cenit

Science
for Transport

Center for Innovation in Transport

CORPORATE PRESENTATION

Barcelona, March 31 of 2023

Who we are

The Center for Innovation in Transport (**CENIT**) is a research group of the prestigious International Centre for Numerical Methods in Engineering (**CIMNE**), a consortium of the Catalan Government and UPC-BarcelonaTech with the cooperation of UNESCO, and Severo Ochoea Center of Excellence.

CENIT was created in 2001 as a partnership between the **Catalan Government** and the **Polytechnic University of Catalonia (UPC-BarcelonaTech**) to centralize expertise in transportation innovation**.** In 2017 CENIT became a member of CIMNE.

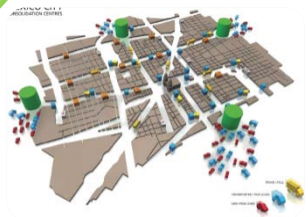
Our mission at CENIT is to build the next generation of solutions in global transport.

Our team is comprised of a diverse and experienced group of multilingual researchers including civil engineers, economists, computer engineers, naval architects and mathematicians.

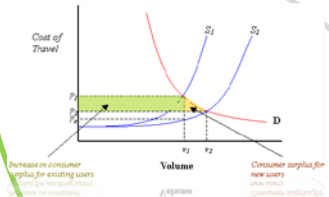
Consortium of:

PORT AND MARITIME TRANSPORTATION

PORT LOGISTICS AND MARITIME TRANSPORT



LOGISTICS AND FREIGHT DISTRIBUTION



TRANSPORT ECONOMICS

RAIL TRANSPORT

SUSTAINABLE MOBILITY AND TRAVEL BEHAVIOUR

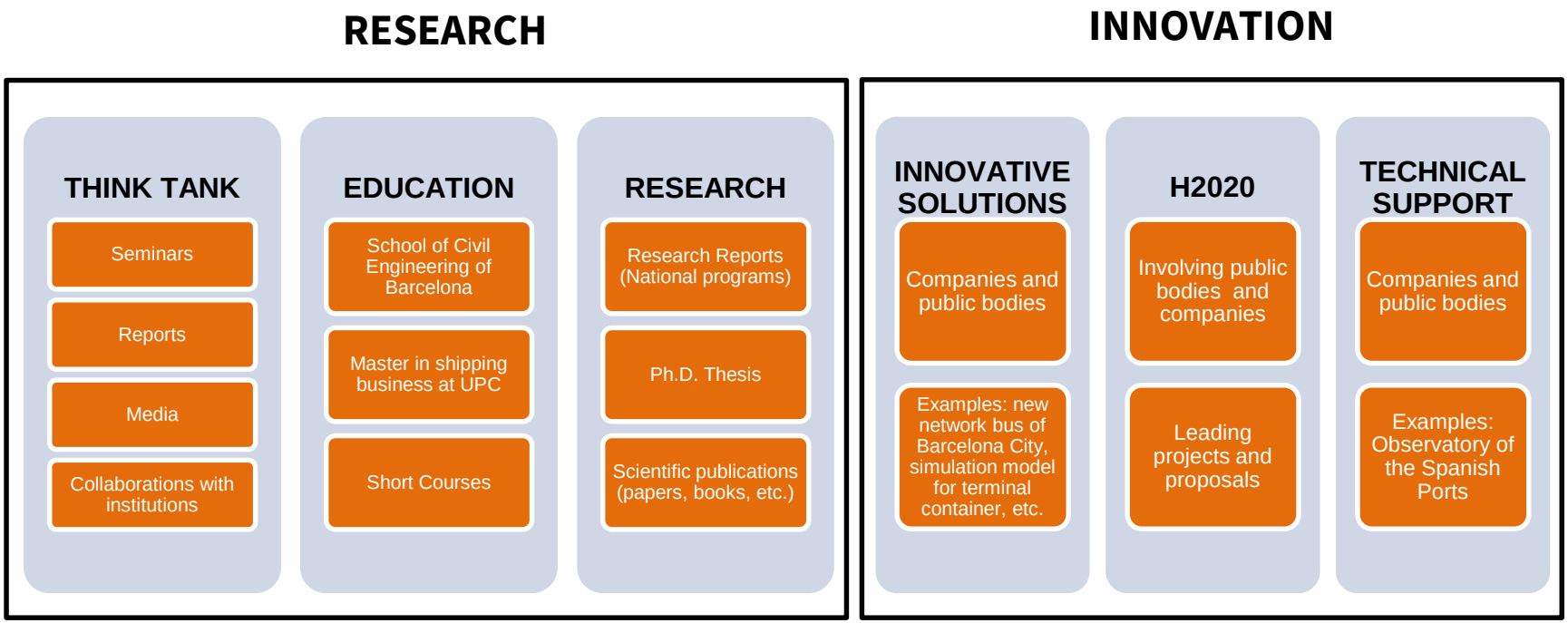
TRAFFIC MANAGEMENT

PUBLIC TRANSPORT

URBAN MOBILITY

INFRASTRUCTURE MANAGEMENT

How do we work?



CENIT offers a **scientific perspective** to analyzing the problems affecting the day-to-day operations of transportation systems, logistics chains and mobility plans.

We use Big Data, Econometric modeling and Operational Research to provide **innovative solutions** for the transport challenges**.**

Public Research Partnership Program (PRPP)

- Economic Appraisal of Transport Investments
- Analysis of O/D matrices
- Private-Public Partnership in road

→ Generalitat de Catalunya

- Emerging trends and their impacts on ports. Port Vision 2040
- E-commerce in port business
- Energy transitions in ports
- E-mobility and ports

→ Port de Barcelona

- Urban Public Transport Financing

→ ATM Àrea de Barcelona Autoritat del Transport Metropolità

Scientific production

CENIT, as a research centre, is committed to analysing the problems affecting the day-to-day operations of transportation systems, logistics chains/nodes and general mobility from a **scientific point of view.**

For this reason, CENIT boasts an experienced and diverse team of PhDs and PhD candidates with a high level of **scientific production.** Our work is published in books, articles and conference papers on a regular basis.

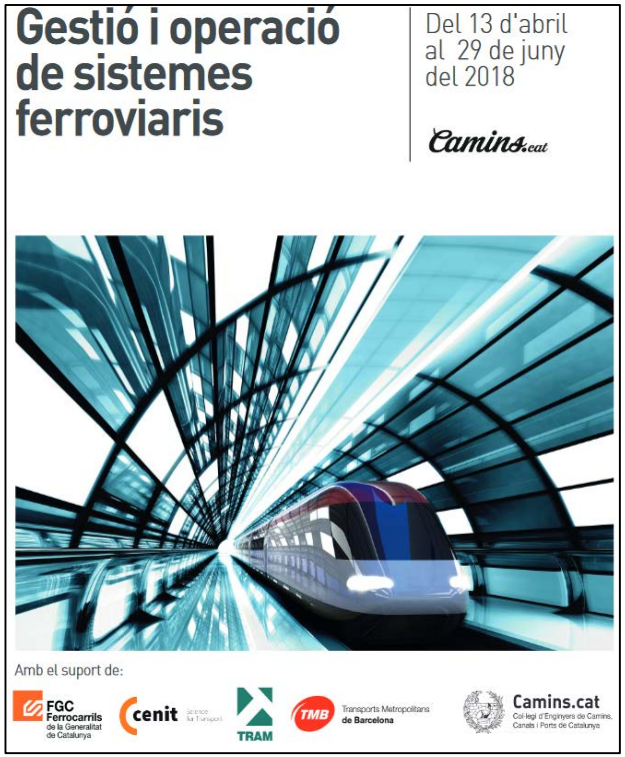
In this way, we **add value** through support and advisory services to public and private sector entities by developing tools and methodologies that can be applied in different fields of transport and logistics.

Education

Fundació UPC:

Master in Shipping Business

Master in Urban Development



cenit

Some of our clients

IFC International Finance Corporation World Bank Group

European Commission

BID Invest

CAF Banco de Desarrollo de América Latina

Republic of Trinidad and Tobago
Lorem ipsum

KRRI Korea Railroad Research Institute

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Generalitat de Catalunya

Gobierno de España
Ministerio de Transportes, Movilidad y Agenda Urbana

Québec

ATM Àrea de Barcelona
Autoritat del Transport Metropolità

Ajuntament de Barcelona

FGC Ferrocarrils de la Generalitat de Catalunya

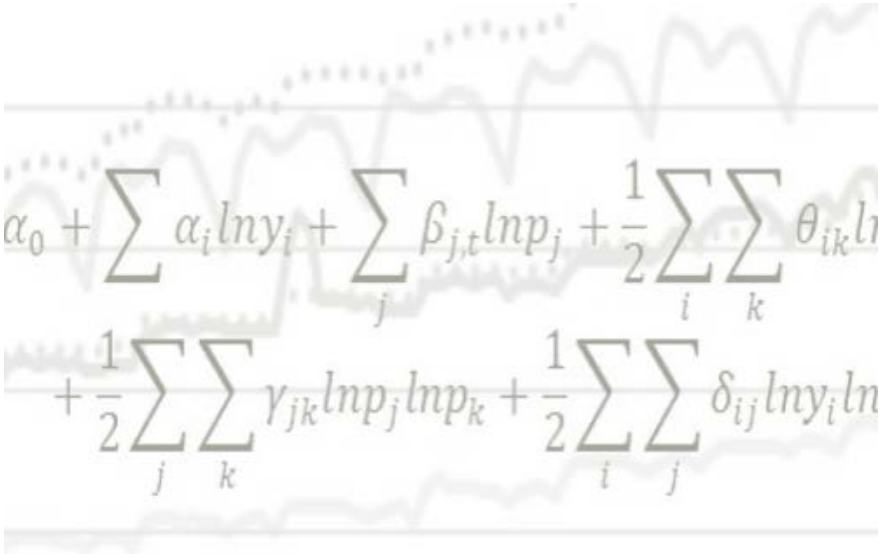
eit Urban Mobility

Port de Barcelona

amtu
Associació de Municipis per la Mobilitat i el Transport Urbà

Research Areas

Transport Economics



We are focused on the particular problems encountered by transport authorities and companies involved in the management of transport systems.

Our various fields of study and analysis include:

- **Cost- benefit analysis**
- **Charging systems**
- **PPP concession systems**
- **Financing**
- **Impact of transport investments**

References

Economic assessment of motorway and high capacity roads in Catalonia. Technical report. Regional Government of Catalonia

SAIT- Handbook for transport investment appraisal
Technical report. Regional Government of Catalonia

Investment Analysis in the Latin American Transport Sector for 2040
Technical report. Corporacion Andean de Fomento - CAF

Pilot Project Study on Innovative Ways of Sustainably Financing Public Transport
Technical report. European Commission - DG MOVE

Public Urban Transport

We offer advisory services for public transport operators to improve operational efficiency.

Our various fields of study and analysis include:

- **Public transport network design**
- **Implementation of the electric bus**
- **Efficiency analysis of the public transport**
- **Optimization of operations**
- **Demand analysis**

References

Zero Emission Urban Bus System- Zeus
Research Project. H2020. European Commission

Retbus I and II. Design of the Barcelona's bus network
Technical Report. City Hall of Barcelona

Annual Observatory of the Taxi of Barcelona
Technical Report. Metropolitan Area of Barcelona

Port Logistics and Maritime Transport

We advise the public sector, port services operators, stevedoring and shipping companies on:

- **Port operations and optimization.**
- **Cost analysis**
- **Demand analysis.**
- **Design of port terminals**
- **Impact of technologies**

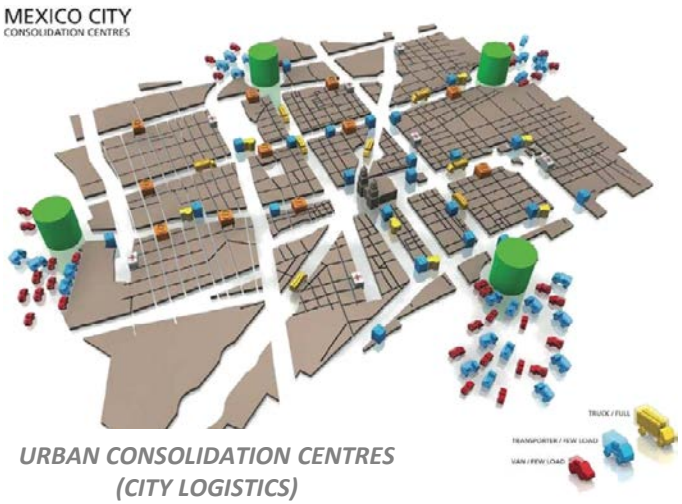
References

Analysis of recent trends in EU shipping and analysis of policy support to improve the competitiveness of Short Sea Shipping in the EU
Technical Report. European Commission – DG MOVE

Port of the Future. Vision 2040 of the Port of Barcelona
Research. Port of Barcelona

Sustainable Ports Subgroup
Technical and scientific support. European Commission – DG MOVE

Logistics and Urban Freight Distribution



URBAN CONSOLIDATION CENTRES (CITY LOGISTICS)

fuente: www.dhl.com

Our main research area is urban freight distribution with specific expertise in last-mile delivery.

Our work includes:

- **Designing routes for freight delivery,**
- **Solutions for the environment,**
- **Use of electric vehicles for freight distribution,**
- **Location of electric charging stations,**

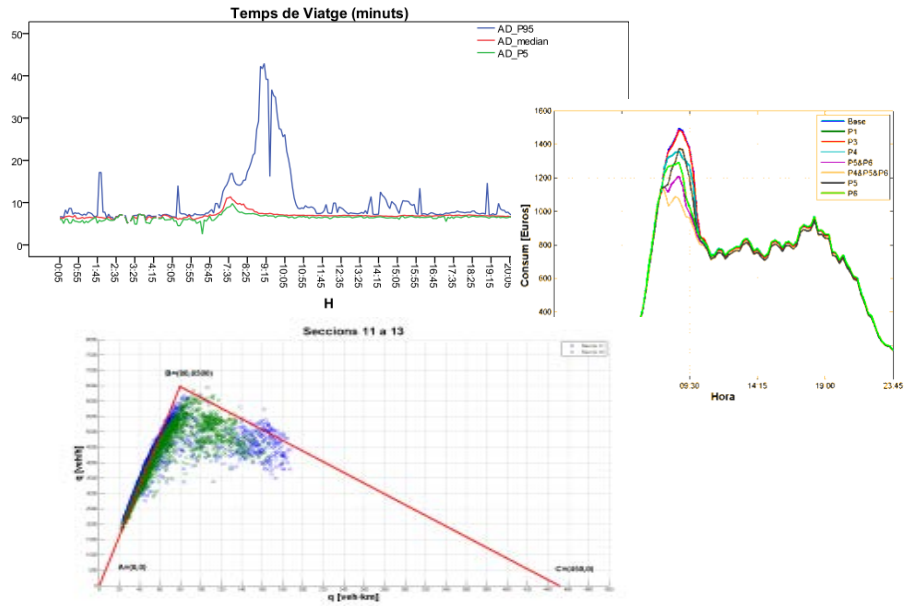
References

NOVELOG New cooperative business models and guidance for sustainable city logistics. H2020 Research Project. European Commission

SMILE: Smart Green innovative urban logistics for energy efficient mediterranean cities. Med Programme (L'Europe en Méditerranée). European Commission

White Paper on the Urban Freight Distribution.
Technical Report. Metropolitan Authority of Barcelona (ATM).

Traffic Modeling



Involving some of our most prominent projects which include:

- **The analysis of speed on urban highways.**
- **Use of dynamic signage and estimated travel time.**
- **Simulation models for cities**
- **Traffic light optimization**
- **Improvement of the urban mobility**

References

Mobility Simulation Tool for the City of Barcelona and traffic light optimization
Research and simulation model. Barcelona City Council

Tramway Extension Project
Research and simulation model. Barcelona City Council

Impact of the speed limit on traffic management
Technical Report. Catalan Agency of Traffic Management

Smart Cities and Urban Mobility

SmartCity solutions for a better performance of the urban mobility. The approach includes both the operational level and policy-making and urban development strategy.

- **Assessment of new modes of transport in cities.**
- **Balance of all transport modes transport in an urban setting.**
- **Traffic Simulation models for cities**
- **Urban mobility Policies**
- **Financing the new mobility solutions**

References

GrowSmarter – Transforming Cities for a Smart Sustainable Europe
Research. EU Horizon 2020 Project

New Paradigm of Urban Mobility – Limit of Modal Changes
Research. Volkswagen - SEAT

Mobility Simulation Tool for the City of Barcelona and traffic light optimization
Research and simulation model. Barcelona City Council

Emerging Research Areas

Urban Planning and mobility
(AMB, EIT Urban Mobility, macroblock paper)

Applications of Machine Learning in transport and mobility
(cell phone data, etc.) Post-Doc Severo Ochoa

Transport digitalization
(Handbook for Generalitat, MITMA, etc.)

Demand Analysis
(activity based models, new prokect in Ankara!)

Some references for SUMP of Ankara

GROWSMARTER - Transforming Cities for a Smart, Sustainable Europe

CUSTOMER: European Commission – H2020 Lighthouse Project | **2015-2020**

ABSTRACT

The GrowSmarter project is about how cities with smart environmental technology solutions can create more jobs and grow, while becoming more energy efficient, easily walkable and attractive to residents.

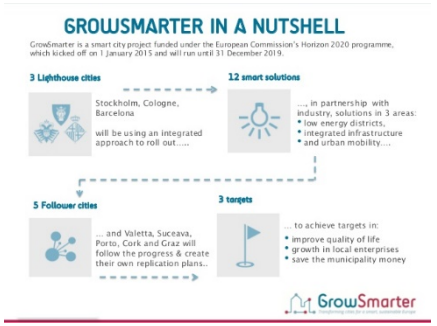
The objectives of the project were to:

- Improve the quality of life for European citizens by better mobility, housing and the quality of urban infrastructure while improving the citizens economy by lower energy costs and creating as much as 1500 new jobs (on the demonstration level).
- Reduce the environmental impact by lower energy needs by 60 % and increased use of renewable energy thus further reducing GHG emissions.
- Create sustainable economic development by demonstrating and preparing a wider rollout of smart solutions.

The team at CENIT provided the following services:

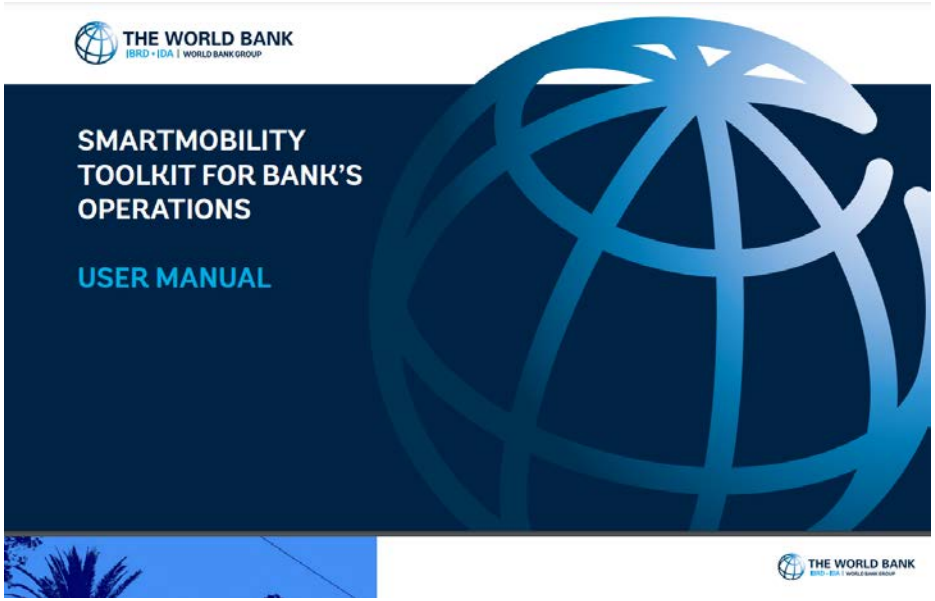
• Coordination of the mobility measures in Barcelona

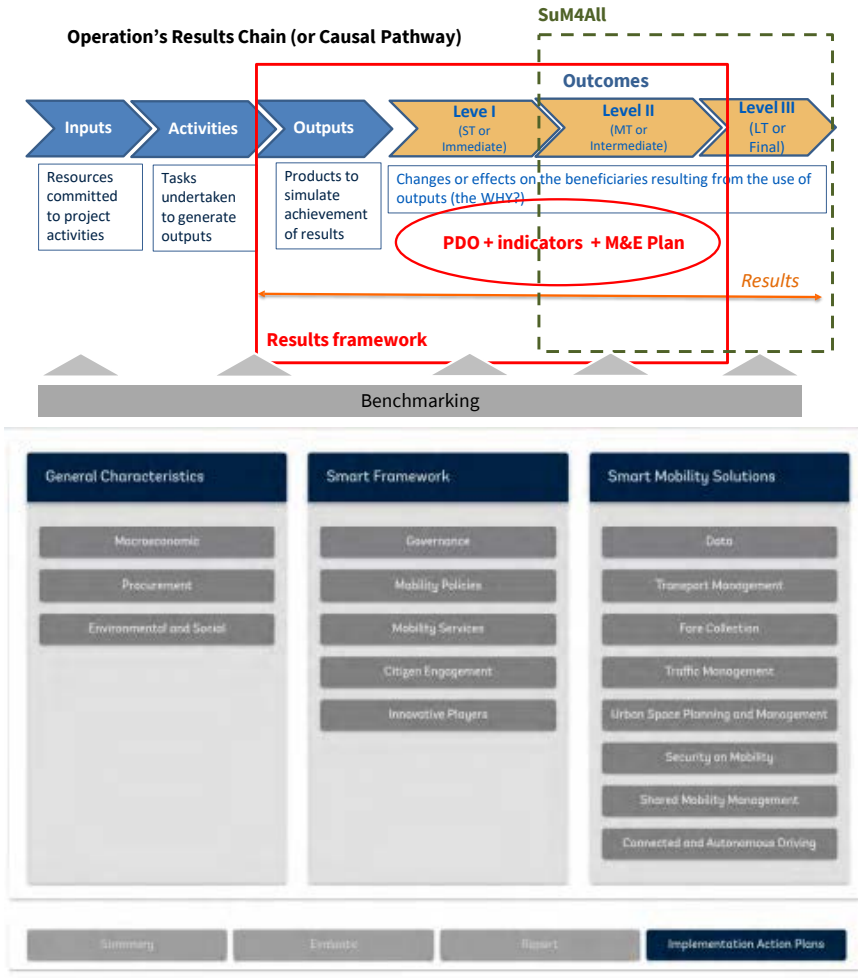
• Evaluation of a platform of goods distribution, a smart taxi stand and the use of the MFD theory to improve traffic congestion



Supervision Support for Development of a Smart Mobility Guideline for Bank Operations, Benchmarking, and Piloting

CUSTOMER: WORLD BANK | **2022-ongoing**





Diagnostic Tool for Urban Transport

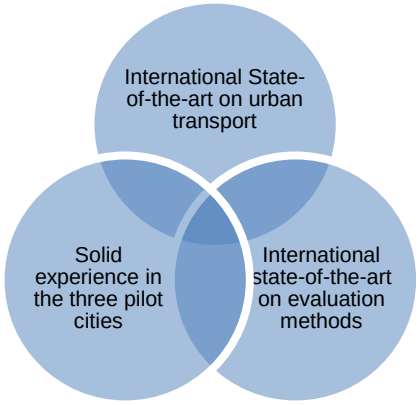
CUSTOMER: International Finance Corporation | **2017-2018**

ABSTRACT

The overall objective was to create a Diagnostic Tool to support the IFC in business development and to facilitate on-going strategic city engagements. The tool was created to be transparent and systematic, to build on strong knowledge of local context, to be based on qualitative assessments providing an overall picture of the strengths and weaknesses of a city's urban transport system to be compared against peer cities. The three peer cities chosen by the IFC were Belgrade, Buenos Aires and Kiev.

The first phase of the project focused on further development and finalization of the diagnostic tool. When the final product was created, it was then tested in three cities and then evaluated and findings were reported.

The team at CENIT provided the following services:
- As an Urban Transport Analysis Expert CENIT assisted with development of the diagnostic tool.
- Pilot evaluation of the three cities.
- Preparation of the final report.



Logic behind assessment

External factors
⇩
Objectives
⇩
Targets (indicators) for achieving objectives
⇩
Institutions and measures

Assessment

Key topics	Analytical elements	Scores	Data sources
Political and institutional set up (Soft infrastructure)	1a - 1d	0 - 5	Interviews Documents Field visits
Transport network (hard infrastructure)	2a – 2e	0 – 5	
User experience	3a – 3e	0 - 5	

Summary
Good practise
Challenges

EnerNETMob - Mediterranean Interregional Electromobility Networks for intermodal systems and multimodal connections

CUSTOMER: MED - Interreg (European Commission) | **2018-2022**

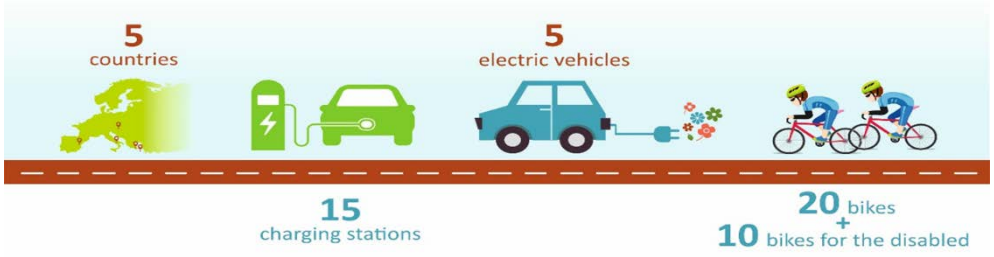
ABSTRACT

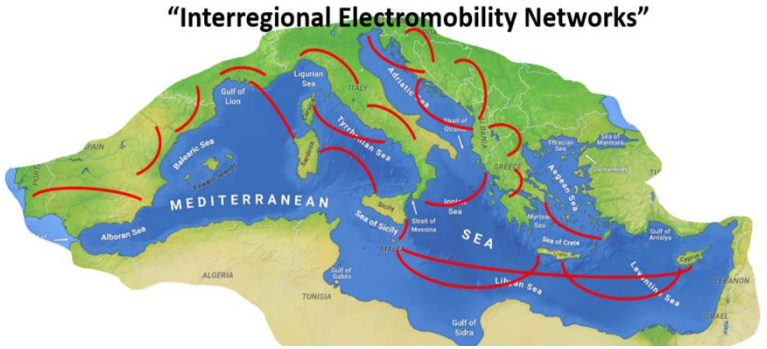
EnerNETMob aims to draft, test and improve parallel “Sustainable Electromobility Plans” according to common standards and low carbon emission policies, in order to set an “Interregional Electromobility Network” crossing cities of all the Interreg MED area. The project promotes sharing mobility and land-sea intermodality using electric transport systems, by implementing interurban and interregional pilot networks of Electric Vehicles Supply Equipment (EVSE) also co-powered by Renewable Energy Sources.

It will develop electromobilty solutions and will test pilot actions to overcome medium-trip limitations and to coordinate future investments on electric transport.

The team at CENIT provided the following services:

- Development of electromobility solutions
- Testing of pilot actions to overcome medium-trip limitations





ELIPTIC – ELECTRIFICATION OF PUBLIC TRANSPORT IN CITIES

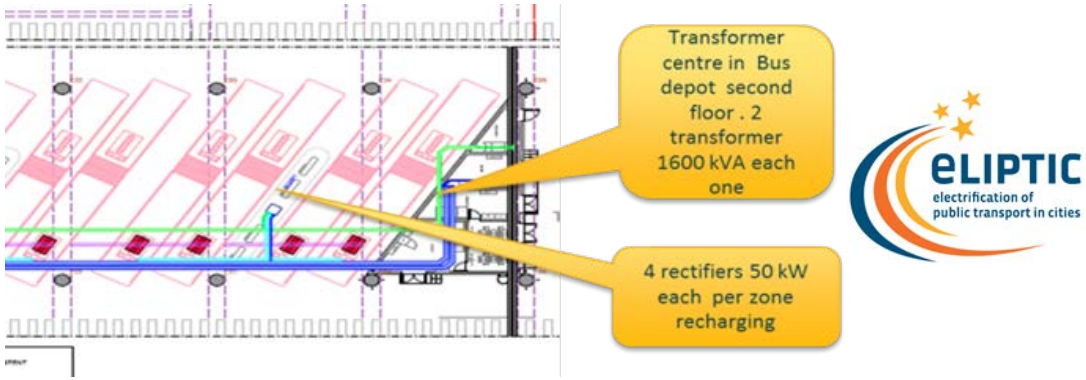
CUSTOMER: European Commission – H2020 | **2015- 2018**

ABSTRACT

The aim of the ELIPTIC project was to develop new use concepts and business cases in order to optimize existing electric infrastructure and rolling stock, saving both money and energy. The project strengthens the role of electric public transport, leading to reduced fossil fuel consumption and improved air quality.

To achieve this goal, ELIPTIC analyzed 23 use cases within 11 cities (Barcelona, Bremen, Brussels, Eberswalde, Gdynia, Lanciano, Leipzig, London, Oberhausen, Szeged, Warsaw) and in three thematic pillars. The project also supported the uptake and exploitation of results by developing guidelines and tools for upgrading and regenerating electric public transport systems. ELIPTIC promotes the electric public transport sector at a political level and helps develop political support for the electrification of public transport across Europe.

The team at CENIT provided the following services:
- Project management.
- Development of guidelines and tools for upgrading and regenerating electric public transport systems.
- Policy recommendations for the electrification of public transport.
- Coordination of Barcelona pilot tests.



Hubs for Last Mile Delivery Solutions (Project HALLO)

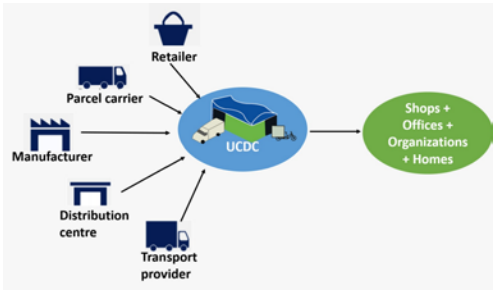
CLIENT: EIT Urban Mobility | **2021**

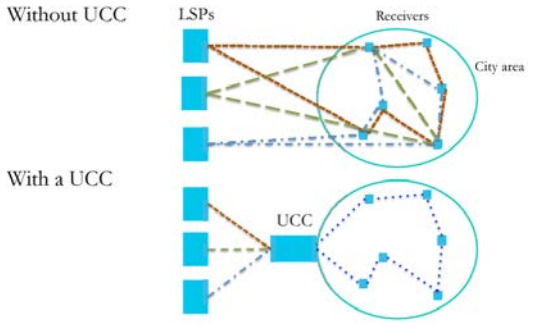
ABSTRACT

HALLO project seeks to create shared urban consolidation and distribution centres (UCDCs) through a pilot case implemented at the Low Emission Zone in the Metropolitan Area of Barcelona (AMB) and four complementary actions in Stockholm which consist of: (a) delivery fossil-fuel free logistics in the district of Södermalm, (b) innovative delivery solutions across Stockholm, (c) plan and test a micro-terminal for logistics and other services in Södermalm, and (d) conduct a stakeholder dialogue that will outline a roadmap for future development of fossil-free logistics in Stockholm.
Moreover, to allow future replications to other cities, a roadmap with detailed location planning that takes account of implementation challenges and the business model is provided. The CENIT researchers will contribute from their experience in optimization of freight distribution routes, urban mobility, and smart city solutions.

The team at CENIT provided the following services:

- The layout of the facility location and knowledge base relevant for the ensuing stages of the project.
- Analysis of the state of the art
- Support activities on tools for implementation, HALLO's living labs as well as evaluation and exploitation.





New Paradigm of Urban Mobility in Barcelona - Limit of Modal Changes

Volkswagen | **2015- present**

ABSTRACT

New mobility models aim to integrate all transport models into a single mobility system instead of considering each one independently. For this reason, public transport authorities and new stakeholders such as the automotive industry seek to understand better user satisfaction and anticipate trends in mobility for planning their future product offering.

The main objectives of this project are to identify factors that contribute to shift from one transport mode to another and to explore the best way to analyze such changes. The outcomes of this analysis will show current mobility patterns in Barcelona and identify possible solutions to be implemented in order to correctly satisfy citizens' transports priorities.

To this end, the CENIT Team is undertaking the following measures:

(i) Statistically analyze the data collected and classify individuals into groups based on their travel behaviour and preferences towards different mobility services.

(ii) Analyze the patterns of the users (demand) in relation to the service features (supply).

(iii) Create different scenarios to see what type of transport will be chosen.

	Willingness to change	Flexibility	Personal space	Loyalty to car	Comfort	Use of time	PT service
Use of PV	0,036	0,156	0,223	0,414	-0,119	-0,141	-0,108
Use of PT	0,018	-0,083	-0,113	-0,220	0,045	0,219	0,041

EMBLEMATIC- Mobility Simulation Tool for the City of Barcelona and traffic light optimization

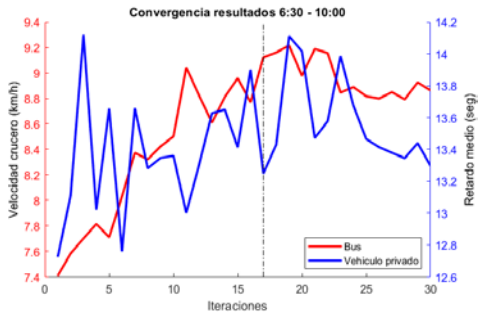
CUSTOMER: Barcelona City Council | **2017-2019**

ABSTRACT

The objectives of the project were the development of a decision-making tool (simulation tool) to improve the mobility of Barcelona and traffic light optimization. It provides a framework for the evaluation of the mobility measures to achieve sustainable mobility. On the other hand it allows a better traffic light regulation to improve public transport, private vehicle, pedestrian and bicycle mobility. The tool is based on a macroscopic and microscopic model. It will simulate the set of different modes of transport of the city, including the traffic light, public transport, private vehicle, pedestrian and bicycle. The architecture of the tool is based on the integration and improvement of some of the software currently in the market.

The team at CENIT provided the following services:

- Definition of scenarios and execution of them with the subsequent analysis of the results
- Development of external applications to implement automations and complex external functionalities, such as optimization of traffic light configuration.
- Preparation of results reports and user manuals and installation of the simulation tool.
- Simulation of the set of different modes of transport within the city, including traffic lights, public transport, private vehicle, pedestrian and bicycle



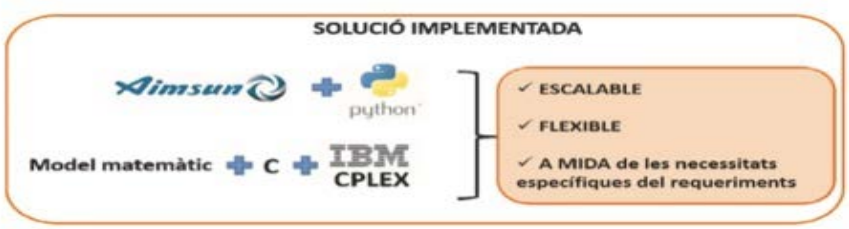
Tramway Extension Project

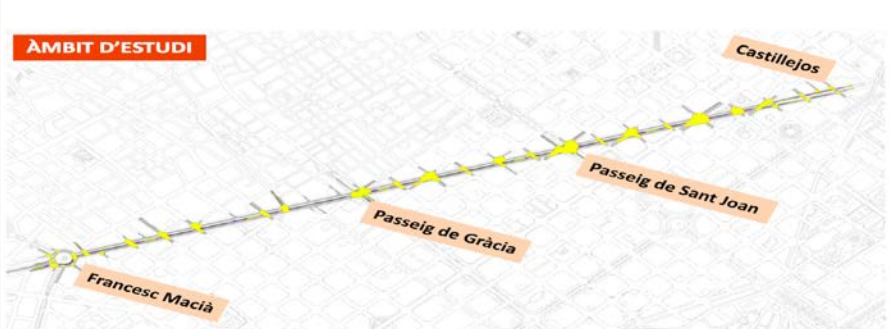
Barcelona City Council | **2017**

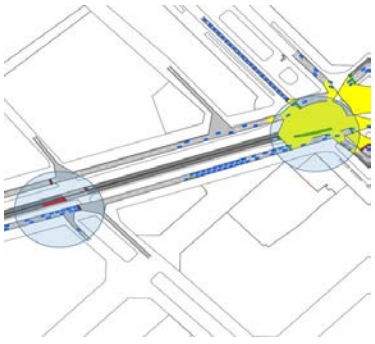
ABSTRACT

The Tramway Extension Simulation Project evaluated, through simulation, the impact the extension of the tramway would have on mobility. Currently the tram is split in two routes on opposite sides of the city and the project assessed the effects on mobility of joining the two tram routes through the central business district of Barcelona along the Diagonal Avenue. A new traffic light regulation was proposed in order to optimize the flow of trams, vehicles, bicycles, buses and pedestrians.

The study concluded that it is possible to connect the tram on Diagonal AV. With a correct commercial speed while at the same time guaranteeing the efficiency of the other modes of transport and even on some occasions, improving the bus travel times without increasing private traffic congestion. Mobility conditions for cyclists and pedestrians also improved in this study as the new layout on the avenue increases the space devoted to this group.







RETBUS I- Public Transportation Network in Barcelona

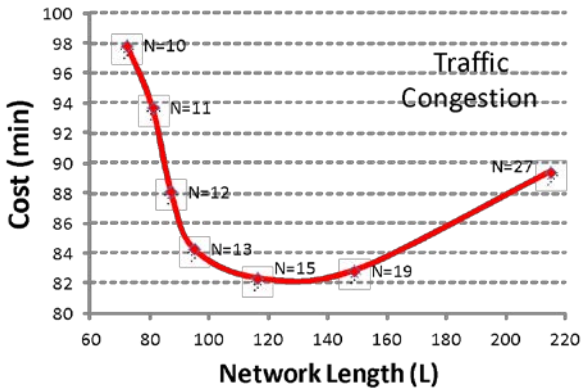
Barcelona City Council and Transports Metropolitans de Barcelona (TMB) | 2009-2010

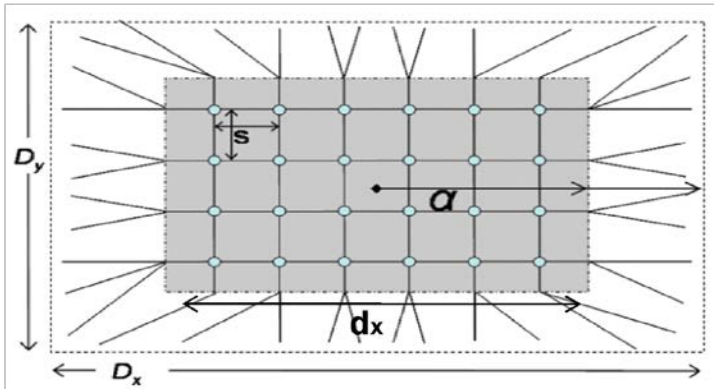
ABSTRACT

The goal of the project was to design the new bus network for the city of Barcelona. The network was created with hierarchic configuration and scientific methodology to ensure top performance of the bus lines. The analysis was done at strategic, tactical and operational levels.

The network combines high performance corridors with conventional and proximity networks, making it possible to combine good accessibility with a high quality of service.

In addition to the definition of a new bus network line, the project resulted in a scientific paper published in several SCI journals.





cenit

Science
for Transport

Centre d'Innovació del Transport (CENIT)
C/ Jordi Girona, 1-3, C3, S120, 08034, Barcelona
www.cenit.es

A member of:

CIMNE

EXCELENCIA
SEVERO
OCHOA