SUITS

Building Small-Medium (S-M) LAs' to implement Emerging Transport Technologies (ETT)

Presentation

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SUITS Capacity Building Programme
Outline of the course

Welcome session

Chapter 1: Introduction

Chapter 2: Emerging Transport Technologies (ETT)

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

Chapter 4: Successful case studies or Best practices of SUITS cities

Chapter 5: Innovative financing, procurement, partnership

Chapter 6: Process and implementation aspects

Chapter 7: Available tools and guidelines

This material is result of WP5 of SUITS project

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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”

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Chapter 1: Introduction

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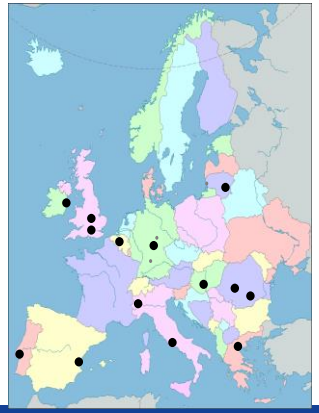
SUITS
Supporting Urban Integrated Transport Systems: Transferable tools for authorities

- **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:** approx. 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



22 Partners

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Course Framework: SUITS Project
Main objectives of SUITS Capacity Building

Overall aim: To increase the capacity of S-M LAs 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 (independent);
- 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.

Course Framework: SUITS Project
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

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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

Digital badges

Following the completion of the workshop exercises, you are entitled to **SUITS digital badge!**

It will be sent directly to your email account through the https://mydigitalbadges.net/ platform. There is information encrypted in the picture related to the course.

- save this picture (badge) as png file.
- create an account on Mozilla's backpack https://backpack.openbadges.org/backpack/welcome
- upload the badge

This is the place where you can store all badges you receive from SUITS but also from other webinars, e-learnings etc.

The platform, developed by our partner SBOING, can be used by multiple organizations (local authorities, companies, institutions, etc.) to design, issue, award, display and manage their own digital badges.

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

In particular aims at:

- **Increasing 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

Introduce yourself…

Chose the mean of transport in your future city?

What are your expectations from this workshop?

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 to introduce the most suitable tools to increase the urban sustainability.

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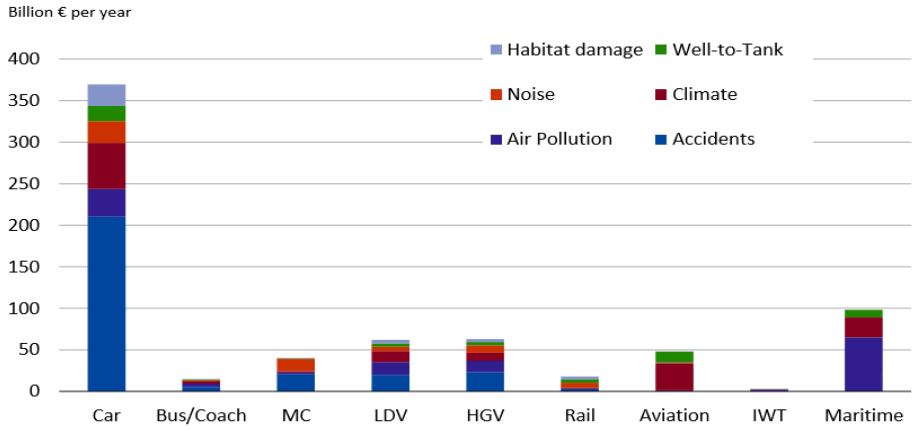
Key aspects of the problem

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)

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



Total external costs per transport mode for EU28 in 2016

*…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*

Key aspects of the problem

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

Key aspects of the problem

Issues need to be addressed for mobility in urban areas [3]

- ***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

Chapter: Introduction

EXERCISE A

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EXERCISE A :
Identifying weaknesses of the urban transport modes

Description of material

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

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Municipality Logo

EXERCISE A

TEAM NAME:

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

URBAN TRANSPORT MODE	WEAKNESSES
• Car	
• Public transport	
• Bicycle	
• Walking	

Chapter 2: Emerging Transport Technologies (ETT)

Chapter 2: Emerging Transport Technologies (ETT)

A) Clean fuel and e-vehicles:

- 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

Chapter 2: Emerging Transport Technologies (ETT)

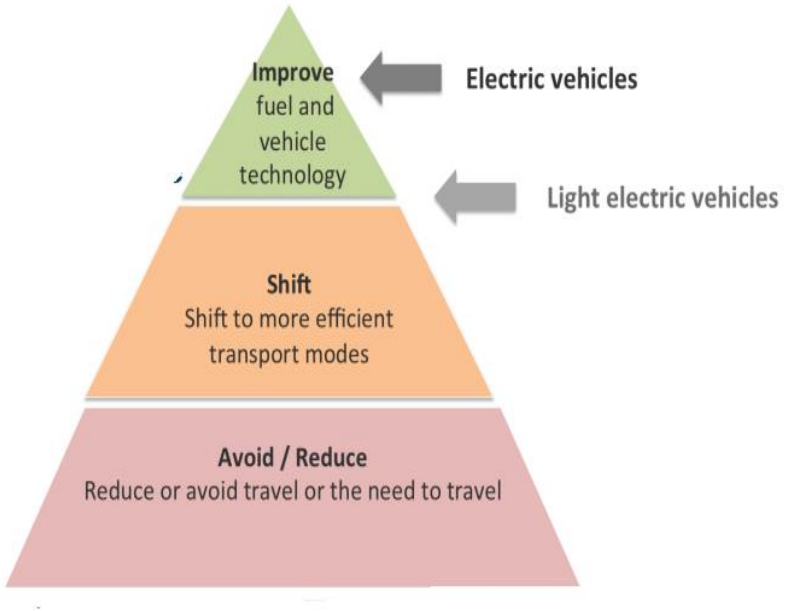
A) Clean fuel and e-vehicles:

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



Chapter 2: Emerging Transport Technologies (ETT)

B) Cooperative systems:

- 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.

Chapter 2: Emerging Transport Technologies (ETT)

C) Traffic information systems:

1. Dynamic Traffic Management

- For drivers Information about incidents, routes, and parking through mobile phones (mobile applications, Bluetooth, SMS)
- For public transport passengers.
  - ✓ Information about upcoming stops, destination, weather forecast, advertisement, news through on-board monitors, mobile and website applications
  - ✓ information about arrivals, delays, incidents, timetables through on stops devices (electronic signs), mobile and website applications
- For freight operators Information about preferred routes and parking bays through on road signs, website and mobile platforms

Multimodal journey planning services –MaaS 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 (through applications or websites).

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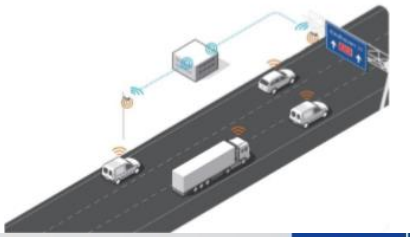
C) Traffic information systems:

2. Probe vehicle data

- 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.



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D) Pedestrian assistance systems

1. High-tech pedestrian crossing design

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.

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D) Pedestrian assistance systems

2. Multi-media Integration for pedestrians' varied needs

- 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.

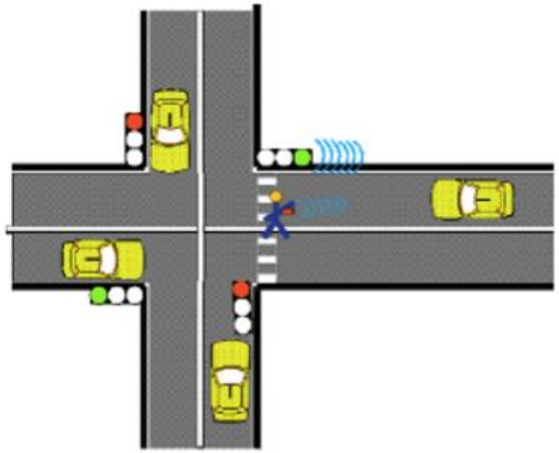
D) Pedestrian assistance systems

3. Cooperative traffic light for Vulnerable Road Users (VRU)

- 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

- 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.

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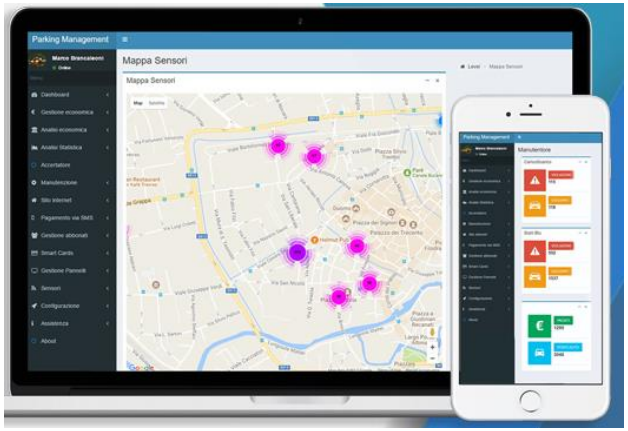
E) New systems and applications for parking management

2. Management software

- 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.



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E) New systems and applications for parking management

3. The parking meter

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.

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E) New systems and applications for parking management

4. Demand-responsive pricing (policy)

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.

Chapter 2: Emerging Transport Technologies (ETT)

EXERCISE B

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EXERCISE B:

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

Description of material

A. 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.

Building S-M LAs' capacity to implement Emerging Transport Technologies

Municipality Logo

EXERCISE B

TEAM NAME:

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

WEAKNESS	TRANSPORT MODE TECHNOLOGY
• [WEAKNESS 1] • [WEAKNESS 2] • [WEAKNESS 3]	• [TECHNOLOGY 1] • [TECHNOLOGY 2] • [TECHNOLOGY 3]

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

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

Benefits of *ETT*

Direct positive effects

- 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

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

Benefits of *ETT*

These benefits can be all translated into economic growth since:

- Compliance with European legislation is achieved (by avoiding environmental fee, eligibility for claiming 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

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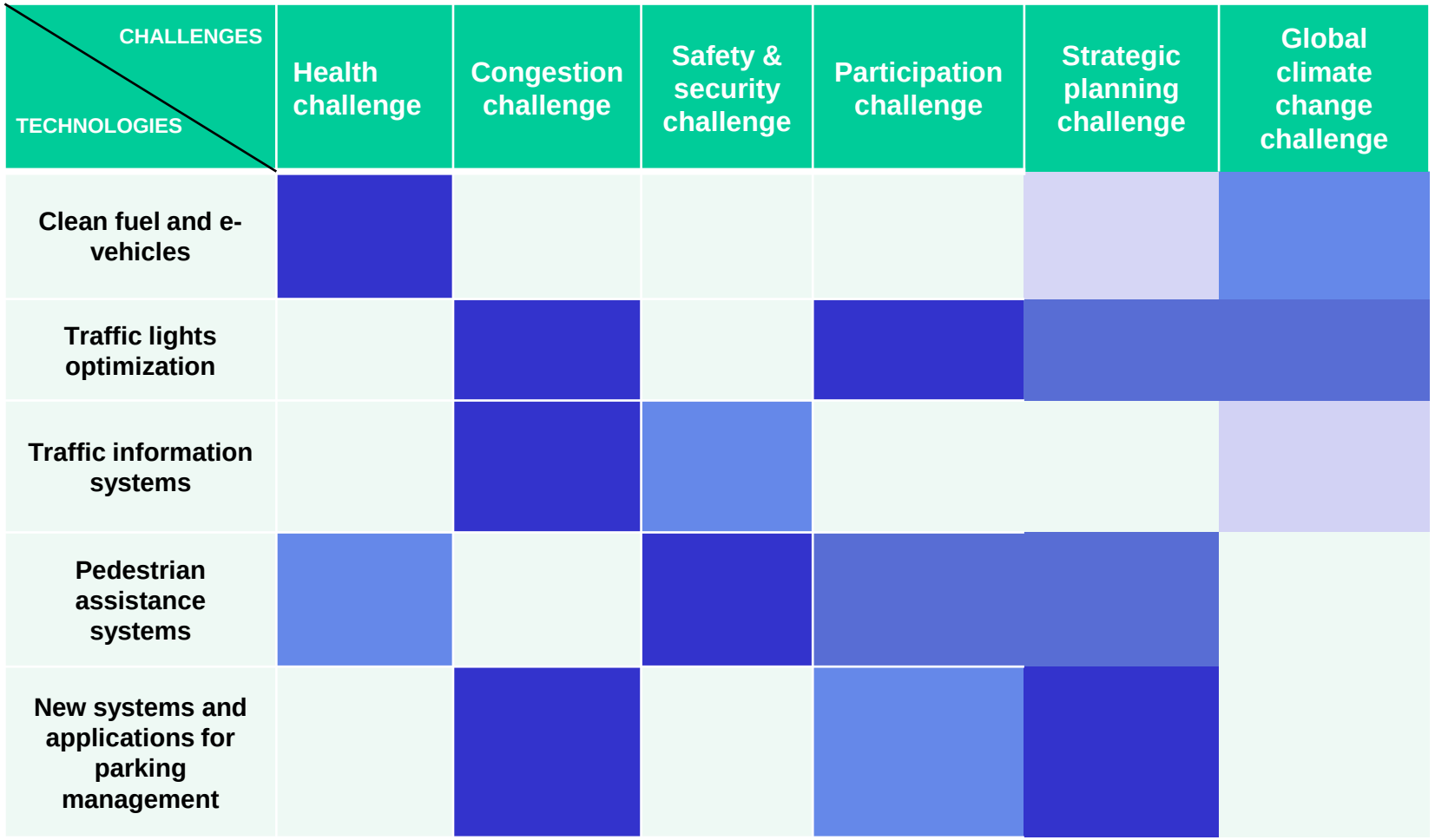
Chapter 3: Value for S-M cities (Challenges, Benefits and Beneficiaries)

Correlation of Emerging Transport Systems (ETT) with city strategic objectives



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

EXERCISE C

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Building S-M LAs' capacity to implement Emerging Transport Technologies

Municipality Logo

EXERCISE C:
Identification of key features for transport technologies

Description of exercise

A. 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.

B. 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).

Building S-M LAs' capacity to implement Emerging Transport Technologies

Municipality Logo

EXERCISE C

TEAM NAME:

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

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:

Building S-M LAs' capacity to implement Emerging Transport Technologies

Municipality Logo

EXERCISE C

TEAM NAME:

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

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

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, and the air pollution strategies, while they are part of SUMP.
- In **national and EU level**, these measures contribute to meeting its environmental, health and climate policy goals
- **The alignment of ETT to these policies as part of SUMP [2] could make S-M cities eligible to receive financial support from EU funds.**
- 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

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Corresponding Document	Topic	Type of content	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	Communication 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 • NEW AND EMERGING 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 • NEW AND EMERGING 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) • NEW AND EMERGING 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 [6]	• SAFETY AND SECURITY • NEW AND EMERGING TRANSPORT SCHEMES • MOBILITY MANAGEMENT • CAR INDEPENDENT LIFESTYLES • NEW AND EMERGING 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

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

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.)

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

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)

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

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.

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

Impact Assessment Dimensions

- **Environmental impacts** are 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 2min / 2 to 5min / > 5min			
	Reliability impact on Commuting and Other users					
	Physical activity					
	Journey quality					
	Accidents					
	Security					
	Access to services					
	Affordability					
	Severance					
	Option and non-use values					

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

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

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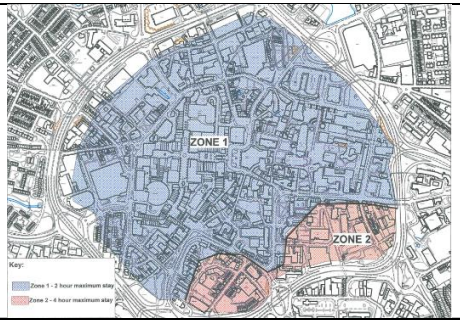
Chapter 4: Successful Case studies or Best practices of SUITS cities



Emerging Transport Technologies
Traffic management, Parking management

LOCATION
Coventry, United Kingdom

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.

SCALABILITY/REPLICABILITY
Similar projects were implemented previously on sma ller 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.

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

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 realise benefits for Coventry's council, motorists and citizens through improved traffic flow, reduced congestion, reduced 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 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.

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	BARRIERS AND DRIVERS	FURTHER INFORMATION
- 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 - Optimise enforcement by mapping out historical trends of 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 beneficiary 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 on emissions leads to 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. **Indicators to measure success/implementation:** 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:	**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 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:** Installation of sensors successful and occurred ahead of schedule. **Technical/Data Resources** **Barriers:** Concerns regarding identification of faulty 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 as they arose. **Drivers:** Clear project plan. **Political** **Barriers:** The concepts and technology are difficult to adopt as the knowledge base to understand and implement the technology is lacking. **Drivers:** TfWM and the West Midlands Combined Authority have detailed the project as part of their bid	

Indicators to measure success/implementation: 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), this was 62% during paid hours.	**BARRIERS AND DRIVERS** **Barriers:** Procurement delay due to concerns internally at 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

LOCATION
Ljubljana, Slovenia

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.

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.

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.

MEASURE DESCRIPTION
The city has been striving for environmental sustainability and air quality improvement over the past decades. 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.

The main objectives of the measure 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.
- The present bus fleet of the PT operator LPP comprises 217 urban buses.

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	BARRIERS AND DRIVERS	FURTHER INFORMATION
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. However, the city is still striving to make public transport more comfortable and efficient for passengers as well as to upgrade its environmental component and reduce emissions through the following measures: • 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 social groups benefited through 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.	**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 the 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 require funds and person months to be devoted. **Drivers:** Through the training workshops, the operator are able to prepare in order to be able 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.	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

LOCATION
Rotterdam, The Netherlands

INITIAL PROBLEM AND TARGET GOAL
Traffic and transport is a major cause 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.

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.

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.

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 CO_2 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.

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 along with other municipal subsidies can further decrease the price of the vehicle up to €7,000. Moreover, organisations or people who place a charging station on their own property 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	BARRIERS AND DRIVERS	FURTHER INFORMATION
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), NO_x, and CO_2 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 NO_x the total emissions saved in 2013 were 538 kg, and these saved emissions increased to almost 1,100 kg in 2014. For CO_2 the saved emissions increased by a factor of more than 3, from 311 tons in 2013 to 1,130 tons in 2014.	**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:** Funding needs to provide citizens with incentives to adopt electric vehicles. **Drivers:** The development of sustainable financial models and the involvement of local and national stakeholders, ensures 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:** 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.	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/

Chapter 5: Innovative financing , procurement, partnership

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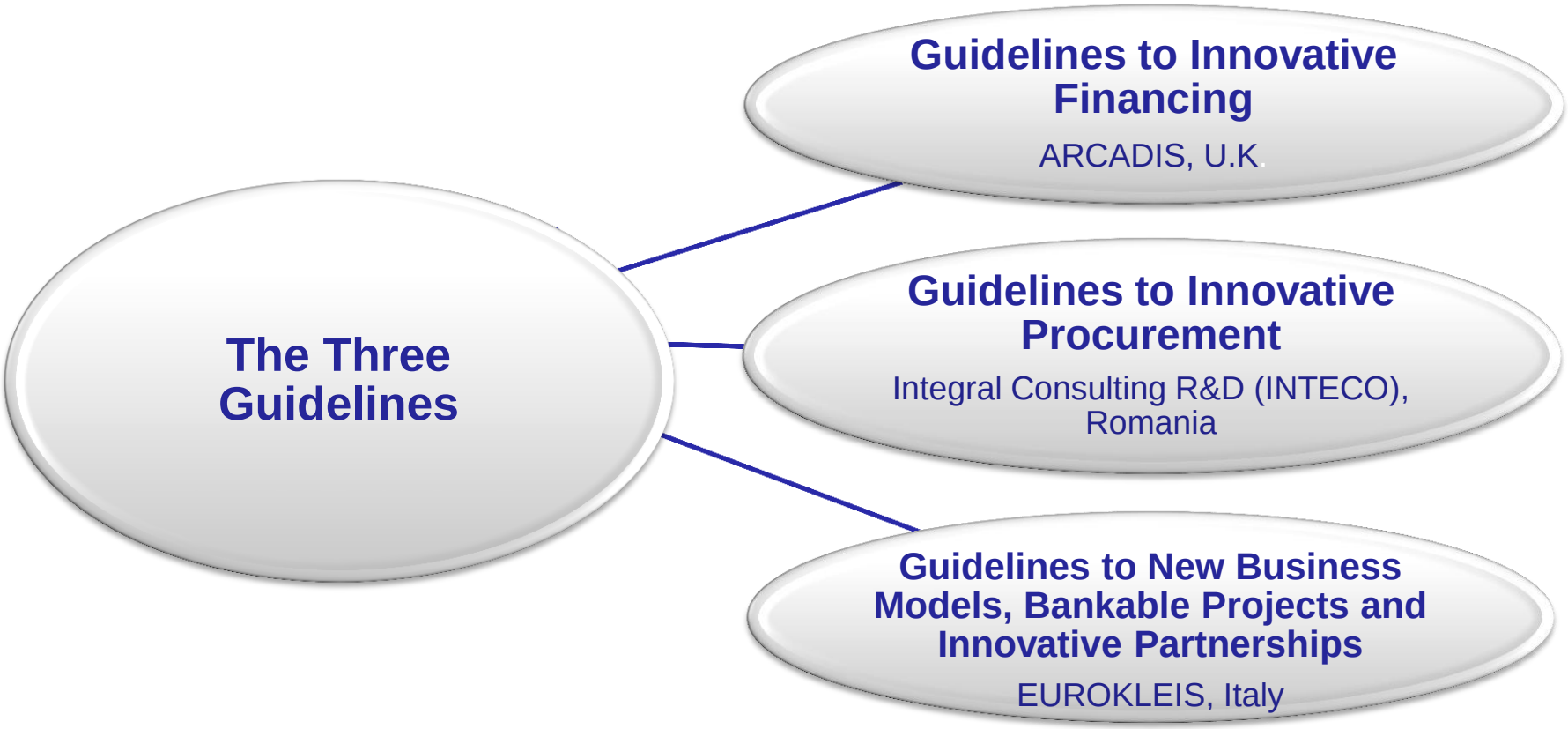
Chapter 5: Innovative financing, procurement, partnership

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



Chapter 5: Innovative financing, procurement, partnership

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.

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Chapter 5: Innovative financing, procurement, partnership

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.

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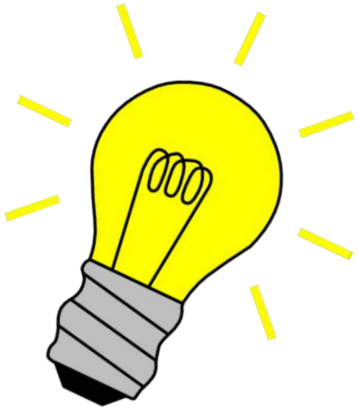
Chapter 5: Innovative financing, procurement, partnership

How to make the best use of the Guidelines

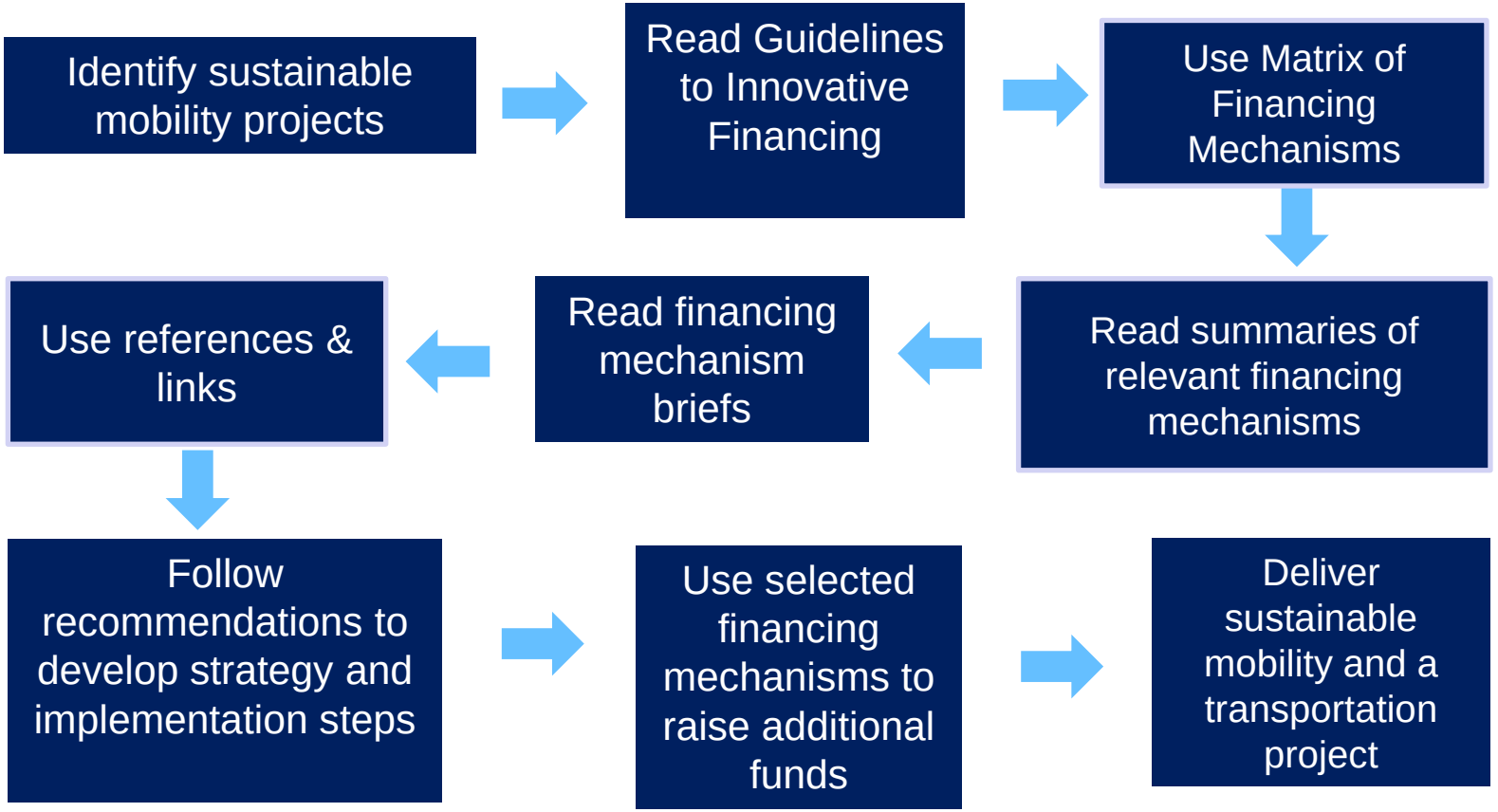


Tips for Implementation:

- 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.

Chapter 5: Innovative financing, procurement, partnership

Guidelines to Innovative Financing



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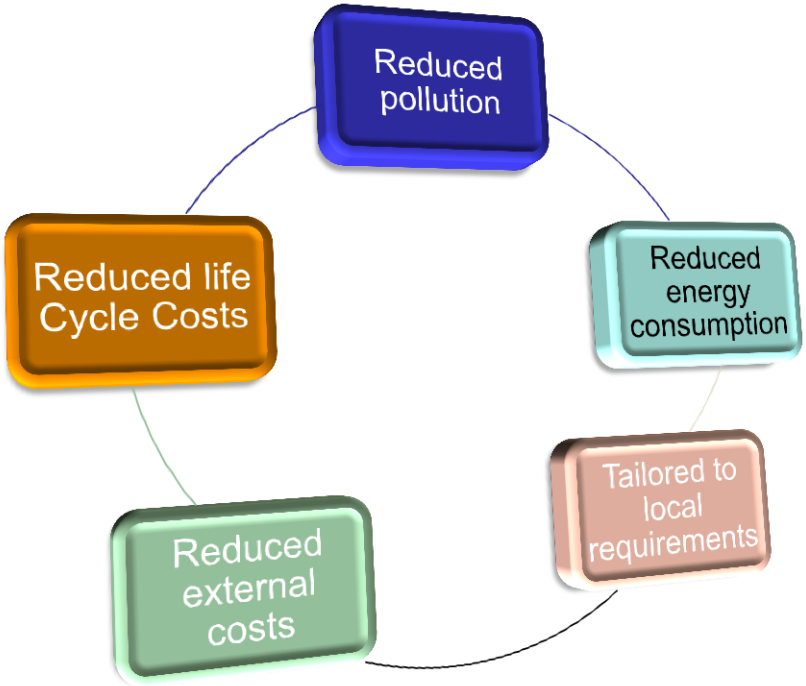
Chapter 5: Innovative financing, procurement, partnership

Guidelines to Innovative Procurement

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



Chapter 5: Innovative financing, procurement, partnership

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.

Chapter 5: Innovative financing, procurement, partnership

Guidelines to New Business Models, Bankable Projects and Innovative Partnerships: 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

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Chapter 5: Innovative financing, procurement, partnership

Innovative financing mechanisms

- **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(check **bold**). All detailed description are available in the Guidelines

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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

Chapter 5: Innovative financing, procurement, partnership

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

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	Increase attractiveness and name recognition or to disseminate good practices in areas of interest
Comments	Can be applied across all sectors of interest

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

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

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

Toll Roads	
Description	This 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

Chapter 5: Innovative financing, procurement, partnership

Innovative procurement steps

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;

Chapter 5: Innovative financing, procurement, partnership

Innovative procurement steps

8. Promote public – private partnerships and the collaboration with the industry;

9. Use public financing for research and innovation in a strategic way in order to improve challenge impacts of public procurement;

10. Use the new ‘Innovation Action’ and ‘Pre-Commercial Procurement’ instruments to encourage cities and the innovation community to collaborate.

11. Understand and raise awareness to the importance of innovative procurement and prepare their application;

12. Develop a long-term procurement strategy.

Detailed description available in the Guidelines [2]

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Chapter 5: Innovative financing, procurement, partnership

Innovative Public Private Partnerships

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 available in the Guidelines [3]

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Chapter 5: Innovative financing, procurement, partnership

Innovative Public Private Partnerships – Probable roles allocation

- **State organisations for** the drawing up, financing and implementation of policies and programmes
- **Public organisations for** supervising, creating incentives and regulatory frameworks, developing new opportunities and governance mechanisms to enable the sustainable long-lasting collaboration with the private sector and other forms of organization,
- **Private sector for** bringing the investment and expertise in the alliance having its business for-profit orientation.
- **NGOs, CSOs or communities for** bringing their expertise and vision of transport and mobility sector.
- **R&D for** developing new product or service (or improve an old one), and other actors who are economically interested in the development of such innovations

Establishing an iPPP requires strengthening the capacities of all the actors involved.

Chapter 5: Innovative financing, procurement, partnership

Innovative Public Private Partnerships - Benefits of iPPP for mobility local authorities

Detailed description available in the Guidelines [3]

- 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 the social relevance and influence and builds capacity for policy monitoring.

Chapter 5: Innovative financing, procurement, partnership

Innovative Public Private Partnerships [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]

Chapter 5: Innovative financing, procurement, partnership

Have you ever used any innovative financing mechanism of the ones listed before?

In which concept ?

What type of business model did you use or could you use (partnerships, ownership etc.) to implement ETT in yours city

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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].

Chapter 6: Process and implementation aspects

Chapter 6: Process and implementation aspects

EXERCISE D

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EXERCISE D: Final of 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

Building S-M LAs' capacity to implement Emerging Transport Technologies

Municipality Logo

EXERCISE D

TEAM NAME:

TECHNOLOGY TITLE:

Main activities (administrative and designing/application)	**Required data, surveys for implementation**	**Evaluation indicators**	**Need for Outsourcing** yes(what kind)/no	**Potential legal barriers**

Key Performance Indicators [1], [2]			
	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, derived or 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

Chapter 7: Available tools and guidelines

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LIST OF AVAILABLE TOOLS AND GUIDELINES FOR ETT

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 document / 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)

LIST OF AVAILABLE TOOLS AND GUIDELINES FOR ETT

Tool name	Format	Source /Link	Usefulness for S-M cities and Importance in SUITS project	Rating of relevance [1 - 5]	Rating explanation
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
GROWSMARTER	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.

Chapter 7: Available tools and guidelines

Tools Selection- the ELAN project

- 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)

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Chapter 7: Available tools and guidelines

Tools Selection- the ELIPTIC project

- 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.

Chapter 7: Available tools and guidelines

Tools Selection- the CODECS project

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 (eg, what is the business case?) and 'how' can I deploy (eg, 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.

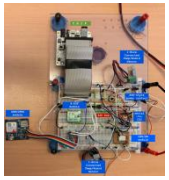
Chapter 7: Available tools and guidelines

Data collection tools

- **Crowdsourcing**
  Crowdsourcing using conventional GPS trackers & IoT telecom services

SUITS Pilot Demo
In Kalamaria

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



SBUTRACKER

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

CarNavi Car Edition

Chapter 7: Available tools and guidelines

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 sbaing)

- **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)

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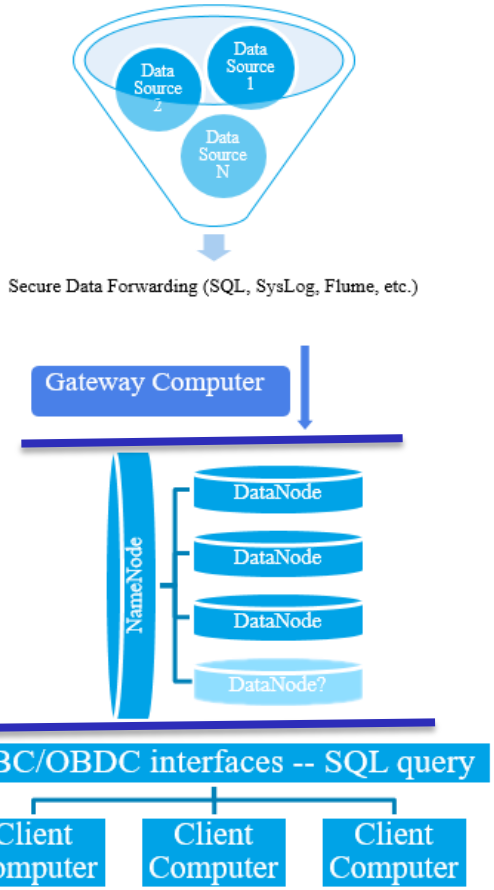
Chapter 7: Available tools and guidelines

PP4TM:SUITS database for big data

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

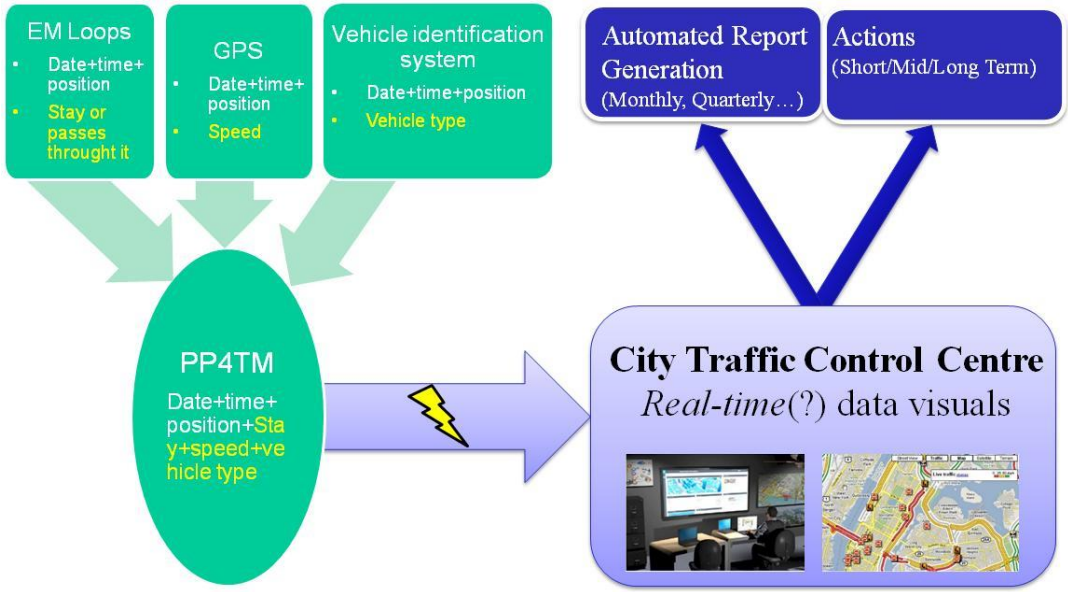
- Convert any data sources and formats (including historical) to common data format at once
- Store lots of data (Big Data) and access them very quickly
- Very easy and cheap to expand the storage capacity in runtime
- Easy to connect to any visualization tools
- Quickly serve your visualization needs



Chapter 7: Available tools and guidelines

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)



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