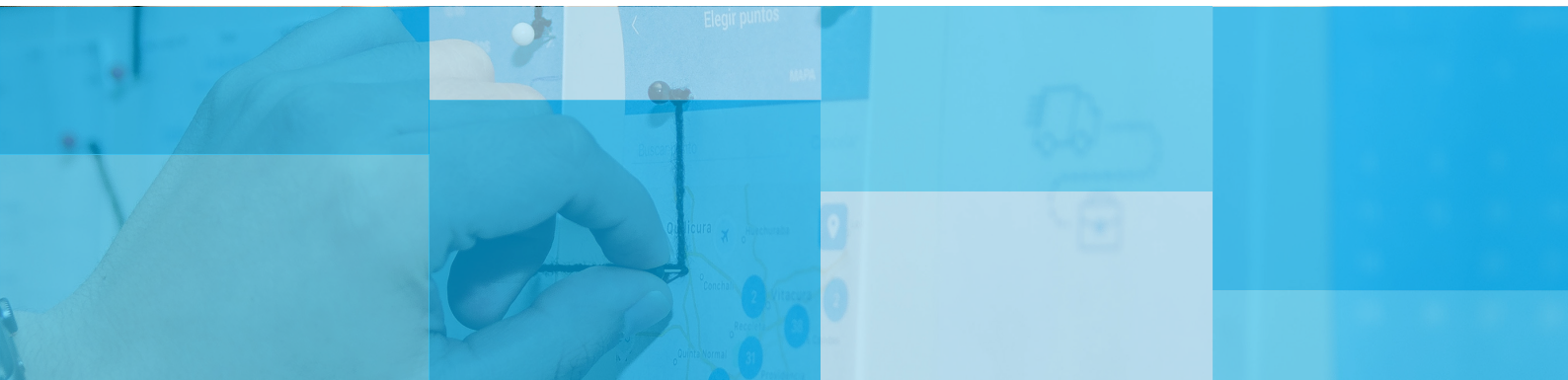
- A **Sustainable Urban Mobility Plan** is a useful tool supporting Local Public decision-makers and stakeholders in "**governing" urban mobility technologies**.
- The plan integrates **strategies, measures** and **rules** that can be adopted with a cooperative approach among different actors.
- ETT could be identified as essential for measures packages (Stage 2, Step 6 of SUMP cycle). Provided material aims to support S-M cities at 7.2 SUMP step in preparing an action and budget plan and at 8.1 SUMP step in arranging for monitoring and evaluation.



2. Define implementation & evaluation required data sets and data collection methods

TYPE OF DATA FOR IMPLEMENTATION	FOR WHICH KIND OF TECHNOLOGY [REFERS TO THE TECHNOLOGIES FROM CHAPTER 2]	DATA COLLECTION TOOL	USEFUL DATA ALSO FOR EVALUATION
Real time traffic data	TECHNOLOGY A, B, C, D, E	Traffic Detector Systems Sensors	X
Length of road infrustructure or number of junctions with application of any form of ETT	Technology C, D, E	Wi- Fi Detection	X
Number of fatal accidents with pedestrians in crossings	TECHNOLOGY D, E	Data collection from police databases	X
Time spend for drivers in finding a parking spot	TECHNOLOGY E	Passengers' data collection through surveys	X
Estimating the number of users/ the range of implementation	TECHNOLOGY A, B, C, D, E	Passengers' transport data collection through surveys	
Specific passengers' data	TECHNOLOGY A, C, D	Public transport operators' statistics	

TYPE OF DATA FOR IMPLEMENTATION	FOR WHICH KIND OF TECHNOLOGY [REFERS TO THE TECHNOLOGIES FROM CHAPTER 2]	DATA COLLECTION TOOL	IS IT ALSO FOR EVALUATION
Number of alternative-drive vehicles registered in a city	TECHNOLOGY A		
Distances covered by such vehicles	TECHNOLOGY A	Traffic Detector Systems	X
CO2 emissions saved by the substitution of conventional vehicles	TECHNOLOGY A	Data collection from environmental research	X
Energy consumption caused by traffic lights in the urban road network	TECHNOLOGY B	Traffic Detector Systems	X
Development of the occupancy rate of parking spaces	TECHNOLOGY E	Parking Surveys	X



CONSIDERATIONS FOR DATA MANAGEMENT

Data Collection

- Need **sustainable** data sourcing.
- Need more **accurate** and **complete** data.
- Need **real-time** and **historical** data.

↓

Data Selection

- Need to be **selective** in data searches.
- Need to be able to deal with **Big Data**.
- Need to **standardize** & **convert** data formats.

↓

Data Visualization

- Need **data visualization** tools.
- Need urban **traffic monitoring**.
- Need **decision support** systems.

3. Identify potential difficulties/ barriers and check for solutions

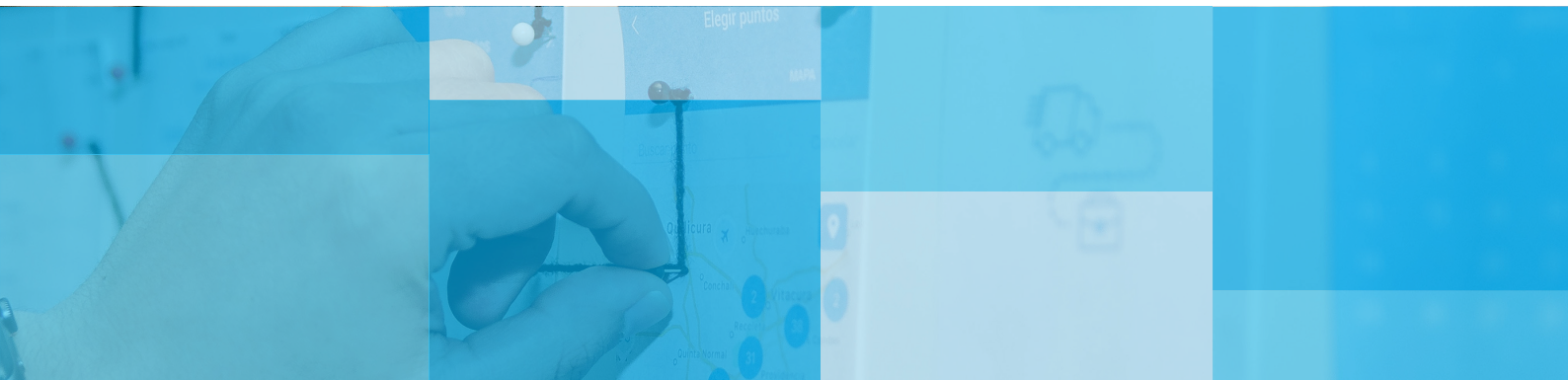
POTENTIAL LEGAL DIFFICULTIES FOR REGULATORY MEASURES	
TYPE OF LEGAL DIFFICULTY	**SOLUTION**
There is a extremely varied picture, ranging from countries where no specific legal provision exists to deal with this kind of technology (although in some cases local rules are issued) Conflicts about the use of public space may evolve in case public charging infrastructure	Requiring Member States to develop national policy frameworks for the market development of their infrastructure (i.e. alternative fuels, C- ITS, pedestrian assistance system)
	Foreseeing the use of common technical specifications (i.e. for recharging and refueling stations)
	Paving the way for setting up appropriate consumer on information related to technologies

POTENTIAL LEGAL DIFFICULTIES FOR INNOVATIONS	
TYPE OF LEGAL DIFFICULTY	**SOLUTION**
Concerning Real- Time traffic data, issues about personal data protection may arise	Data collection methods and tools must ensure anonymous data gathering for protecting citizen's personal information

POTENTIAL DIFFICULTIES RAISED BY STAKEHOLDERS	
TYPE OF DIFFICULTY	**SOLUTION**
A major risk related to C-ITS deployment is significant upfront investment needed on the infrastructure level	The European Commission plays a key role in financing C-ITS project → Through the framework of the Connecting Europe Facility (CEF) it provides financial support
	The EC has created the C-ITS Platform by means of which it promotes the interoperable deployment of C-ITS in the EU

4. Identify implementation and evaluation indicators

- Indicators are one of most important parameter of implementation and evaluation process.
- Key performance indicators (KPI) consist of the main tool of assessing impact of the implemented technologies.
- The following table consist of some indicative KPI's concerning the implementation and the assessment of the ETT (for finding out more indicators follow the References section).



Key Performance Indicators [1], [2], [3]

SELLING EXPERTISE AND TECHNICAL KNOW-HOW			
	Key Performance Indicator	Description	Data /Units
ECONOMY	The amount of operating revenues and costs	• Capital costs • Maintenance costs	• Euros/pkm or Euros/ vkm, quantitative, derived or measured Euros, • Euros/pkm or Euros/ vkm, quantitative, derivedor measured
ENERGY	The amount of Fuel Consumption	• Change in share of renewables in total energy consumption • Change in total fuel consumption • Carbon footprint per transport mode and route	MJ/vkm, quantitative, derived or measured
ENVIRONMENT	Level of Emissions	• Change in PM10 emissions per vehicle km • Change in carbon footprint per transport mode and route	Ppm or g/m3, quantitative, measured
	Level of Air Quality	• Number of peak noise events	dB/ selected area derived or measured
SOCIETY	Safety	• % change in number of reported accidents along routes where ITS service has been implemented • Number of fatalities • Average driving speed • Perception of road safety	Quantitative, derived or measured
	Acceptance	• Awareness of the policies/measures • Attitude survey of current acceptance of the measure	Index (%), qualitative, collected, survey
	Security	• Perception of security when using service	Index, qualitative, collected, survey
TRANSPORT	Traffic Levels	• % change in peak hour traffic flow • Reduction of private car use (in km/day) • % change in journey time variability on routes where ITS has been implemented	Veh per hour, quantitative, measured
	Transport Comfort	• Average delay time • Average traffic speed • Average parking search time at public transport facilities	Km/hr, quantitative, derived

EXERCISE D

Final selection of Emerging Transport Technologies and identification of key actions to be implemented by LAs.

Description of exercise

A. A table with 6 fields: (a) required data and surveys for implementation and evaluation of success - identification of relevant indicators, (b) main activities (both administrative and designing/application ones), (c) time plan, (d) milestones, (e) needs for outsourcing, (f) potential legal barriers.

TEAM NAME

MEASURE TITLE

MAIN ACTIVITIES (administrative and designing/ application)	REQUIRED DATA, SURVEYS FOR IMPLEMENTATION	EVALUATION INDICATORS	NEED FOR OUTSOURCING yes(what kind)/no	POTENTIAL LEGAL BARRIERS

Further Reading

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3. Newbits-project.eu. (2017). [online] Available at: *http://newbits-project.eu/wp-content/uploads/2016/12/NEWBITS_D2.2_Assessment-of-main-barriers-and-KPIs-for-the-implementation-of-ITS-services.pdf* [Accessed 27 Mar. 2019].

7 Available tools and guidelines

- **Guidelines** and **tools** to **support the design and implementation of such technologies are numerous**. However, this chapter aims to provide **the ones most correlated to S-M cities instead of being generic**. The provided rating of the relevance to SUITS objectives supports prioritisation of these tools.
- Besides SUMP guidelines that include generic suggestions (available in all EU languages by ELTIS), there are also specific guidelines and tools for ETT developed in the frame of EU projects.

TOOL NAME	FORMAT	SOURCE / LINK	USEFULNESS FOR S-M CITIES AND IMPORTANCE IN SUITS PROJECT	RATING OF RELEVANCE [1-5]	RATING EXPLANATION
ELAN	PDF document, training workshop for implementers	[1]	Interesting for both, S-M and big cities [8]	5	The target group of ELAN is identical to that of SUITS
ELLIPTIC	PDF document, webinars	[2]	Mainly solutions for big cities, but some of them can also be implemented in S-M cities	4	Part of the results of the project is good practice in S-M-cities
SMARTSET	PDF document	[3]	Relevant to both small, medium and larger cities. Partners – regions of every size are involved in the project	4	Two of the participating cities are classified as medium-sized cities
CODECS	Guidance documen/ Manual for C-ITS	[4]	Interesting for both, S-M and big cities	4	Views and requirements of city authorities regarding C-ITS
CARAVEL	Cost benefit tool, PDF document/ presentation	[5]	Yes. Some of the examples and BPs provided come from S-M cities (ex. Liège) and they cam also be applied to S-M cities	3	Topics considered in this Module are mainly developed in the cities of the project that cannot be classified as S-M, but useful hints coming from Burgos (S-M city)
CIMEC	PDF document	[6]	YES. Bilbao (Spain), Kassel (Germany), Trondheim (Norway) and Reading (United Kingdom)	3	Only some of the participating cities are S-M sized
GROWS-MARTER	PDF document and hints and contact details of good practice examples	[7]	More focused in the transferability to big cities (London, Oslo, Paris, Brussels, Rome):	3	The participating good practice cities are larger than S-M cities. But a number of the measures implemented in the good-practice-cities are also suitable for smaller cities if adapted accordingly.

Tools Selection the ELAN project [1]

- The ELAN project as part of EU CIVITAS programme, addresses topics of specific interest to Central and Eastern European cities → emphasises a two-way learning process facilitated through **technical workshops**, **training sessions** and **technical site visits**.

Aims to

- increase the modal share of walking and cycling,
- support innovative freight delivery solutions,
- implement innovative demand management,
- increase the use of cleaner and energy-efficient vehicles.

Through an extensive analysis of case studies aims to provide **specific guidelines** to the cities with the same characteristics (consists of documents and presentations).

Tools Selection The ELIPTIC project [8]

- The ELAN project as part of EU CIVITAS programme, strengthens the role of electric public transport, leading to reduced fossil fuel consumption and improved air quality → **provides a web-based decision support tool** for the electrification of public transport in cities.
- There is a **support tool** that help the cities determining which technology is appropriate in their situation based on your operational profile and specific city context.
- The ELIPTIC team conducted a series of **webinars** to support public transport stakeholders in the development of their electrification plans.
- The ELIPTIC **User Forum** (EUF) consisted of a wide range of public transport practitioners selected from both Public Transport Operators (PTO) and Public Transport Authorities (PTA) on the basis of their substantial expertise and many years of experience in the sector.

Tools Selection the CODECS project [9]

The Thematic Areas: Transport telematics - C-ITS

- **Connected and automated transport**.
- **Real-time road-user information**.
- **ITS for traffic**.

Consist of a report that highlights the **key issues that need to be addressed**, covering both the 'why' should I deploy (i.e. what is the business case?) and 'how' can I deploy (i.e. integration, organisational issues, procurement).

→ appeals to anybody who is interested in understanding the urban transport context and specifically **the city perspective on C-ITS and ITS** more generally.

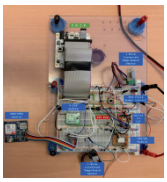
Data collection tools

SUITS Pilot Demo
In Kalamaria

- **Crowdsourcing**.

  Crowdsourcing using conventional GPS trackers & IoT telecom services.

SBUTracker



- **Multi-GNSS + INS tracker**.

  Advanced, multi-GNSS + INS tracker prototype for urban vehicle tracking.

CarNavi Car Edition

- **Vehicle navigation**.

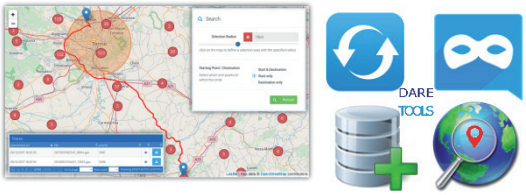
  Collaborative, crowdsourced navigation system adapted for in-vehicle multimedia consoles.

Data selection tools

- **S-DARE SELECTION TOOLS**
  - GPX format (converter).
  - GPX file anonymisation / pseudonymisation.
  - Insertion of GPX file metadata into a Geospatial DB
  - Geo-selection of GPX trace datasets.

↓

DaRe.SUITS-project.eu/tools



S-DaRe Tools (by)

- **PP4TM SYSTEM**

  Scalable, data homogenisation funnel and fast query processing engine over big transport data.

↓

SUITS Tool: The PP4TM System

logdrill
MAKE YOUR DATA WORK
PetaPylon

GPX file is a GPS data saved in the GPS Exchange format, an open standard that can be freely used by GPS programs. It contains longitude and latitude location data, which includes waypoints, routes, and tracks. GPX files are saved in XML format that allows GPS data to be more easily imported and read by multiple programs and web services.

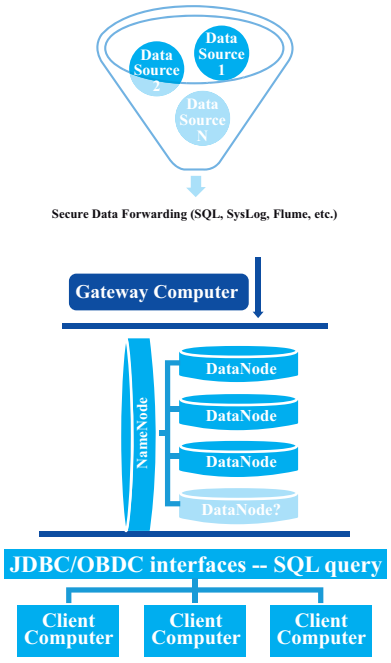
S-DaRe: SUITS' Data Repository

DaRe.SUITS-project.eu/tools

- The data, including associated metadata, needed to validate the results presented in scientific publications.
- Collected data during the project, after anonymization and including associated metadata, as specified in the DMP.
- Generated data during the project, including associated metadata, as specified in the Consortium Agreement and in the DMP.
- Public project reports and public deliverables.
- All dissemination-related material (all that is public).

SBOING's Repository:

- Hosted in Germany (@Hetzner.de), 3TB+, SFTP accessible (+more).
- (Mirrored in LOGDRILL's (local) Data centre).



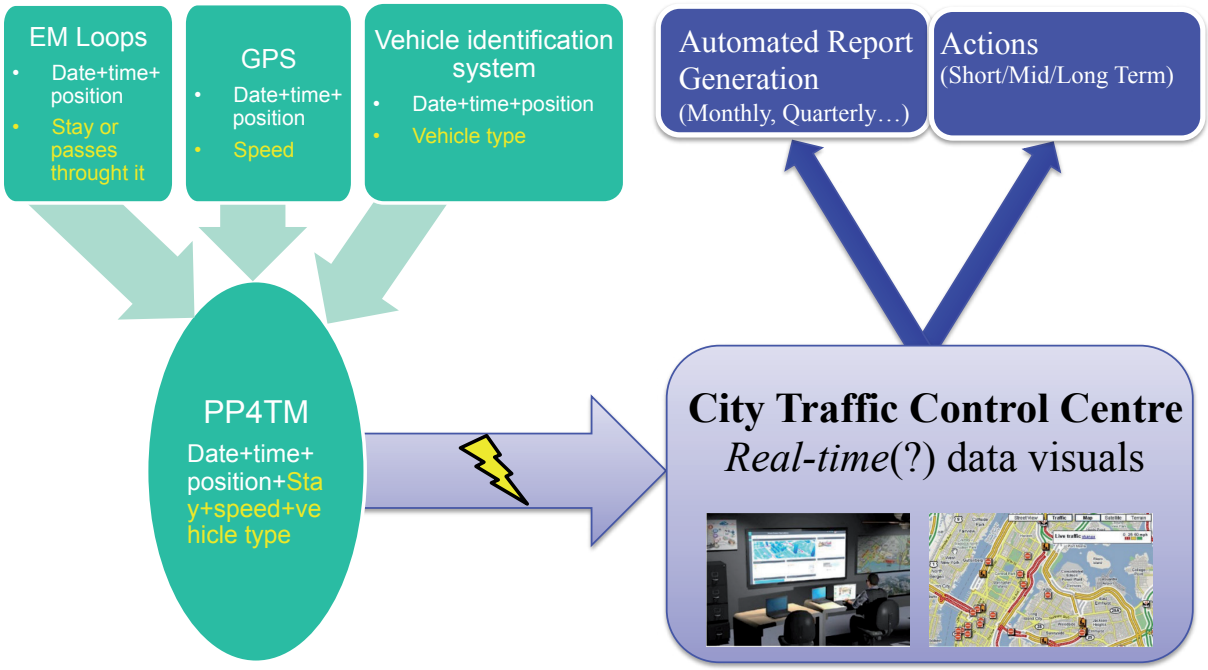
PP4TM: SUITS database for big data

Fast and robust analytic database solution for civil traffic research and development purposes.

- Convert any data sources and formats (including historical) to common data format at once.
- Store lots of data (Big Data) and access them very quickly.
- Very easy and cheap to expand the storage capacity in runtime.
- Easy to connect to any visualization tools.
- Quickly serve your visualization needs.

How to use PP4TM

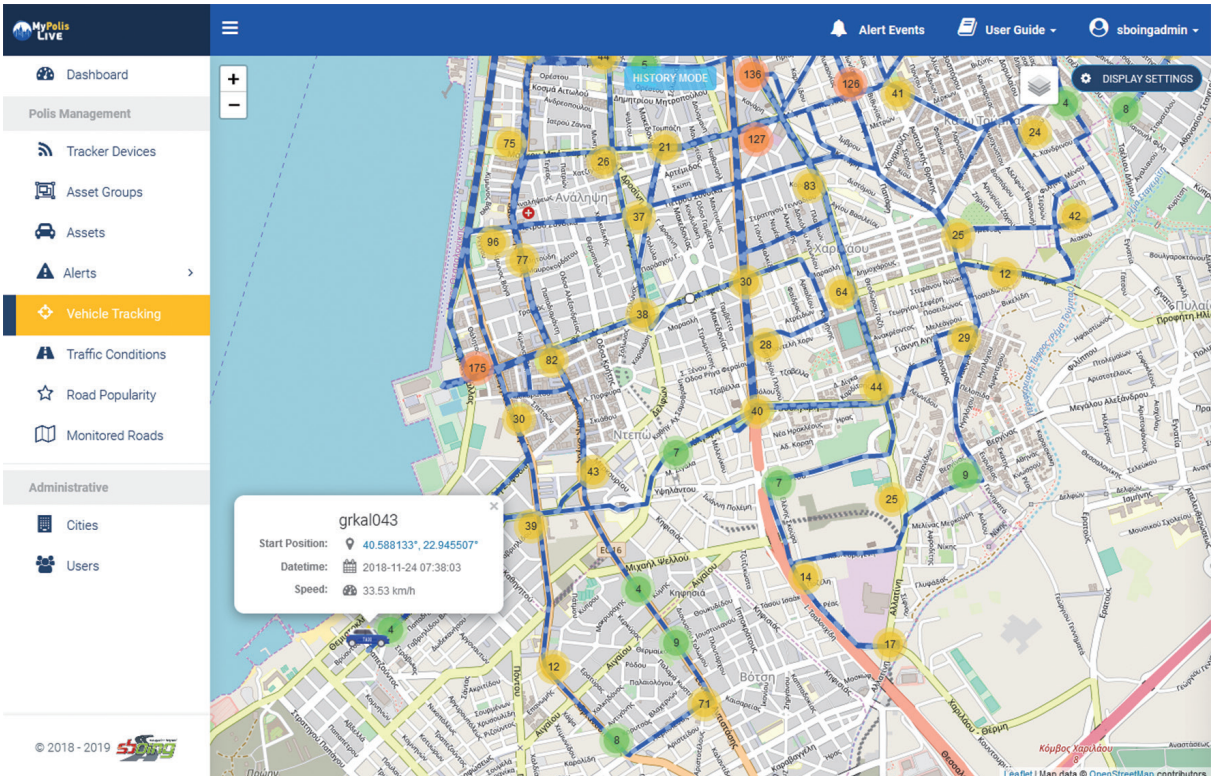
1) Create a table in PP4TM, will contain all of your data (common data format).
2) Use PP4TM to convert different data sources to „common data format".
3) Store all of your data in PP4TM.
4) Connect your favorite visualization tools to PP4TM (example MS Power BI free)
5) Analyze your data instantly (find a correlations in different type and source of data).
6) Expand your data to real-time (use step 2 continuously).
7) Use the live visualization (step 5 with refreshing).



Data visualisation tools

- **MyPolisLive.net**

  A platform for real-time vehicle tracking and traffic monitoring for urban traffic management.



https://www.mypolislive.net/

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4. Civitas.eu. (n.d.). CODECS - cities requirements for C-ITS | CIVITAS. [online] Available at: *https://civitas.eu/tool-inventory/codecs-cities-requirements-c-its* [Accessed 27 Mar. 2019].
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