triangulum

DEMONSTRATE · DISSEMINATE · REPLICATE

D6.6. Revised implementation plan, Sabadell

WP 6, Smart city framework, Task 6.7. Development of follower cities implementation strategy

January, 2018 (M36)

Project Coordination:
Fraunhofer Institute IAO

H2020-SCC-2014-2015/H2020-SCC-2014:
'Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects'

Collaborative Project – **GRANT AGREEMENT No. 646578**

Deliverable information sheet

Project Acronym	TRIANGULUM	
Project Title	Triangulum: The Three Point Project / Demonstrate. Disseminate. Replicate	
Project Coordinator	Damian Wagner (Damian.Wagner@iao.fraunhofer.de) Fraunhofer IAO	
Project Duration	1st February 2015 – 31st January 2020 (60 Months)	
Deliverable No.	D6.6. Revised implementation plan, Sabadell	
Diss. Level	PU	
Status		Working
		Verified by other WPs
		Final version
Due date	31st January 2018	
Work Package	WP 6 – Smart city framework	
Lead beneficiary	21 (AJSAB) + THIRD PARTIES VIMUSA, PES & IAS	
Contributing beneficiary(ies)	FHg, MCC, EIN, SK	
DoA	Supported by scientific evaluation, close collaboration with lighthouse cities and a systematic approach to replication, the follower Cities Prague (CZ), Sabadell (ES) and Leipzig (GER) will finalize their own Smart City Implementation Plans within the first 3 years of Triangulum. The implementation plans are aligned to the implementation structure within lighthouse cities and will address the sectors energy, ICT and mobility in an integrated way. They will further include measures for citizen integration and plans for investments and funding of implementation. During the process of developing the own Smart city implementation plans, follower cities will provide feedback to lighthouse cities and WP 06 leaders in order to assure replicability of lighthouse cities implementation.	

Date	Version	Author	Comment
August 5, 2017	0.1	Ajuntament de Sabadell, Oriol Llevot	First draft
January 16, 2018	0.2	Ajuntament de Sabadell, Oriol Llevot	Second Draft reviewed by Manchester City Council (Sophie Sheil) and Stavanger City Council (Katelien van den Berge)
January 29, 2018	0.3	Ajuntament de Sabadell, Oriol Llevot	Third Draft reviewed by Fraunhofer IAO (Sonja Stöffler/Alexander Schmidt)
January 31, 2018	0.4	Ajuntament de Sabadell	Final draft
January 31, 2018	0.5	Fraunhofer IAO, Marielisa Padilla	Cross-check coordination team IAT
February 6, 2018	1.0	Ajuntament de Sabadell, Oriol Llevot	Final version

List of partners

Title	Abbreviation
Ajuntament de Sabadell (beneficiary)	AJSAB
Habitatges Municipals de Sabadell SA (linked third party)	VIMUSA
Promoció Econòmica de Sabadell SL (linked third party)	PES
Informàtica Ajuntament Sabadell (linked third party)	IAS

List of main abbreviations (excluding Appendix)

Title	Abbreviation
DoA	Description of the Action (Triangulum project document)
UAB	Autonomous University of Barcelona
ESDI	Superior university school of design
Follower city Implementation strategy	FCIS
Integrated & sustainable urban development strategy	EDUSI
European regional development funds	ERDF
European social funds	ESF
Electric vehicles	EV
Urban innovative actions	UIA
Morgenstadt	MS
CAPEX/OPEX	Capital expenditures / Operational expenditures

Preface

The Triangulum's follower city implementation plan is at the core of the project's motto "*Demonstrate. Replicate. Disseminate*". After demonstrating and evaluating the validity of innovative solutions in the ICT, mobility and energy fields in the lighthouse cities, it is necessary to proof that these solutions are replicable in the rest of European cities, with Sabadell as one of the first replicators, together with Prague and Leipzig. This represents an additional challenge beyond the mere, single city implementation, as success factors, barriers and local frame conditions can be very variable between lighthouse and follower cities.

The challenging goal is to design tailored solutions adapted to local needs, but standard enough to be applied to a significant array of European cities, with bankable and demand-oriented projects. This process has been concretised through the application of the "*Morgenstadt*" methodology in the follower cities, the on-site visits in lighthouse cities and the training missions, facilitating peer-to-peer learning between all the Triangulum partner cities. Not only follower cities learn from the lighthouse cities solutions, but also the lighthouse streamline their innovations on the basis of the follower cities conditions, in order to ensure replicability. This systematic methodology for replication represents, by itself, a project outcome which can be useful for many other cities in Europe.

This Triangulum implementation plan of Sabadell is thus the result of matching the previously identified Sabadell city needs with the innovative solutions implemented in the lighthouse cities, to eventually concretise several low-risk replicable projects, backed by sound business models and payback periods. It has been enriched in the last months with the contributions of the lighthouse cities and, specially, of other relevant Sabadell city stakeholders, so that both the project design and implementation phases are co-produced in a "quadruple helix" framework. This is very important for Sabadell. By testing new business models with less burden on public finances, we can innovate not only in technologies but also in governance schemes.

For Sabadell, the main goal is that our strategy reflects the ideas of citizen's life quality improvement, social inclusion, democratic quality, and leverage for equitable economic progress with new jobs creation, especially for small entrepreneurs and the social economy sectors. To this aim, we will continue to work so that the Triangulum project leaves a strong footprint in our city.

Miquel Soler i Antolí
Councillor of Innovation and city

Sabadell, 31th January, 2018

Executive summary

The present deliverable is submitted according to the Triangulum project document (DoA-Description of the Action), which establishes that the implementation strategy for the follower cities (FCIS) must be approved before the end of the 3rd project year (January 2018), and implementation must start during 2018. It is part of the Task 6.7. "Development of follower cities implementation strategy". The document structure is based on a template provided by the work package coordinator.

The deliverable is divided into **2 differentiated parts**: Until chapter 4.2., it refers to the project pre-requirements, city conditions and replication processes that influenced the elaboration of the Sabadell's FCIS: City conditions and on-going Triangulum-related strategies; pre-requirements for the FCIS established in the DoA; and urban indicators assessment. Oppositely, as of chapter 4.3., it describes the actual 10 actions included in the strategy, as a result of this previous replication process, and how the strategy matches with the project objectives. Finally, the appendix encompasses all background information that was used as input for the deliverable, including actions that were discussed during the replication process but finally not prioritised as part of the FCIS.

The following requirements have been considered in the strategy, in accordance with the DoA:

- Energy, ICT and mobility sectors have to be addressed in an integrated way, and measures for citizen involvement and funding plan have to be included.
- The following aspects have to be included in the strategy (see chapter 5): District/area to be used for smart city implementation; Technologies & solutions to be implemented; Costs of planned implementation measures; Funding and business models applied for implementation; Reference to lighthouse cities (replication); Key timescales; Lead partners; Risks & risk mitigation measures; Local governance & coordination structure
- The overall project objectives, which are referential for both the lighthouse and the follower cities -in particular, project goals 7 to 10 refer directly or indirectly to the follower cities replication- are taken as general objectives for the Sabadell's implementation strategy (see Table 04).
- Business models based on bankable projects and market oriented measures. Low risk investments.
- Common, standard ICT Reference Architecture for integrating data into smart cities data platforms, across the 6 cities
- The specific objectives for Sabadell as stated in the DoA (see Table 04)

The criteria for the elaboration of the Triangulum's FCIS has been not to overlap but complement, complete and build upon the actions already included in the existing, approved municipal strategies, so that it is coherent with the overall municipal strategic planning.

Therefore, the Triangulum's FCIS establishes actions mostly relying on a different funding than the other already approved municipal strategies. This funding can be already committed or pending to be concretised. In relation with existing strategies, the new actions foreseen in the Triangulum's FCIS are mostly:

- Fully new.
- Same action as in the existing strategies but for a different location or beneficiary.

- Action foreseen in existing strategies but improved on the basis of the Triangulum process

This is not in contradiction with the fact that the already approved actions in other strategies can be refined and improved based on the learning from the Triangulum's replication process – especially as a result of the on-site visits in lighthouse cities- but mostly not as part of the Triangulum's FCIS because they rely on already approved funding.

Moreover, the actions included in the Sabadell's FCIS are in phase with:

- The general and specific objectives and conditions established in the Triangulum project document (DoA-Description of the Action)
- The lighthouse cities implemented actions and training mission
- The results from the on-site assessment in Sabadell and the Morgenstadt data assessment
- The existing Sabadell municipal strategic planning
- The internal roundtables and interviews held before and after the Sabadell's on-site assessment

As a result (see chapter 4.3), the Sabadell's Triangulum FCIS has been elaborated with 10 actions in the fields of mobility, energy and ICT, for implementation in the period 2018-2020 (for most of the actions). The majority of the actions are at the starting point.

The Triangulum implementation strategy is going to be officially approved by the competent municipal body once this deliverable has been accepted by the European Commission.

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Table of figures and tables (excluding Appendix)

Figures

Tables

1. City context and definition of the initial problem/ policy challenge

This chapter refers to city conditions that have influenced and determined the actions prioritised for the Sabadell's FCIS, so that it is aligned with the real city needs and policies established by the local government.

1.1. Statistical and referenced evidence to demonstrate and define city context and challenges

Sabadell is a city benefitting from a strategic position in southern Europe, close to a world city like Barcelona, well connected to main infrastructures linking the Mediterranean coast to the rest of Europe. Sabadell has also succeeded in preserving its personality despite being only 25 km. from Barcelona. This is due to the strong historical will of its population of being active in promoting initiatives in all fields: economic, cultural and social. This is why Sabadell remains the headquarter for certain finance and industrial organisations with influence at the national level, hosts an Opera Theatre (La Faràndula) and acts as a commercial centre for an important part of the "Western Vallès" area, with 900,000 inhabitants.

Sabadell has also a remarkable contemporary history, when at the beginning of the 20th century was called the "Catalan Manchester" due to the big presence of textile industries. Due to pressure from cheaper markets, textile industries have declined in number but increased in quality, boosted by the Sabadell School of Design. Moreover, Sabadell is located in an area surrounding the B-30 orbital highway (known as B30 axis) hosting near 23,000 firms, a big university (UAB), an international business school (ESADE) and a modern industrial-scale synchrotron (Alba). Therefore, the city has the optimal conditions to be prepared for the new economy.

Sabadell pursues to have a good balance between life quality and economic prosperity. This is due to the political orientation of the city as of the early 80s, where citizens have been given the main role. For this reason, the construction of the impressive financial axis of Sabadell (Eix Macià) in mid 90s came together with the development of the big Catalunya Park just in front of it, and the recuperation of previously polluted areas surrounding the Ripoll river for leisure uses, as well as ecological agricultural production. Since 2015, the local government puts greater emphasis on transparency and real citizen participation, in view of empowering citizens in decision-making related to local public affairs.

However, the city suffers from certain temporary and structural problems, like school failure and undereducation with respect to the Catalan average, as well as low employment and active population rates due to the effect of the economic crisis. Moreover, there are significant socioeconomic, housing and public space differences between the central area and other city districts, which the municipality struggles to reduce but with limited investment budget. The city experiments a particular difficulty to retain and attract the most qualified workforce, which flows towards other areas of the Barcelona metropolitan region. Finally, urban spaces are still too much oriented to private cars, compared to the space offered for public transport, pedestrians and bicycles, although there is a big share of walking mobility, facilitated by a flat surface and a "compact city" design.

- Location of the city

Figure 01: Map of Sabadell with indication of districts and sectors. Source: Sabadell City Council

Figure 02: Sabadell in the 1950s (60,000 inhab.). Source: Institut Cartogràfic i Geològic de Catalunya

Figure 03: Sabadell in the 2010s (208,000 inhab.). Source: Google Maps
(*The city has almost doubled its urbanised surface, while population has been multiplied by 3.5, corresponding to a "compact city" with preference for vertical apartment blocks in newer constructions)*

- City main statistics

Population (2017)	209,931	**Area (Km²)**	37.89 sqm.
Location	WESTERN VALLÈS COUNTY, METROPOLITAN REGION OF BARCELONA, CATALONIA	**Official language**	CATALAN AND SPANISH
Mayor	Mr. Maties SERRACANT i CAMPS		
Population Density: 5,540.54 inhab./sqkm.			
GDP per capita (2015): 21,500 Euro (Catalonia: 29,000 Euro)			
Other: GDP: 4,448,800 Euro; Firms: 10,980; Main Economic activities: Manufacturing industries 10.95%, Finance and insurance 14.10%, Wholesale and retail trade 18.61%; Green spaces: 1,855,473 sqm; Public libraries: 8; Motorisation index: 604.01 vehicles/1,000 inh. (61.84 motorcycles); working obliged mobility of employed residents: 52.4%; Population with university education: 18.4%; Rain: 563.7 mm/year; Average temperature: 14.4ºC (12.4ºC high in January, 31.0ºC high in July); Yearly rainy days: <100; Wind: 2.1 m/sec.; Height: 250 m. (m.a.s.l.)			

Table 01: Sabadell main figures. Source: Institut d'Estadística de Catalunya (IDESCAT) + Municipality of Sabadell

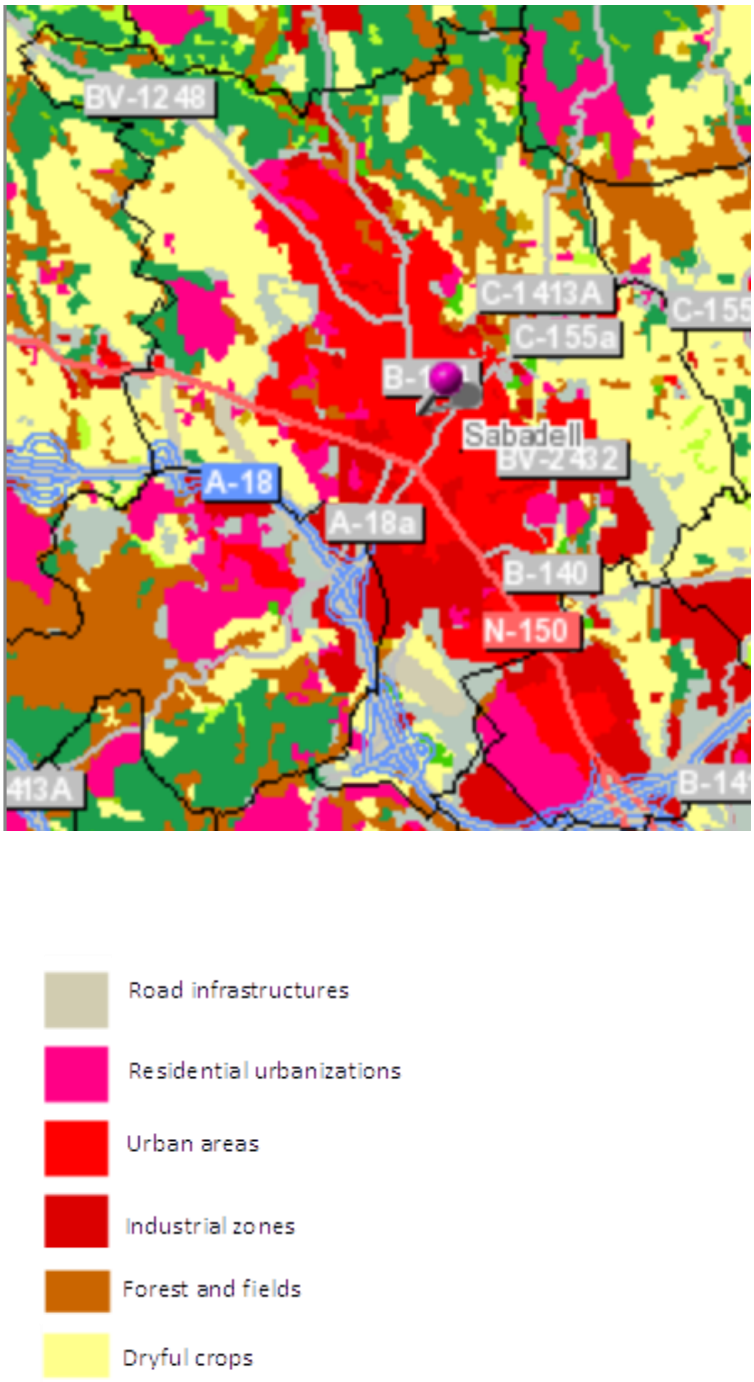


Figure 04: Uses of land in Sabadell and surrounding municipalities. Source: Institut Cartogràfic de Catalunya

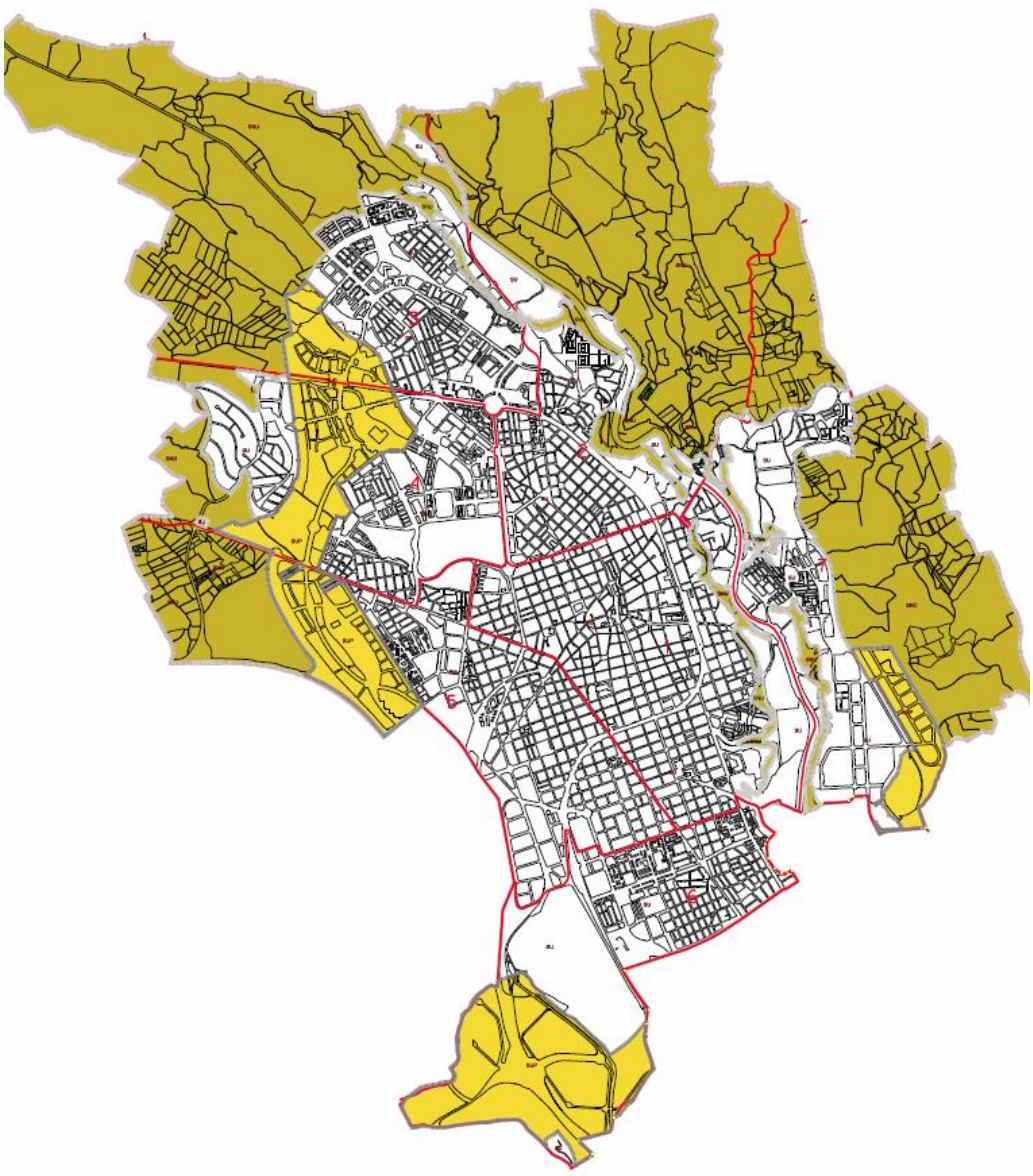


Figure 05: Land qualification according to General plan of ordination of Sabadell, 1993 (PGMOS). Source: Sabadell City Council. *White colour=Urban land; Yellow=developable land; Brown=Not developable land.*

- Summary of relevant Operational Programmes (ERDF and ESF) covering the city

The municipality of Sabadell has been recently attributed ERDF funding (50% co-financing) for the implementation of the local **Integrated and sustainable urban development strategy (EDUSI).** This involves an important investment for the period 2017-2020, of nearly 20 million Euro, including the following actions that are in line with the ERDF thematic objectives 2, 4, 6 and 9.

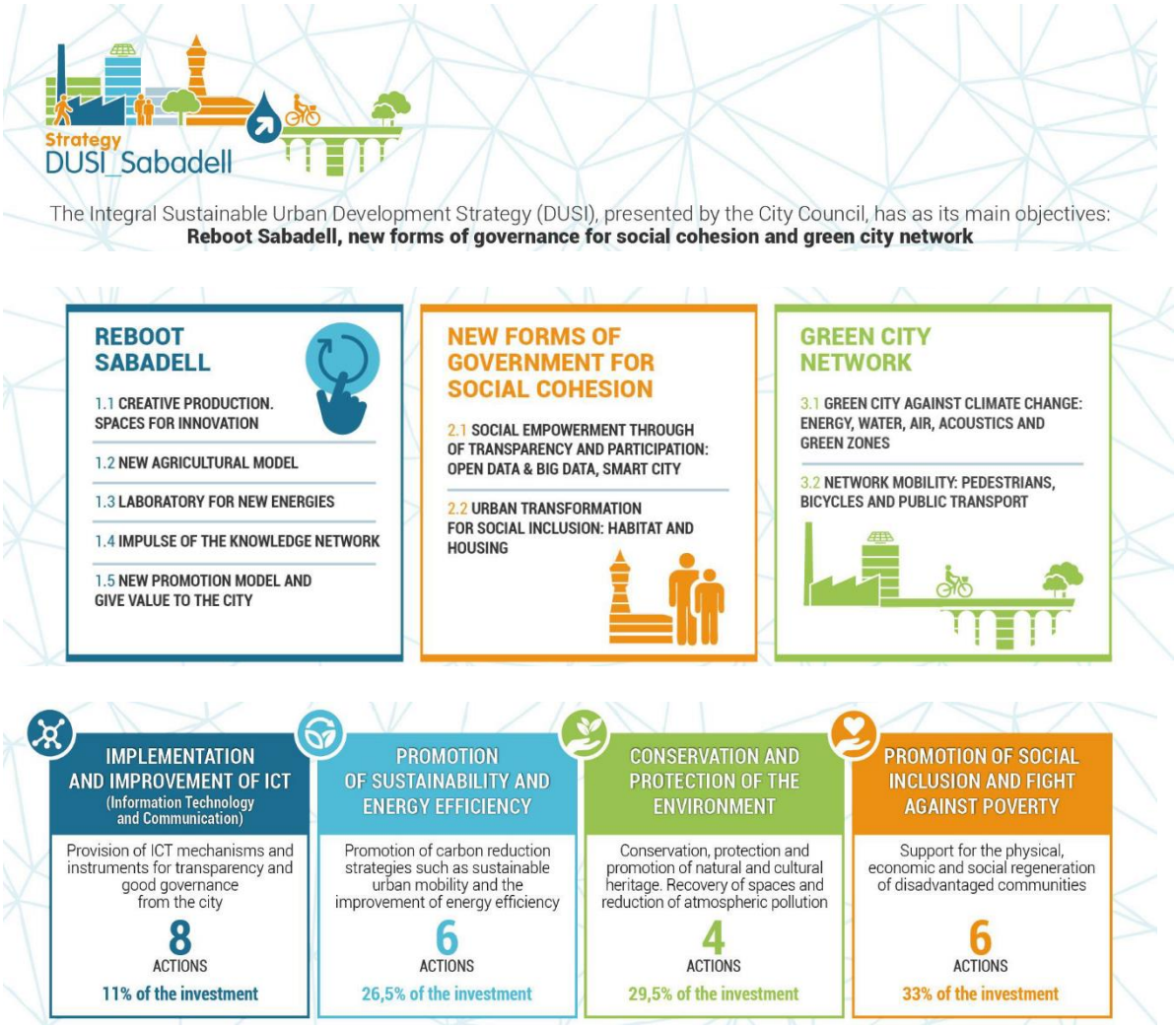


Figure 06: Sabadell's Integrated and sustainable urban development strategy (EDUSI) scheme of actions and objectives

List of the 24 EDUSI's actions:

ERDF Thematic objective 2 (Implementation and improvement of ICT (Information and communication technology):

- Open data & big data: improve ICT infrastructure at sport facilities; renewal of the municipal open data portal; ICT tools for 2.0 citizen's participation; increase accessibility to municipal websites; mobile-responsive e-administration: 920,000 Euro.
- Implement a contactless "citizen's card": 250,000 Euro.
- ICT for the remote energy management & monitoring of municipal buildings: 200,000 Euro.
- Environmental –pollution and noise- sensors: 350,000 Euro.
- "Smart mobility": real-time parking sensors, access control to pedestrian areas, ICT system to manage and control municipal bikes; Renew the bus operation aid system (OAS); increase crossroads with priority traffic lights for buses: 450,000 Euro.
- ICT for tourism and retail shopping: mobile "apps" for tourism and retail shopping: 450,000 Euro.

ERDF Thematic objective 4 (Promotion of sustainability and energy efficiency):

- Increase bike lanes and bike parking places; establish "Protected environment urban zones"; School paths: 2,300,000 Euro.
- Bus renewal: 1,400,000 Euro.
- Control cameras for freight parking spaces; app to inform about availability of freight parking spaces: 300,000 Euro.
- Energy refurbishment at social housing rented buildings: 200,000 Euro.
- Energy refurbishment of public buildings (schools, libraries): 900,000 Euro.
- Renewable energies in public buildings; Energy "living lab": 400,000 Euro.

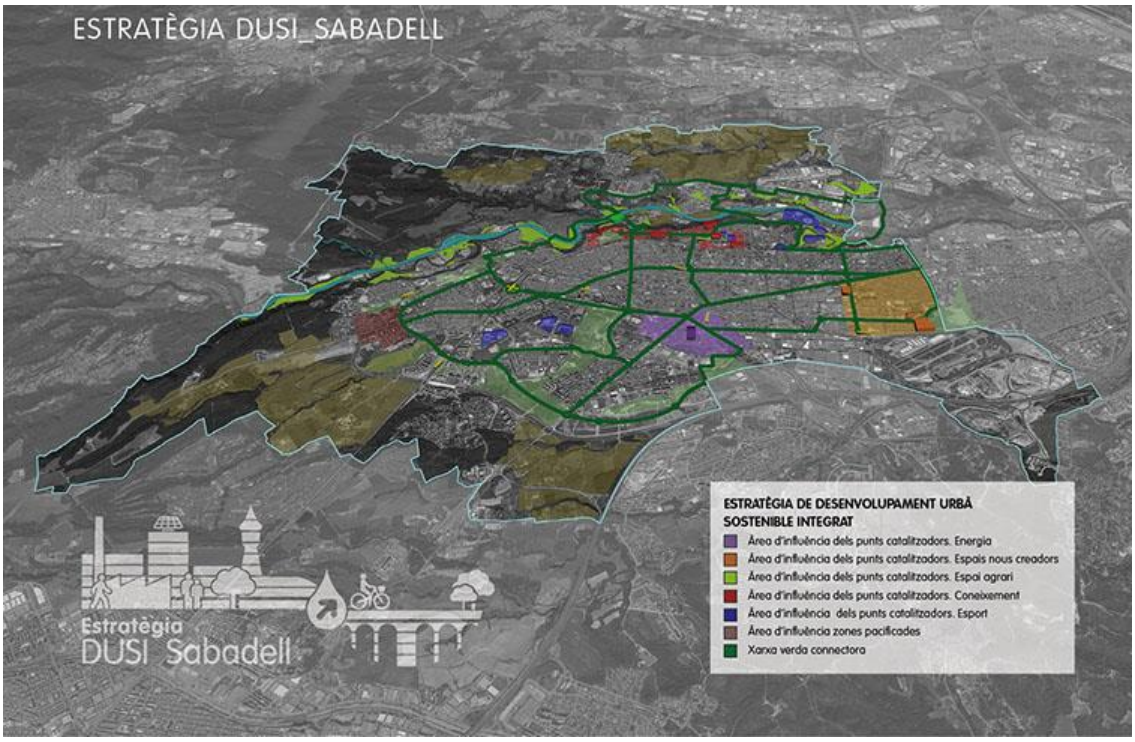


Figure 07: Territorial geopositioning of EDUSI's actions

The municipality of Sabadell has also designed in conjunction with the neighbouring municipalities of Castellar, Barberà and Sant Quirze the **Competitiveness and specialisation territorial plan (PECT)**, *"Vallès county RIS3 Territorial specialisation, Industrial Vallès: innovation and design of the European industry",* which will receive 1.7 million Euro of ERDF/ESF funding from the Catalan government (50% co-financing)[i]**.** The focus of this plan is on design applied to industrial systems, and it has been elaborated in a quadruple helix approach, with universities, technological centres, municipalities and companies in our local, county and metropolitan surroundings.

Other ongoing projects with participation of Sabadell with ERDF/Horizon 2020 funding:

- "Urban Wins" (urban metabolism analysis applied to waste prevention and management)[ii]. Horizon 2020. Project coordinator: Cremona municipality; Main partners: Bucharest municipality, Turin municipality, ICLEI, University IUAV of Venice, CTM Technological centre of Manresa, University of Coimbra, New university of Lisbon. Budget allocated to Sabadell: 98,625 Euro.

- RELOS3 (successful deployment of smart specialisation strategies). Interreg Europe[iii]. Lead partner: Economic development agency of Sabadell; Main partners: Local authority of Emmen, Wielkopolska region, Tartu city government, Metropolitan city of Bologna, region of Western Macedonia. Budget for the entire project: 1.4 Million Euro (1.2 million financed by the European Commission).

- GEN-Y-CITY. (retaining young creative talent in the European cities)[iv]. Lead partner: Poznan municipality; Main partners: Bologna, Genova, Granada, Coimbra, Nantes, Wolverhampton, Kristiansand, Klaipéda, Daugavpils and Torun. Budget for the entire project: 6.7 million euro. Urbact III project

Past projects with participation of Sabadell with ERDF/Horizon 2020 funding:

- FP7. District of Future (DOF)[v] European project (2013-2016) (call ICT-2013 Optimizing Energy Systems in Smart Cities) managed by DG CONNECT. A new open big data platform will be developed and tested in the cities in order to optimize the Energy systems. The cities will deploy sensors in different prosumer buildings and will upload the information on the platform, helping to generate services on energy optimization at district level. Lead partner: Telefonica; Main partners: City of Corby, city of Orléans, VTT technological centre. Budget allocated to Sabadell: 342,960 Euros (218,667 Euros financed by the European Commission).
- IEE. Einstein European project (2008-2010) (*Expert system for an INSupply of Thermal Energy in Industry*)[vi]. The Sabadell City Council participated as beneficiary for the realisation of industrial processes thermoenergetic audits, through an electronic audit tool, specialized trainings and audit processes to 90 companies at European level. Lead partner: Joanneum Research Institute for Sustainable Techniques and Systems; Main partners: University of Rome "La Sapienza", University of Maribor, Slovenia, Austrian Energy Agency, Krajowa Agencja Poszanowania Energii S.A., The European Association for the Promotion of Cogeneration. Budget for the entire project: 927,000 Euro (463,500 Euro financed by the European Commission).
- Interreg IVC. Complex Challenges Innovative Cities (CCIC) European project (2012-2014)[vii] – aimed at increasing the levels of innovation in 13 diverse partner-regions. By exchanging good practices, they addressed a set of interlinked challenges faced by all public authorities and related to innovation in public sector as: public finance for innovation, public authorities as innovators and innovation stimulators, public attitudes to innovation, public procurement to support innovation. Lead partner: Sofia municipality; Main partners: City of Eindhoven, Warsaw, Birmingham, Eindhoven, Genova, Lazio, Catania, Tartu. Budget for the entire project: 2.03 million Euro (1.59 million Euro financed by the European Commission).
- Urbact II. Economic Strategies in Medium Sized Cities (ESIMeC I and II) (2009-12 and 2014-15)[viii]. In 2010, 8 medium sized cities from across Europe responded to the economic crisis by coming together to find innovative approaches to economic recovery, growth and resilience. The partners involved focused on how best to put long-term workforce development strategies in place in their cities, placing equal emphasis on the demand side of the labour market (what employers want from workers now and in the future) as on the supply side (how to ensure that people are prepared for 21st century jobs). Lead partner: City of Basingstoke and city of Deane; Main partners: City of Besançon, Charleroi, Cherbourg, Debrecen, Albacete, Bistrita, Gävle. Budget for the entire project: 425,000 Euro (ESIMeC I).

1.2. Current state of play with regard to smart city development strategy and policies

The City of Sabadell has developed in the last years several strategies and plans with influence in the areas of energy, mobility and ICT tackled by the Triangulum:

Id.	Plan/programme/Strategy	Year/period	Main domain
1	**Plan of legislature 2016-2019 (+yearly municipal action plans 2016-17-18-19)**	2016-2019	Cross-city
2	**Government's "commitment"**	2015-2019	
3	**Strategy of Integrated and sustainable urban development (EDUSI)**	2017-2020	Sustainability/Territorial and strategic planning
4	**Action plan for the improvement of acoustic quality of Sabadell**	2012-2017	
5	**Agenda 21+10**	2011-2020	
6	**Plan for the improvement of air quality**	2017-2022	
7	**Managing plan for the use of water external with respect to the drinking water distribution network**	2014-2024	
8	**Action plan for sustainable energy**	2016-2020	
9	**Urban mobility plan (new plan under elaboration)**	2009-2014	Mobility
10	**Managing plan of the bicycle**	2017-2020	Mobility/Territorial and strategic planning

Table 02: Sabadell's smart city development strategies and policies. Source: Municipality of Sabadell

According to this strategic planning, Sabadell has to achieve **CO2 reduction of 27% in 2020 and 35% in 2030**, increase the bike trips share from 0.4% of the total city mobility (2006), **to 5% (2020) and 15% (2030)**, and reduce by **16**% NO2 and PM10 emissions in 2022, among other targets.

Moreover, the **local Agenda 21+20 (2011-2020)** establishes 9 management objectives for 2020 related to energy and environment:

- 71 toe (tonnes of oil equivalent) / million euros of local energy intensity
- 20% reduction of primary energy consumption
- 20% reduction in emissions of Greenhouse Gases (GHG)
- 20% increase in contribution of renewable energy consumption
- 5% non-potable water reuse
- 100% grass surface with remote irrigation
- 66% share of sustainable mobility in daily mobility on a weekday commuting to work
- 30% of municipal fleet vehicles with energy efficient technologies
- 50% gross rate of separate collection of municipal waste by weight.

2. Brief overview over the Morgenstadt methodology and the on-site assessment process

The actions to be included in the Sabadell's Triangulum implementation strategy are the result of several participatory processes and assessments held under the Triangulum, as part of Work Package 6 "*Smart city framework*":

- Assessments and participatory processes prior to the Sabadell on-site assessment (before March 2016):

- "Morgenstadt" indicators and action fields assessment:

As a result of applying the "Morgenstadt"[ix] methodology from the research institute Fraunhofer IAO, information has been compiled about the city of Sabadell based on several pre-set indicators.

Three main questions are covered by this data assessment:
- What is the quantifiable city performance regarding sustainability?
- How does the city manage sustainability and smart city development?
- Why do things work or do not work in the city?

Finally, since the data was collected in the 2nd semester of 2015, the more updated data for some indicators and action fields has evolved (mainly to improve), although this is not reflected, as the data was "frozen" at that moment.

- Preliminary ideation meetings with municipal departments

During the last quarter of 2015 and January-February 2016, internal sectoral roundtables were organised to review the *Morgenstadt* assessment results and extract ideas of actions that could be in line with the city strategy and inspired from the Triangulum's lighthouse cities, as a previous step before the Sabadell on-site assessment.

- Assessments and participatory processes during the Sabadell on-site assessment held (March 2016):

From the 29th February to the 9th March 2016, the "on-site assessment" took place in Sabadell, in accordance to the Triangulum's project task 6.5. "*On-site assessment in follower cities*".

As a result, 36 interviews, conducted by Fraunhofer IAO, took place between the 29th February and 8th March, with more than 60 representatives of local stakeholders (Municipality, subcontracted companies, universities, business associations, citizen's associations, regional government, etc.), with a focus on mobility, energy, ICT and economic development.

After the interviews, the initial 24 project ideas where enriched with new ideas, totalising 33 potential actions or technological solutions in fields like electric mobility, bicycle promotion or ICT for communication with citizens.

On the 7th March an internal workshop took place to present and select the ideas which would be discussed during the first stakeholder workshop on the 9th March 2016; among the 33 ideas discussed during the interviews, 14 were prioritised for the final workshop. Finally, during this closing stakeholder workshop, the 14 ideas were further developed, in small groups and in plenary session, in the fields of energy efficiency, economic development, bicycle promotion or ICT for citizen participation/communication.

These 14 ideas have constituted the basis for the feasibility efforts undertaken after the on-site assessment, during the 2nd half of 2016 and 1st half of 2017.

30 entities -public authorities, research centers, universities, associations and local companies with experience in the field of urban services- participated in the Sabadell's on-site assessment interviews or the closing workshop, including 21 municipal departments and agencies.

- Assessments and participatory processes after the Sabadell on-site assessment (after March 2016):

Once the on-site assessment was closed, a process of permanent refinement and feasibility analysis of the project ideas began. The main steps in this process have been the following:

- More than 50 interviews took place with the majority of municipal departments as part of a needs detection process completing the results of the on-site assessment (1st quarter 2017).
- The "follower city days" during the 2nd on-site assessment in lighthouse cities have been attended by representatives of Sabadell (May to July 2017).
- Training mission for the benefit of follower cities (including 4 workshops and 7 webinars) has taken place in the period February-September 2017. It has included a closing stakeholder workshop in Sabadell on the 13th and 14th November 2017, with 40 people attending from 23 organisations. Under this workshop, fast training sessions on governance, ICT, Public space, energy, Finance & economic development and mobility took place. Moreover, 6 actions to be included in the Sabadell's implementation strategy were discussed in groups, in order to further analyse and develop them. Finally, they were ranked according to 3 parameters: Innovativeness; Usefulness; and Feasibility. The results were the following:

		Parameters considered							
	Name of the action	Usefulness		Feasibility		Innovativeness		TOTAL Dots/Action	
1	Incentives for the clean last-mile delivery of freight	7	21%	7	21%	7	21%	21	21%
2	Digital platform for shared spaces + maker space connected with the circular economy	4	12%	6	18%	10	29%	20	20%
3	Start-up acceleration programme + Adapted "I-city" tender	4	12%	7	21%	7	21%	18	18%
4	Environmental sensors (noise, pollution)	4	12%	6	18%	5	15%	15	15%
5	Energy refurbishment of buildings	9	26%	5	15%	1	3%	15	15%
6	Recharging points for electric vehicles connected with the renewal of the municipal fleet	6	18%	2	6%	4	12%	12	12%
	TOTAL DOTS	34	34%	33	33%	34	34%	101	

Table 03: Preferences among the 6 discussed actions of participants at the Sabadell's stakeholder workshop, held 13-14 November 2017, using the "Dotocracy" methodology -each participant is given 3 dots, one for each parameter, and she can freely match it with the 6 actions, not necessarily "spending" all 3 dots.

- The most voted and balanced action, among the 3 parameters considered, was "Incentives for the clean last-mile delivery of freight".
- The most innovative action, according to the number of "dots" received, was "Digital platform for shared spaces+maker space connected with the circular economy". The most useful was "Energy refurbishment of buildings", while the most feasible were "Incentives for the green last-mile delivery of freight" and "Start-up acceleration programme + Adapted 'I-city' tender".
- The less innovative action was "Energy refurbishment of buildings", while the less feasible was "Recharging points for electric vehicles connected with the renewal of the municipal fleet". These 2 actions were the ones that received less "dots" overall. Actions on "maker" spaces, environmental sensors and start-up acceleration were considered less useful.

3. Results of data assessment and analysis

This chapter synthetises the city data[1] arising from 3 main sources:

- The "Morgenstadt" indicators and action fields collection (2nd semester of 2015).
- The interviews and closing workshop with relevant city stakeholders (quadruple helix) during the Sabadell on-site assessment (March 2016)
- The internal interviews and roundtable with the municipal departments (before and after the Sabadell's on-site assessment).

"Word cloud" summarising Sabadell's data assessment under the Triangulum:

- POSITIVE ASPECTS / TO REINFORCE

[1] In case of results divergence in the same indicator/action field between the 3 sources of information, the most realistic result, according the municipality's criteria, has been selected.

- NEGATIVE ASPECTS / TO IMPROVE

Results by topic:

This includes a summary of the Morgenstadt indicators and action fields for each thematic interpreting the results of the indicators (for the entire list of indicators, see appendix).

1.1. Natural environment:

The Sabadell City Council has integrated sustainability into their organisation and strategic policy, but it lacks collaboration with the scientific world and especially with the business actors. Sabadell is a city with low CO2 emissions and low consumption of water with a high level of recycling (as well as waste) and treatment of wastewater. Almost half of greenhouse gas (GHG) emissions in the city are caused by mobility. Overall, the regulatory framework in the field of local sustainability is stricter than the national one. There are certain incentives for environmentally responsible behaviour but they are limited. There is a low level of use of reclaimed water and reuse of rainwater.

1.2. Urban mobility:

Sabadell has a very high percentage of walking (61.8%), very low public transport (9.5%) and very low bicycle / motorcycle and electric vehicles (<3%), although the overall weight of the "soft" mobility modes is high. Mobility is affordable, and the household budget devoted to this concept is low. It lacks to implement innovative policies for the delivery of goods. In recent years the public sector has invested heavily in mobility in the city (extension of “Ferrocarrils de la Generalitat de Catalunya”, FGC railway). On average, residents in Sabadell work relatively close to where they live. The application of technological systems for managing mobility is limited. The fatal accidents due to mobility are low. Strategic planning of mobility policy is essentially channelled through the urban mobility plan.

1.3 Energy and housing:

Sabadell has a low proportion of buildings in relation to its population, and correspondingly the demand for energy is quite low. Almost half of the buildings in Sabadell have a residential use. The cost of energy paid by consumers is low. Very little power locally produced. Lack of implementation of renewable energy installations and heating and cooling networks at the district level (DH&C); there are some experiences of utilisation of geothermal energy in public buildings. There is a plan of investments in energy efficiency in public buildings and energy optimisation technologies are implemented in 50% of municipal buildings. Municipality-owned social housing is very scarce, although it is investing, and in general there is very little retrofitting of buildings. The price of rental housing is relatively low.

1.4. Economic development and projection of city

Sabadell has a high rate of unemployment and few jobs / GDP in innovative economic sectors. The educational level of the population is relatively high (over 50% have secondary or higher education). The City Council is designing a strategy for economic innovation based on regional specialisation, including surrounding towns with synergies. Missing policy of "marketing" of the city screened internationally. No significant local funds to finance innovative companies, but instead there are tax incentives and expert advice to local companies newly implemented in the city. No experience in creating sustainable business districts. There is not an institutionalised network for a permanent company-university-municipality cooperation. A study on industrial symbiosis has been conducted.

1.5. Planning and urbanism:

The planning is based on a long-term municipal plan which is due to be renewed in the coming years (dated from 1993). Also regional regulations regarding traffic, energy, climate and land use impact the local level. The political commitment to achieve sustainable neighbourhoods is clear. The city has a green space, a renovated riverfront and a shopping district, but there are not defined "experimental urban areas" and there are certain districts / areas in need of revitalisation / restructuring. The city is demographically dense with a low volume of buildings in relation to the population.

1.6. Information and communication technologies:

The incorporation of new technologies in the City is channelled mainly in the context of municipal tenders. There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard. The penetration of internet among citizens is high.

1.7. Citizen participation:

The City Council has a decentralised structure for citizen participation through district councils, councillors and coordinators, but in the other areas there is not a municipal management at the district level, with an allocated budget. So far the decision making has not been broadly upward (bottom-up) and the public has had a purely consultative/informative role, not binding. An online platform for citizen participation is used (Consensus).

1.8. Internal organisation of the City:

The Council has an internal working group on innovation, including funding search functions. The organisational strategy of the City Council does not encourage interdepartmental work, training, and incentives to workers of high performance. The municipal budget is too focused on administrative expenses or to repay debt with relatively low own incomes.

4. Actions and roadmap

4.1. Implementation strategy general conditions

- According to the Triangulum project document (Description of the Action – DOA), the implementation strategy for the follower cities (FCIS) must be approved before the end of the 3rd project year (January 2018). Implementation must start during 2018.
- Energy, ICT and mobility sectors have to be addressed in an integrated way
- Measures for citizen involvement and funding plan have to be included
- During the development of the FCIS, feedback has to be provided to lighthouse cities and the WP6 leader, to ensure replicability from lighthouse cities to follower cities.
- The following aspects have to be included in the strategy:
    - District/area to be used for smart city implementation
    - Technologies & solutions to be implemented
    - Costs of planned implementation measures
    - Funding and business models applied for implementation
    - Reference to lighthouse cities (replication)
    - Key timescales
    - Lead partners
    - Risks & risk mitigation measures
    - Local governance & coordination structure

The Triangulum project document sets the **overall project objectives** which are referential for both the lighthouse and the follower cities -in particular, goals 7 to 10 refer directly or indirectly to the follower cities replication. They are taken as general objectives for the Sabadell's implementation strategy:

Goal 1: ENERGY EFFICIENCY: Reduce energy consumption of buildings (a total of 107,390 m² floor area) on this project by factor 3 or higher (>65%) leading to a total reduction of over 14 Mio KWh/a.
Goal 2: RENEWABLE ENERGIES: Provide at least 75% of the remaining energy demand (electricity, heating, cooling) with renewable energies.
Goal 3: ELECTRIC MOBILITY: Increase utilisation levels of electric vehicles and charging infrastructure (e-cars, e-bikes, e-buses) in the districts significantly. (By 100% in Eindhoven and Manchester with reference to status quo 2014).
Goal 4: SMART ENERGY GRIDS: Integrate intelligent energy management technologies for approximating coverage of local energy demand and renewable energy provision.

Goal 5: ICT DATA PLATFORMS: Integrate buildings energy use, users mobility demand, alternative fuels like electric energy for EV's and smart appliances into an adaptive and dynamic ICT data hub that allows for a broad range of value added services and smart city appliances.
Goal 6: CITIZEN PARTICIPATION: Maximize co-creation and a bottom up approach involving citizens – as users, inhabitants and tenants of the district – in the process of designing, implementing and participating in the smart city districts.
Goal 7: NEW BUSINESS MODELS: Create, test, streamline and replicate Business Models for functioning smart city solutions in the fields of sustainable urban mobility, ICT based services, building refurbishment and energy efficiency.
Goal 8: STANDARDS GENERATION: Work towards rationalisation and consolidation of existing smart city standards
Goal 9: REPLICATION METHODOLOGY TO FOLLOWER CITIES: Design, evaluate and apply a Triangulum Smart City Framework and Decision making tool for smart city development for accelerated and enhanced replication within follower cities.
Goal 10: REPLICATION METHODOLOGY TO FOLLOWER CITIES: Prepare Smart City Implementation Plans and start individual replication in Leipzig, Prague and Sabadell from 2018 onwards.

Other important references in the Project document, regarding the Follower cities implementation strategy and, in general, the role of follower cities that have been considered for the elaboration of the Sabadell's FCIS:

- Business models based on bankable projects and market oriented measures. Low risk investments.
- Common, standard ICT Reference Architecture for integrating data into smart cities data platforms, across the 6 cities. It addresses issues like open data, interfaces, standards, software and hardware specifications etc. and the design and implementation of a common data hub for impact assessment and monitoring. This common architecture facilitates the benchmark and comparability among the different cities.
- Consider the "Smart city framework" recommendations and guidelines when elaborating and implementing the IS, which includes:
    - An assessment tool containing a set of smart city indicators, a checklist on the state of important key action fields for smart city development and a methodology for local identification of best suitable starting points for smart city implementation.
    - A project development guideline detailing functioning smart city modules (clusters of integrated technologies (energy, transport, ICT), business models and stakeholder structures) and linking them to the ICT Reference Architecture.

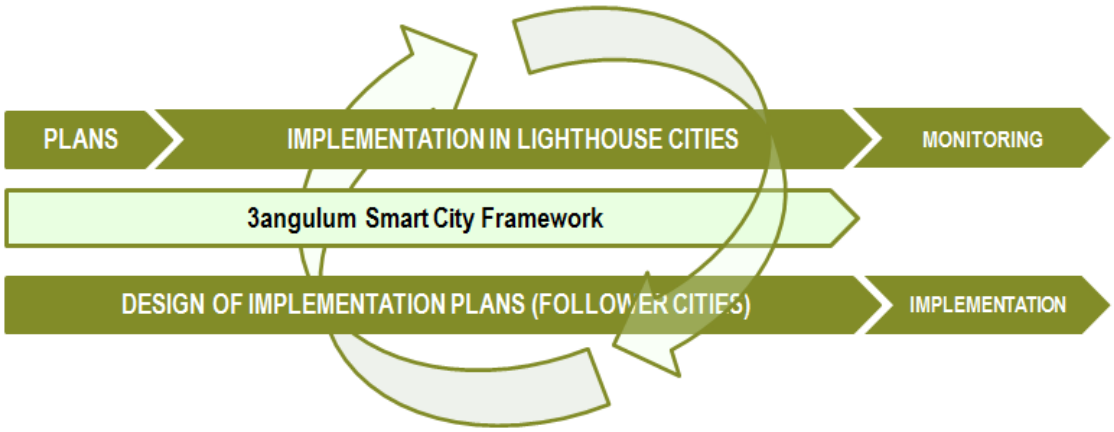


Figure 07: Representation of the "Smart city framework" replication methodology. Source: Triangulum project document

4.2. Implementation strategy specific conditions in Sabadell

According to the Triangulum project document (DoA-Description of the Action) in Sabadell the implementation strategy has to contribute to the **following specific objectives**:

- Sustainable energy development through specific actions on:
  - Energy demand reduction (retrofitting)
  - Renewable energy implementation in public space and public and private buildings
  - Citizen awareness raising on renewable energies
  - Achievement of Near Zero Emission Buildings (Nzeb) on approximately 25% of the public infrastructures in the deployment area.

- Smart grid implementation, which will allow the optimisation of the existing network and the promotion of prosumer entities, leveraging the existing infrastructures (e.g. using public lighting infrastructure to charge electric vehicles).

- Promotion of new public services creation thanks to data sharing (e.g. collaboration with important stakeholders such as utilities).

- Connection between smart grids and electric vehicles.

- Employment and new innovative companies creation, promoting knowledge transfer, fostering innovative actions on existing companies and including a training plan in smart cities topics to achieve these goals.

- Intelligent data collection platform

- Focus in the city northern area as proposed "lighthouse district" (corresponding to the administrative districts 2-3-4)[2], a mainly residential area including several commercial axis serving the neighbourhoods, with a majority of buildings from the 1960-70s and historically benefitting from less private investment than the city centre.

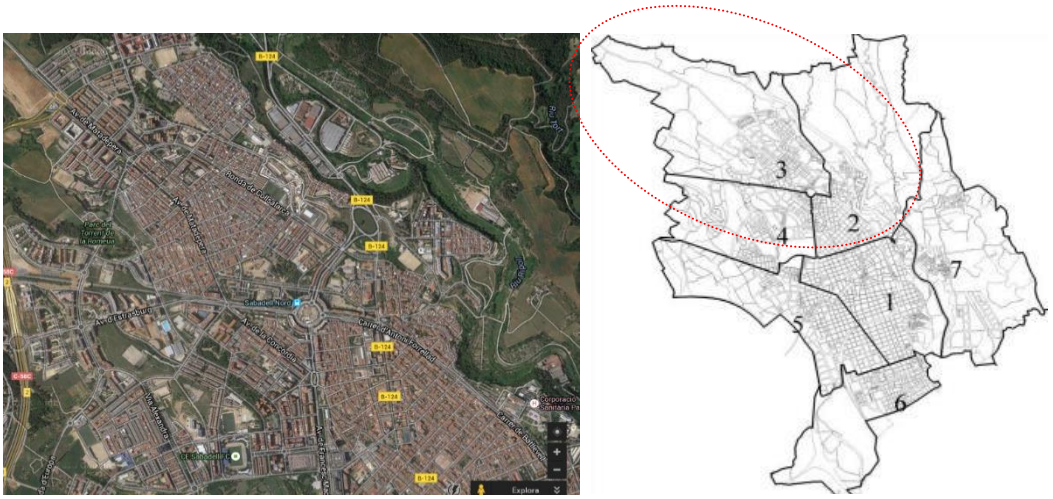


Figure 08: Northern districts of Sabadell. Source: Google Maps and Municipality of Sabadell

The roles of the city of Sabadell and its linked third parties in the project, as they appear in the Project document, have been taken into account when assigning responsibilities for each action included in the Sabadell's FCIS:

- Municipality of Sabadell: It will actively participate in the lighthouse cities project implementation, helping to define it as replicable. At the same time, it will work on the development of its own implementation plan, following the lighthouse cities example, learning from the experience and collaboration with the other 2 follower cities and leveraging the existing local stakeholders.

Ajuntament de Sabadell

- Promoció Econòmica de Sabadell SL (local economic development agency): its main contribution to the project is the connection of the local economic development policies with the Sabadell's IS. This strategy will enhance the city life quality, and therefore it is necessary to ensure that there will be an impact on civil society, local businesses and the different entities that compose the socioeconomic context of Sabadell. Some of the actions that the agency will carry out are the following:
  1) Link and promote entrepreneurship towards Smart City solutions.
  2) Engage local companies in the deployment of the strategy and fostering job creation.
  3) Connect with universities and research centres for smart solutions, and promote the triple helix concept.

2 The implementation strategy includes actions referred to this city areas but not exclusively, selecting the most suitable locations for implementation across the entire city.

4) Adapt the workforce to the training needs and skills of the future smart jobs.

- VIMUSA, Habitatges Municipals de Sabadell SA (local social housing public company): its main contribution to the project is the participation in the Sabadell's IS as experts on social housing and energy efficiency measures on buildings, helping to map the current city situation and defining the best strategic and operational plan.

- IAS, Informàtica Ajuntament de Sabadell, autonomous body responsible for the municipal IT management. Its main contribution to the project is the management of the ICT area regarding the integrated solutions included in the Sabadell's IS, helping to map the current infrastructures and designing the IS as far as the ICT part is concerned.

The criteria for the elaboration of the Triangulum's IS **has been not to overlap but complement, complete and build upon the actions already included in the existing, approved municipal strategies**, so that it is coherent with the overall municipal strategic planning. Therefore, the Triangulum's FCIS establishes actions mostly **relying on a different funding** than the other already approved municipal strategies. This funding can be already committed or pending to be concretised. In relation with existing strategies, the new actions foreseen in the Triangulum's IS are mostly:

- Fully new.
- Same action as in the existing strategies but for a different location or beneficiary.
- Action foreseen in existing strategies but improved on the basis of the Triangulum process

This is not in contradiction with the fact that the **already approved actions in other strategies can be refined and improved** based on the learning from the Triangulum's replication process –especially as a result of the on-site visits in lighthouse cities– **but mostly not as part of the Triangulum's FCIS** because they rely on already approved funding.

Moreover, the actions included in the Sabadell's FCIS are in phase with:

- The general and specific objectives and conditions established in the Triangulum project document (Description of the Action-DoA)
- The lighthouse cities implemented actions and training mission

- The results from the on-site assessment in Sabadell and the Morgenstadt data assessment
- The existing Sabadell municipal strategic planning
- The internal roundtables and interviews held before and after the Sabadell's on-site assessment

The suggested actions to be included in the Sabadell Triangulum's FCIS have been ranked, refined, narrowed-down and validated by the local innovation ecosystem during the **2-day "Stakeholder workshop" that was held in Sabadell on the 13th and 14th November 2017**. It has also been the occasion to concretise the involvement of these stakeholders in the implementation phase as of 2018.

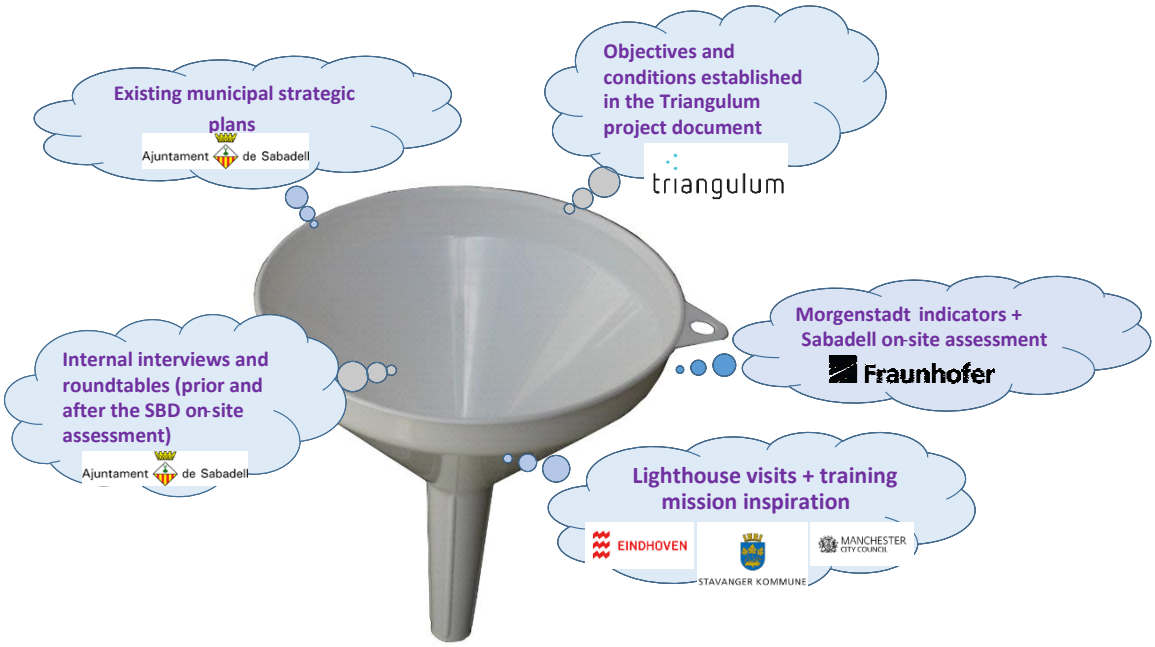


Figure 09: Visual summary of inputs considered to define actions for the Sabadell's Triangulum implementation strategy (FCIS)

4.3. Breakdown of planned activities/actions/projects[3]

This sub-chapter includes a summary of the 10 actions in the Sabadell's FCIS, classified by the three sectors, and a description of how they are aligned with the Triangulum objectives, previous data assessment and the city strategic planning.

ICT/Innovative economic development:

	NAME OF THE ACTION	OBSERVATIONS
1	DIGITAL "HORIZONTAL" PLATFORM FOR REAL-TIME DATA INTEGRATION	ICT. LEAD PARTNER: IAS. FINANCED BY THE TRIANGULUM PROJECT
2	VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES	ICT. INSPIRED BY STAVANGER. FUNDING NEEDS TO BE CONCRETISED AND SECURED (E.G. H2020 PROPOSAL). POTENTIAL PILOT TEST (5 USERS) WITH TRIANGULUM RESOURCES
3	"START-UP" COMPANIES ACCELERATION PROGRAMME + Adapted "I-city tender"	INNOVATIVE ECONOMIC DEVELOPMENT. ACTION PARTNER: PES SL. INSPIRED BY EINDHOVEN (TECHNICAL UNIVERSITY OF EINDHOVEN, "BRAINPORT" REGION DEVELOPMENT AGENCY AND MUNICIPALITY OF EINDHOVEN). FUNDING HAS TO BE CONCRETISED. POTENTIAL CO-FUNDING WITH TRIANGULUM RESOURCES FOR THE "I-CITY TENDER" REPLICATION
4	DIGITAL PLATFORM FOR SHARED SPACES + MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY	ICT/INNOVATIVE ECONOMIC DEVELOPMENT. 2ND STAGE APPLICATION TO HORIZON 2020 CALL SUBMITTED (NOT APPROVED). IDEA ORIGINATED AT THE INNOVATION WORKSHOP AND INTERVIEWS DURING THE TRIANGULUM'S SABADELL ON-SITE ASSESSMENT (MARCH 2016).
5	"CITY BEACONS" (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)	ICT. INSPIRED BY EINDHOVEN & MANCHESTER. IT CONTRIBUTES TO THE "CENTRAL SPACE" TRANSFORMATION PROJECT. FUNDING HAS TO BE CONCRETISED.

[3] **Legend:** Project on-going or Funding for the project is secured; Project where technical definition has already started, funding not yet secured/Easy implementable project, funding yet to be determined; Project with medium/high complexity where technical definition has not started yet, nor funding is secured.

Energy:

	NAME OF THE ACTION	OBSERVATIONS
6	INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES, RUNNING CIRCUITS	ENERGY. CONNECTED WITH EINDHOVEN. FUNDING HAS TO BE CONCRETISED.
7	APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS	ENERGY. LEAD PARTNER: VIMUSA. MAINLY CONNECTED WITH EINDHOVEN.

Mobility:

	NAME OF THE ACTION	OBSERVATIONS
8	INCENTIVES FOR THE GREEN LAST MILE URBAN DELIVERY OF GOODS	MOBILITY. CONNECTION WITH. FUNDING SECURED (ERDF–EDUSI)
9	RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA	MOBILITY. INDIRECT CONNECTION WITH EINDHOVEN & MANCHESTER (CAR-SHARING). MUNICIPAL FUNDING SECURED
10	PROMOTION OF GREEN MOBILITY AT SCHOOLS	MOBILITY. IDEA SUBMITTED AS PART OF THE 2017 "URBAN INNOVATIVE ACTIONS" APPLICATION (NOT APPROVED). IT INCLUDES LENDING BIKES TO SCHOOLS. FUNDING NEEDS TO BE CONCRETISED

Table 04: Diagram of the Triangulum's implementation strategy actions with respect to the project objectives, results of previous data assessment and municipal strategies

SABADELL TRIANGULUM'S IMPLEMENTATION STRATEGY OBJECTIVES		CONNECTION WITH TRIANGULUM'S DATA ASSESSMENT + EXISTING MUNICIPAL STRATEGIC PLANNING	ACTION ADDRESSING THIS OBJECTIVE
GENERAL OBJECTIVES TO COMPLY WITH ACCORDING TO THE *TRIANGULUM PROJECT DOCUMENT (DoA-Description of the Action)*	ENERGY EFFICIENCY: Reduce energy consumption of buildings	· TRIANGULUM DATA ASSESSMENT: very little refurbishment of buildings · MUNICIPAL STRATEGIC PLANNING: 20% reduction of primary energy consumption (Agenda 21+10); Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)	·APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS
	RENEWABLE ENERGIES: Provide at least 75% of the remaining energy demand (electricity, heating, cooling) with renewable energies	· TRIANGULUM DATA ASSESSMENT: Lack of implementation of renewable energy installations and heating and cooling networks at the district level · MUNICIPAL STRATEGIC PLANNING: 20% increase in contribution of renewable energy consumption (Agenda 21+10)	·APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS · INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES
	ELECTRIC MOBILITY: Increase utilisation levels of electric vehicles and charging infrastructure (e-cars, e-bikes, e-buses) in the districts significantly.	· TRIANGULUM DATA ASSESSMENT: Sabadell has a very percentage weight of walking, very low public transport and very low bicycle / motorcycle and **electric vehicles.** · MUNICIPAL STRATEGIC PLANNING: 30% of municipal fleet vehicles with energy efficient technologies (Agenda 21+10); Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)	· RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA · INCENTIVES FOR THE GREEN LAST MILE URBAN DELIVERY OF GOODS
	SMART ENERGY GRIDS: Integrate intelligent energy management technologies for approximating coverage of local energy demand and renewable energy provision.	· TRIANGULUM DATA ASSESSMENT: Lack of implementation of renewable energy installations and heating and cooling networks at the district level · MUNICIPAL STRATEGIC PLANNING: 20% increase in contribution of renewable energy consumption (Agenda 21+10)	· APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS · INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES
	ICT DATA PLATFORMS: Integrate buildings energy use, users mobility demand, alternative fuels like electric energy for EV's and smart appliances into an adaptive and dynamic ICT data hub that allows for a broad range of value added services and smart city appliances.	· TRIANGULUM DATA ASSESSMENT: There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)	·DIGITAL "HORIZONTAL" PLATFORM FOR REAL-TIME DATA INTEGRATION ·DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE IN CONNECTION WITH THE CIRCULAR ECONOMY
	CITIZEN PARTICIPATION: Maximize co-creation and a bottom up approach involving citizens - as users, inhabitants and tenants of the district - in the process of designing, implementing and participating in the smart city districts.	· TRIANGULUM DATA ASSESSMENT: So far the decision making has not been broadly upward (bottom-up) and the public has had a purely consultative role / informative, not binding. The penetration of internet among citizens is high. · MUNICIPAL STRATEGIC PLANNING: Foster the neighbours participation in the design of the public space; promote a plural and deliberative political participation (Plan of legislature 2016-2019)	·"CITY BEACONS" (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS) · PROMOTION OF GREEN MOBILITY AT SCHOOLS · VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES · DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE IN CONNECTION WITH THE CIRCULAR ECONOMY · INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES
	NEW BUSINESS MODELS: Create, test, streamline and replicate Business Models for functioning smart city solutions in the fields of sustainable urban mobility, ICT based services, building refurbishment and energy efficiency.	· TRIANGULUM DATA ASSESSMENT: Local investment in research and experimental activities is less than 3% of local GDP · MUNICIPAL STRATEGIC PLANNING: Recover direct management and public control of most of the municipal services; promote interadministrative conventions with other administrations to provide public services; social, environmental and local economic promotion clauses in public procurement (Plan of legislature 2016-2019)	·"START-UP" COMPANIES ACCELERATION PROGRAMME+ADAPTED "I-CITY" CONTEST ·INCENTIVES FOR THE GREEN LAST-MILE URBAN DELIVERY OF GOODS ·RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA
	STANDARDS GENERATION: Work towards rationalisation and consolidation of existing smart city standards	· TRIANGULUM DATA ASSESSMENT: There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard. MUNICIPAL STRATEGIC PLANNING: Adoption of open software as the general rule (Plan of legislature 2016-2019)	· DIGITAL "HORIZONTAL" PLATFORM FOR REAL-TIME DATA INTEGRATION

SABADELL TRIANGULUM'S IMPLEMENTATION STRATEGY OBJECTIVES		CONNECTION WITH TRIANGULUM'S DATA ASSESSMENT + EXISTING MUNICIPAL STRATEGIC PLANNING	ACTION ADDRESSING THIS OBJECTIVE
SPECIFIC OBJECTIVES TO COMPLY WITH ACCORDING TO THE *TRIANGULUM PROJECT DOCUMENT (DoA-Description of the action)*	Sustainable energy development through specific actions on: -Energy demand reduction (retrofitting) -Renewable energy implementation in public space and public and private buildings -Citizen awareness raising on renewable energies -Achievement of nZEB on approximately 25% of the public infrastructures in the deployment area.	· TRIANGULUM DATA ASSESSMENT: Lack of implementation of renewable energy installations and heating and cooling networks at the district level; very little refurbishment of buildings; there is a plan of investments in energy efficiency in public buildings and energy optimization technologies are implemented in 50% of municipal buildings. · MUNICIPAL STRATEGIC PLANNING: Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)	· APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS · INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES
	Smart grid implementation, which will allow the optimisation of the existing network and the promotion of prosumer entities, leveraging the existing infrastructures (e.g. using public lighting infrastructure to charge electric vehicles).		
	Promotion of new public services creation thanks to data sharing (e.g. collaboration with important stakeholders such as utilities).	· TRIANGULUM DATA ASSESSMENT: There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard. The penetration of internet among citizens is high. MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)	·DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE IN CONNECTION WITH THE CIRCULAR ECONOMY ·VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES
	Connection between smart grids and electric vehicles.	· TRIANGULUM DATA ASSESSMENT: Sabadell has by a very high percentage of walking, very low public transport and very low bicycle / motorcycle and **electric vehicles.** · MUNICIPAL STRATEGIC PLANNING: 30% of municipal fleet vehicles with energy efficient technologies (Agenda 21+10); Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)	· INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES
	Employment and new innovative companies creation, promoting knowledge transfer, fostering innovative actions on existing companies and including a training plan in smart cities topics to achieve these goals.	· TRIANGULUM DATA ASSESSMENT: No significant local funds to finance innovative companies; Sabadell has a high rate of unemployment and few jobs / GDP in innovative economic sectors. MUNICIPAL STRATEGIC PLANNING: Promotion of social inclusion and fight against poverty (EDUSI)	· “START-UP” COMPANIES ACCELERATION PROGRAMME+ADAPTED "I-CITY" CONTEST
	Intelligent data collection platform	· TRIANGULUM DATA ASSESSMENT: There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard. · MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)	· DIGITAL “HORIZONTAL” PLATFORM FOR REAL-TIME DATA INTEGRATION
	Focus in the city northern area as proposed “lighthouse district” (corresponding to the administrative districts 2-3-4)	Currently not explicitly reflected in existing strategic planning / Triangulum's data assessment	· INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES · APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS

4.4. Gantt chart

The following Gantt chart describes the FCIS timeline per action, indicating the main milestones both from the elaboration (2016-17) and implementation phases (2018-20).

Sabadell Triangulum follower city strategy. Elaboration phase (until January 2018):

	ACTIONS	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
1	DIGITAL “HORIZONTAL” PLATFORM FOR REAL-TIME DATA INTEGRATION	ACTION START	PURCHASE OF SERVER	ASSESSMENT OF INTEGRABLE DATA						SENTILO INTEGRATION	INTEGRATION WITH EXISTING BI TOOLS (PENTAHO)	START OF DATA INTEGRATION			
2	VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES								ACTION START	TECHNICAL FEASIBILITY STUDY					ECONOMIC FEASIBILITY STUDY
3	“START-UP” COMPANY ACCELERATION PROGRAMME+ADAPTED "I-CITY" TENDER														ACTION START
4	DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY	ACTION START	1ST PROJECT IDEATION					INCLUSION IN H2020 PROPOSAL (1ST STAGE)							
5	“CITY BEACONS” (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)									ACTION START				EXTERNAL STUDY ON BEST PRACTICES IN DIGITAL CITIZEN PARTICIPATION	
6	INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES														ACTION START
7	APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS														
8	INCENTIVES FOR THE GREEN LAST-MILE URBAN DELIVERY OF GOODS														ACTION START
9	RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA	ACTION START	1ST PROJECT IDEATION+INPUT STUDY EVECTRA (2015)												FUNDING SECURED (PURCHASE OF VEHICLES)
10	PROMOTION OF GREEN MOBILITY AT SCHOOLS	ACTION START	1ST PROJECT IDEATION					INCLUSION IN UIA 2017 APPLICATION					UIA 2017 APPLICATION SUBMITTED		2ND PROJECT IDEATION (INNOVATION CAMP)

Sabadell Triangulum follower city strategy. Implementation phase (as of February 2018):

	ACTIONS	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18
1	DIGITAL “HORIZONTAL” PLATFORM FOR REAL-TIME DATA INTEGRATION					SABADELL STAKEHOLDER WORKSHOP				PURCHASE OF SENSORS				PURCHASE OF SERVER (CONNECTION WITH OPEN DATA)	FURTHER DATA INTEGRATION
2	VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES			SECURE FUNDING	INFO EXCHANGE WITH LYSE	SABADELL STAKEHOLDER WORKSHOP									
3	“START-UP” COMPANY ACCELERATION PROGRAMME+ADAPTED "I-CITY" TENDER	LOCAL STATE OF THE ART REVIEW		INFO EXCHANGE WITH EINDHOVEN CC AND TU/E		SABADELL STAKEHOLDER WORKSHOP		INFO EXCHANGE WITH EINDHOVEN CC AND TU/E	INFO EXCHANGE WITH EINDHOVEN CC AND TU/E	START OF COLLABORATION WITH TUE STUDENTS					
4	DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY			INCLUSION IN H2020 PROPOSAL (2ND STAGE)		SABADELL STAKEHOLDER WORKSHOP	H2020 PROPOSAL REJECTED		APPLICATION FOR FEASIBILITY STUDY (GRANT DIPUTACIÓ DE BARCELONA)			FEASIBILITY STUDY COMPLETED	SECURE FUNDING	PLATFORM CO-DESIGN	
5	“CITY BEACONS” (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)	INFO EXCHANGE WITH EINDHOVEN CC			EU STATE OF THE ART REVIEW	SABADELL STAKEHOLDER WORKSHOP					SECURE FUNDING				SELECTION OF LOCATIONS
6	INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES	INFO EXCHANGE WITH EINDHOVEN CC			EU STATE OF THE ART REVIEW	SABADELL STAKEHOLDER WORKSHOP					SECURE FUNDING				SELECTION OF LOCATIONS
7	APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS			ACTION START		SABADELL STAKEHOLDER WORKSHOP	ELABORATION OF WORK PROGRAMME FOR THIS ACTION								
8	INCENTIVES FOR THE GREEN LAST-MILE URBAN DELIVERY OF GOODS	INFO EXCHANGE WITH MANCHESTER CC		EU STATE OF THE ART REVIEW		SABADELL STAKEHOLDER WORKSHOP	FUNDING SECURED (ERDF EDUSI)				ELABORATION OF WORK PROGRAMME FOR THIS ACTION				
9	RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA			INFO EXCHANGE WITH EINDHOVEN/STAVANGER CC		SABADELL STAKEHOLDER WORKSHOP						PILOT USE OF NISSAN ELECTRIC VEHICLES	TENDER TERMS OF REFERENCE READY (JOINT PROCUREMENT FOR PURCHASE OF VEHICLES)		
10	PROMOTION OF GREEN MOBILITY AT SCHOOLS			EU STATE OF THE ART REVIEW	PROJECT IDEA PROTOTYPED AS PART OF UAB URBAN LIVING LAB	SABADELL STAKEHOLDER WORKSHOP					WORK PROGRAMME ELABORATION		SECURE FUNDING		

Sabadell Triangulum follower city strategy. Implementation phase (as of February 2018):

	ACTIONS	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19
1	DIGITAL “HORIZONTAL” PLATFORM FOR REAL-TIME DATA INTEGRATION		CLAUSES IN MUNICIPAL CONTRACTS CONNECTING WITH SENTILO												
2	VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES		TENDER TERMS OF REFERENCE READY			START OF VIDEOCONFERENCE EQUIPMENT INSTALLATION									
3	“START-UP” COMPANY ACCELERATION PROGRAMME+ADAPTED "I-CITY" TENDER	TERMS OF REFERENCE NEW ACCELERATION PROGRAMME READY	LAUNCH OF THE STARTUP ACCELERATION PROGRAMME				LAUNCH NEW CONTEST BASED ON "ICITY" EINDHOVEN	END OF COLLABORATION WITH TUE STUDENTS	LAUNCH OFFERS FOR PERSONNEL EXCHANGE SABADELL-EINDHOVEN STARTUPs						
4	DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY	MAKER SPACE CO-DESIGN				PLATFORM OPERATIONAL	MAKER SPACE PRESENTATION				MAKER SPACE OPERATIONAL				
5	“CITY BEACONS” (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)	TENDER TERMS OF REFERENCE READY					START OF CITY BEACONS INSTALLATION			CITY BEACONS OPERATIONAL	PROJECT IMPLEMENTATION EVALUATION		ACTION END		
6	INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES	TENDER TERMS OF REFERENCE READY					START OF INNOVATIVE PUBLIC LIGHTING INSTALLATION			INNOVATIVE PUBLIC LIGHTING OPERATIONAL	PROJECT IMPLEMENTATION EVALUATION		ACTION END		
7	APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS			ELABORATION OF TECHNICAL PROJECT	ELABORATION TECHNICAL REPORT ON BUILDINGS (ITE) + EE CERTIFICATE										
8	INCENTIVES FOR THE GREEN LAST-MILE URBAN DELIVERY OF GOODS				TENDER TERMS OF REFERENCE READY (PURCHASE OF EV FOR DELIVERY)	TENDER TERMS OF REFERENCE READY (DELIVERY MINI-HUBS)						PURCHASE OF EV FOR DELIVERY	IMPLEMENTATION OF DELIVERY MINI-HUBS	APPROVE REGULATORY RESTRICTIONS FOR TRAFFIC IN THE CITY CENTRE	
9	RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA	ELABORATION OF WORK PROGRAMME FOR THE CAR-SHARING SYSTEM			PURCHASE OF VEHICLES IMPLEMENTED		TENDER TERMS OF REFERENCE READY (CAR-SHARING SYSTEM)							CAR-SHARING SYSTEM IMPLEMENTED	
10	PROMOTION OF GREEN MOBILITY AT SCHOOLS	SELECTION OF PARTICIPATING SCHOOLS AND STUDENTS								TENDER TERMS OF REFERENCE READY (PURCHASE OF BIKES & SENSORS)				TRANSFER OF BIKES TO SELECTED SCHOOLS	START OF REAL TESTS WITH SCHOOLS

Sabadell Triangulum follower city strategy. Implementation phase (as of February 2018):

	ACTIONS	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20
1	DIGITAL “HORIZONTAL” PLATFORM FOR REAL-TIME DATA INTEGRATION	PROJECT IMPLEMENTATION EVALUATION			ACTION END		
2	VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES	PROJECT IMPLEMENTATION EVALUATION			ACTION END		
3	“START-UP” COMPANY ACCELERATION PROGRAMME+ADAPTED "I-CITY" TENDER			PROJECT IMPLEMENTATION EVALUATION			ACTION END
4	DIGITAL PLATFORM FOR SHARED SPACES+MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY			PROJECT IMPLEMENTATION EVALUATION			ACTION END
5	“CITY BEACONS” (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)						
6	INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES						
7	APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS	APPLICATION FOR FINANCIAL AID (GRANTED BY THE GOVT. OF CATALONIA)	GRANT OF FINANCIAL AID TO CONDOMINIA (SABADELL CC)	START OF REFURBISHMENT WORKS			ACTION END (DECEMBER 2021)
8	INCENTIVES FOR THE GREEN LAST-MILE URBAN DELIVERY OF GOODS	GREEN LAST-MILE DELIVERY OF GOODS OPERATIONAL					ACTION END (DECEMBER 2020)
9	RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA		PROJECT IMPLEMENTATION EVALUATION		ACTION END		
10	PROMOTION OF GREEN MOBILITY AT SCHOOLS						ACTION END (JUNE 2021)

* *The Actions implementation phase, according to the Triangulum project document, can go beyond February 2020.*

5. Detailed project plan & funding scheme

This chapter describes more detailed data on each of the 10 actions to be implemented under the Sabadell's FCIS, through the template provided by the WP6 Coordinator.

Action #1. DIGITAL HORIZONTAL PLATFORM FOR REAL-TIME DATA INTEGRATION

What current problem is the project trying to solve
Vendor lock-in Dispersion of proprietary protocols Data on urban services not owned by the municipality but vertical software developers Silo approach without harnessing the potential of data crossing No major real-time data offered in open data formats. Reluctance to share data among various municipal departments Need of more microdata for the management of certain municipal departments (mobility, energy, climate, etc.).

Related MS Indicators	Related Action Fields	Related Impact Factors
S48; S58; S59	IT2A; IT3A	None

Action #1. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Put in place a horizontal platform integrating real-time data from several "internet of things" devices, like sensors or smart meters, related to municipal services (energy, mobility, noise, air pollution, etc.).

As stated in the Triangulum project document (DoA), Sabadell will develop the technology system for an intelligent data collection and analysis of the services provided by the city in order to achieve an interoperability environment to be more resource efficient and offer an open data platform.

Core Value

What kind of value does the project create for the city and city stakeholders?

Integrate data from remote management devices (energy, traffic)
Raise awareness on the importance of collecting data
Reuse & improve open source city of Barcelona's platform (Sentilo)
Use of Sentilo-complier hardware to avoid vendor "lock-in" (clause in future tenders)
Municipal-owned data stored in local servers
Integration with existing "business intelligence" applications (PENTAHO, KIBANA)
Compatible with existing "silo" software applications (e.g. for remote management).
Also financed under Triangulum, purchase of servers and sensors (air, noise, traffic, energy consumption) as initial demonstrators
Next steps: connect/cross with other databases + generate indicators

Consortium

Who should be partner in this project and why?

Project developed by linked third party "IAS – Informàtica Ajuntament de Sabadell", as municipal agency of IT.

Interest to learn from similar experiences in the lighthouse cities and connections of this "sensors platform" with open data platforms.

Action #1. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

Sentilo open software
Server to host the new software and related datasets
Minimum number of real-time datasets to integrate (including data generated from other Triangulum actions)
Alignment with the Triangulum ICT reference architecture

Should have

What is the extended set of solutions that increases the value of the project to the next level?

Generation of indicators and dashboards based on the integrated data.

Could have

What are optional solutions and components that help us better deliver the project?
Installation of new sensors and meters which are integrated to the platform.
Opening the integrated data into open data and connect it with “static” data.
Offer data to third parties so that they generate new applications

Action #1. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

Project under development as of 2016, operational in 2017, continuous improving until the Triangulum's project end.
Project is developed internally, with resources and staff financed by the Triangulum

Technologies

Which Technologies are to be implemented in the project?

Open source Sentilo software

Hardware (sensors, meters)

New in-company servers to host the data and the software

Action #1. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

Triangulum's data hub (UiS, University of Stavanger)
Triangulum's performance indicators (UoM, University of Manchester)
Eindhoven's data platform (EIN, City of Eindhoven)

Products & Tools

Add your products and tools that are suitable for getting the project realized.
Open source Sentilo software
Hardware (sensors, meters)
New in-company servers to host the data and the software
Business intelligence applications.

Action #1. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs
60,000 Euros (equipment)
55,000 Euros (personnel)
Total: 105,000 Euros.

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Financed by the Triangulum project (100%)

Action #1. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of integrated datasets
Number of new urban indicators generated
Improvements generated in project management as a result of data integration and exploitation in the platform.

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Connected with MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes. Interlinkages between platforms (federation of data).

Action #1. Contact

Helena PLANA, Director, Informàtica Ajuntament Sabadell (IAS)

Action #2. VIDEOCONFERENCE APPLIED TO MUNICIPAL SERVICES

What current problem is the project trying to solve

Level of quality service for end-users to be improved in:

- Citizen participation
- Social/medical homecare
- Training & education
- Dissemination of city cultural or sports events.

Cost inefficiencies with unnecessary physical, face-to-face services

Lack of citizen participation in municipal affairs, specially for younger generations.

Related MS Indicators

S48; S58; S59; P14C; S42

Related Action Fields

IT2A; IT3A; OS4A

Related Impact Factors

None

Action #2. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Implement videoconference/streaming services in 4 potential use cases related to municipal services (at least 1):

- Citizen participation events
- Cultural/sports events
- Social/medical homecare
- Training and education

Core Value

What kind of value does the project create for the city and city stakeholders?

New digital ways of accessing municipal services, specially suitable for new generations.
Easy and faster access to public services.
Indirectly, decrease in the carbon footprint, as physical trips can be avoided.

Consortium

Who should be partner in this project and why?

Tech providers & researchers:
Demonstration of advanced videoconference and streaming solutions

Action #2. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
At least 1 use case among the 4 use cases mentioned before –cultural/sports events, social/medical homecare, training/education and citizen participation events- implemented, either through pilot test with Triangulum resources (Stavanger), simple inclusion in municipal budgets, or by developing an innovative proposal for funding of H2020, ERDF or other private/public external funding. It must include the conceptualisation of the new service, and purchase of the suitable software and hardware, with a priority for open source. It must allow a degree of interaction for both "sides" of the videoconference system, and with high friendliness for end-users of all ages.

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Enlarge the number of implemented use cases, beyond 1, and complement it with other devices –e.g. sensors- that can be connected to the videoconference system to activate it automatically on the basis of the monitored parameters (artificial intelligence).

Could have

What are optional solutions and components that help us better deliver the project?
Also allowing for a richer training or citizen participation experience through specialised software and hardware –online voting, virtual education software, virtual, automatic translation/subtitling or mixed reality to provide a very realistic experience for the videoconference user.

Data Integration with Sentilo platform (action #1).

Action #2. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

The project started in the last quarter of 2016, after the idea was raised during the Triangulum Sabadell's on-site assessment in March 2016. A technical and economic feasibility study has been undertaken, analysing the most suitable available market software and hardware solutions and comparing their cost. During the last quarter of 2017, funding has been identified in order to start the implementation during 2018 (H2020, Europe for Citizens, Creative Europe, Interreg Spain-France-Andorra, etc.).

If the project is instrumentalised through external funding (e.g. H2020), it could be implemented in consortium with other EU partners (technological centres, IT providers, etc.). If the funding comes from municipal budgets, a "traditional" or innovative tender will take place with terms of reference/specifications and a technological provider would be chosen among those responding to the bid.

Regarding the social-medical homecare, possibility to count on the assisted apartments for the elderly as early "customers": Sant Oleguer, Alexandra and Diego de Almagro compounds. However, it is needed that the current provider of the remote care service (Tunstall-Televida) agrees to "share" or incorporate this new functionality. Currently, customers pay for the Tunstall-Televida service with a monthly fee (30 €), which is a "social price" as there is a municipal subsidy attached to this service.

Regarding the social-medical homecare, a pilot test with 5 users is foreseen with the assistance of LYSE (Stavanger), with Triangulum resources, replicating the cloud-based videoconference solution used in Stavanger.

Technologies

Which Technologies are to be implemented in the project?

Videoconference software

Videoconference hardware (mainly cameras and audio system)

Sensors (social/medical homecare use case)

Virtual education software (training & education use case)

Online voting tools (citizen participation use case)

Virtual/mixed reality (potentially applicable in all use cases).

Artificial intelligence tools to activate videoconference on the basis of monitored parameters (social/medical homecare use case)

Audio+video recording functionality

Action #2. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

The Stavanger project on videoconference applied to medical homecare is taken as reference. Potential pilot test with 5 users in Sabadell with the Triangulum budget, as part of a collaboration with Lyse (Stavanger).

Other references in Stavanger and Norway in general are the Viju company and the Norwegian Smart Care Cluster.

More indirectly, the action is also related to the Cityverve Manchester's project.

Products & Tools

Add your products and tools that are suitable for getting the project realized.

Videoconference software

Videoconference hardware (mainly cameras and audio system)

Sensors (social/medical homecare use case)

Virtual education software (training & education use case)

Online voting tools (citizen participation use case)

Virtual/mixed reality (potentially applicable in all use cases).

Artificial intelligence tools to activate videoconference on the basis of monitored parameters (social/medical homecare use case)

Recording functionality

Action #2. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

4 use cases for the videoconference:

Training & education use case:
CAPEX costs: 7,700-8,800 Euro (excluding VAT)
OPEX costs: 7,100-8,300 Euro/year (excluding VAT)
End-user fee (income): 21,000 Euro/year

Social/medical homecare:
CAPEX costs: 8,500-11,500 Euro (excluding VAT)
OPEX costs: 6,800-11,000 Euro/year (excluding VAT)
End-user fee (income): 1,440 Euro/year

Citizen participation:
CAPEX costs: 7,700-13,000 Euro (excluding VAT)
OPEX costs: 7,100-15,800 Euro/year (excluding VAT)

Cultural/sports events:
CAPEX costs: 10,000-18,000 Euro (excluding VAT)
OPEX costs: 10,000-18,000 Euro/year (excluding VAT)
End-user fee (income): 4,800 Euro/year

(For each of the use cases, 6,800 Euro/year have been foreseen for marketing costs)

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal budget / Private free pilot test / H2020, European programme "active & assisted living", European programme "EIT Health", "Health data challenge" (Mobile World Capital); Creative Europe programme; various H2020 calls; Interreg Poctefa Spain-France-Andorra

End-user fee:
Training & education use case:
21,000 Euro/year

Social/medical homecare:
End-user fee (income): 1,440 Euro/year

Potential pilot test with 5 users in Sabadell with the Triangulum budget, as part of a collaboration with Lyse (Stavanger).

Cultural/sports events:
End-user fee (income): 4,800 Euro/year

Action #2. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of homes where videoconference is installed
Number of events broadcasted
Number of courses with “videoconference” service
Number of students in courses with “videoconference” service

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Connected with MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes, and there are many other possible use cases beyond the 4 selected in Sabadell.

Action #2. Contact

Main contact: Oriol LLEVOT, chief, innovation and knowledge section, Municipality of Sabadell
Josep de Andrés, chief, section of socialmedical, disability and dependency care, Social action department, Municipality of Sabadell
Carmina Martínez, chief, section of arts dissemination and creation, Culture department, Municipality of Sabadell

Action #3. START-UP COMPANY ACCELERATION PROGRAMME+ADAPTED "I-CITY" TENDER

What current problem is the project trying to solve

Sabadell has to improve the capabilities of its ecosystem of non-university start-up companies, as well as small/micro-entreprises, which have difficulties to access talent and connect with larger companies and technological centres.

Sabadell is interested in promoting innovation among these companies and also good practices of collaboration between local economic development agencies and universities/technological centres. There is also a lack of visibility of the Sabadell start-up ecosystem, so applying innovative communication and marketing methodologies will be also of interest, especially to attract new investment. The legal framework is seen as a barrier, without enough incentives for start-up companies and complexity of administrative formalities for company setup (not only for start-up's). Actions for partnership creation with leading companies should be envisaged.

Sabadell is already participating in the EU-financed Erasmus for Young Entrepreneurs programme. Erasmus for Young Entrepreneurs is a cross-border exchange programme which gives new or aspiring entrepreneurs the chance to learn from experienced entrepreneurs running small businesses in other Participating Countries. Under this action, small and microenterprises from Sabadell could exchange with Eindhoven companies, provided that all of them have at least 3 years of existence.

Existing acceleration programme in Sabadell: "Programa d'acceleració emprenedora"[x] (2 editions already completed): Need to involve new profiles of agents in the Sabadell's acceleration programme, based on the Eindhoven's experience.
Existing contests oriented to innovation in Sabadell:
Cafè Aventura [xi]
Co-innovem [xii]

Related MS Indicators	Related Action Fields	Related Impact Factors
P11; S50; S63	IB1A; IB3A; IB4A; RD4A; BT1A; BT3A; IN3A	I12

Action #3. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Based on the experience of the city of Eindhoven and the Technical University of Eindhoven (TUE), this action seeks to promote collaborations between both cities for improving the business innovation ecosystem in Sabadell. **Potential** activities (to be agreed) include the following -at least 1 will be implemented:

1. Enrich the existing business acceleration/support programmes of Sabadell with the experience of Eindhoven (Gemeente Eindhoven and Technical university of Eindhoven, TUE). This is concretised with the application of a methodology for improving a business innovation ecosystem in Sabadell (challenge to TUE students to apply a methodology for setting up/improving the Sabadell's innovation ecosystem on particular sectors).
2. Enrich the existing contests in Sabadell to promote entrepreneurship and urban innovation (E.g. Co-innovem; Cafè Aventura) with contests held in Eindhoven (E.g. I-city).
3. Exchanges between start-up companies in Sabadell and Eindhoven, with temporary exchanges of employees ("Erasmus-type").

Sabadell can provide to the Eindhoven partners its experience in actions for connection between start-ups, universities and tech centres (e.g. brokerage event, innovation forum).

Core Value

What kind of value does the project create for the city and city stakeholders?

Consolidate, retain and attract qualified workers and entrepreneurs to the city.
Improve the city branding as innovative and open to the new knowlege economy.

Promote economic development

Attract/raise public and private funding

Connect partners

Improve existing networks.

Take advantatge of having 2 universities in the city (UAB/ESDI) to build an ecosystem where entrepreneurs create companies and recruit qualified people from those acadèmic centres.

Become an accelerator point in the region.

Consortium

Who should be partner in this project and why?

- City of Sabadell (+linked third party Promoció Econòmica de Sabadell SL, local economic development agency).
- Eindhoven Lighthouse city consortium:
  City of Eindhoven; Technical University of Eindhoven; Volker Wessels.
- Autonomous University of Barcelona (UAB)
- Superior School of Design (ESDI)
- Neighbouring municipalities (Sant Quirze del Vallès, Barberà del Vallès)
- Industry background for mentoring/training.
- NGOs
- Chamber of commerce
- SMEs (traditional businesses)
- Big companies for branding purposes
- Eurecat
- ONION network
- Goverment of Catalonia (ACCIÓ, SOC)
- Provincial council of Barcelona

Action #3. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Enrichment of existing Sabadell contests and business acceleration programmes with new approaches taken from the city of Eindhoven experience.
Interdisciplinary working group.
Exchange of documents on acceleration events, approach, methodologies, etc.
Promotion of an informal network
Good communication and dissemination campaign, including digital (website, social networks, local associations websites)

Should have

What is the extended set of solutions that increases the value of the project to the next level?
"Opening new markets", so that the Sabadell business ecosystem obtains new market opportunities in the Eindhoven region, and vice-versa.
Synergies with the Sabadell's health & sport innovation cluster.
Involve neighbour associations in the contest's jury (Co-innovem) so that they perceive the municipality is empowering them.
A regular follow-up of the action implementation to amend and adjust it if necessary.
Generate partnerships that allow start-up companies to do prototypes.

Could have

What are optional solutions and components that help us better deliver the project?
Joint "Sabadell-Eindhoven" start-up companies created as a result of this exchange.
Tax and other type of benefits for start-up companies.
Incentives to promote entrepreneurship
Possibility to define an internship programme promoted by local industry, oriented to students/young entrepreneurs
Synergies with the the strong territorial specialisation of the area in design applied to industry, as stated in the Territorial competitiveness and specialisation plan (PECT)
Exchange of personnel between Eindhoven and Sabadell start-up and spin-off companies (Erasmus-type).

Action #3. Process

Activities and stakeholders (1/3)

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

The sequence of potential activities 2018-2020 would be the following:

- Information exchange with Gemeente Eindhoven, Technical University of Eindhoven and Volker Wessels regarding their existing programmes and contests in support of start-up and spin-off companies.
- Definition of an acceleration programme, completing the existing ones: selection of a main topic (e.g. Energy/mobility/smart cities/design applied to industry); select main players; contact potential sponsors.
- Replicate and adapt the Eindhoven's methodology for acceleration of start-ups:
    - Selection of projects by a core group (technical, business development & industry experts)
    - Open calls twice a year based on detected interests.
    - For each call, 2 rounds are foreseen (feedback is given in the 1st round, in order to obtain better proposals in the 2nd round). Final outcome of the 1st round is a concrete proof of concept/prototype, while in the 2nd round a product is expected, with a higher economic allocation.
- Organise networking events to promote exchange. For start-up companies, networking and being given the opportunity to give and scale-up ideas is more important than money.
- Give training to companies on how to set agreements and contracts, completing existing training on partnership agreements
- In parallel, the municipality organises a City challenge, e.g. "Coinnovem" 2.0 (with open topics, no focus).
- Formalise this collaboration with Eindhoven through a Memorandum of understanding (MoU).

Technologies

Which Technologies are to be implemented in the project?

Prototypes and products developed under the acceleration programmes and contests

Activities and stakeholders (2/3)

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

The sequence of potential activities 2018-2020 will be the following:
• In order to establish a new business ecosystem in Sabadell, it is needed to draft a business plan containing a proposed governance structure, finances, customers, expected output, etc. An innovation plan/roadmap must be elaborated with a short, middle and long-term horizon. This is done to make all stakeholders clear that there is something in for them at all phases, as different stakeholders have different backgrounds and speak "different" languages, for example: politicians, policymakers, businessman, students, educational/research staff. It must be clear that despite the different "revenues", there is a common goal that can be achieved by working together in an open collaboration.
The challenge is defined roughly by companies/government bodies and should clearly show the societal and economical horizon. Then, multidisciplinary students from Sabadell and Eindhoven can pick it up in collaboration with companies or clusters to further fine polish the idea and start working on it by, for example, filling in the gaps in the framework and making prototypes.
• This methodology will be based on different challenges proposed to a Sabadell mix of entities: municipality of Sabadell, education/research institutes, industries, and entities representing the general public (can be a large sports club for example).
• These challenges have to meet the following requirements:
- Sufficient expected societal impact
- Sufficient expected economic impact
This activity should germinate in communities/networks.
• Examples of sectors that have been developed through this methodology in Eindhoven: 3D printing of structural building elements like concrete bridges, energy transition, solar fuels, metal fuels, safety (regional fire department), security (national police), health, etc.

Activities and stakeholders (3/3)

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

The sequence of potential activities 2018-2020 would be the following:
• A group of Technical University of Eindhoven (TUE) students from different departments can support in the plan to set up an innovation ecosystem in Sabadell -potential sectors: smart city, health+sport, design applied to industry. The challenge would be: "Implement a methodology to set up an innovation ecosystem in Sabadell". This collaboration is included as part of the annual curriculum of their studies.
• Students act as a kind of catalyst in between industry, schools/university and government. TUE has experience with different types of joint work with students, industries and government bodies.
• Sabadell partners will stay owners of the idea/challenge -students can be asked to sign a non-disclosure form.
• A cluster (for example 4 to 12) of interested Sabadell companies should support the challenges and should be able to pick them up if they are sufficiently viable in order to scale up.
• Government (municipality or region) should support in various ways. Examples: Arrange space for testing, act as first customer, help with legislation/incentives when testing, etc.

Action #3. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

I-city tender in Eindhoven [xiii]

Eindhoven has a large experience in acceleration packages oriented to local start-ups and spin-off, on the basis of a triple helix collaboration. Sabadell, through this exchange with Eindhoven, could improve its exisiting schemes oriented to innovative companies, and the collaboration of the municipality, the university and the entrepreneurial sectors.

Acceleration programmes for start-ups and spin-offs of Tu/E and Gemeente Eindhoven

"Desafio Porto" (Portugal) [xiv]

Products & Tools

Add your products and tools that are suitable for getting the project realized.

Applied methodology for setting-up/improving a business innovation ecosystem
Upgraded contest related to entrepreneurship "Cafè Aventura"
Upgraded contest related to urban innovation "Co-innovem"
Prototypes and products developed

Action #3. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs
Estimated cost: 100,000 Euros
"Seed" funding will be allocated by public entities to students for small prototyping (<10,000 Euros). Further funding will be provided by private funding as sponsors.

Other costs will derive from the "Erasmus-type" exchanges between entrepreneurs from both cities, and visits of TUE students to Sabadell, including travel and accommodation costs, as well as direct subsidies/prizes foreseen within the action framework.

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Potential co-funding with Triangulum resources (to adapt the I-city tender)
Financing from ACCIÓ (Catalan agency for economic competitiveness), Provincial council of Barcelona, Servei d'ocupació de Catalunya (SOC, Catalan agency for employment)
Co-financing from the European social fund (ESF)
Applicable regional funding
Banks; Crowdfunding
Sabadell companies members of existing business and innovation networks as sponsors

Action #3. Expected Outcomes

Measuring success	City vision	Beyond the city
Which indicators are suitable to measure the success of the project? Number of companies participating in the programmes/contests (before vs. after the collaboration with Eindhoven). Growth rate from companies participating in the programmes/contests (before vs. after the collaboration with Eindhoven). Turnover (€) People hired Scale-up (%)	**How does the project relate to the larger scale city vision for sustainable urban development?** Connected with MUNICIPAL STRATEGIC PLANNING: Promotion of social inclusion and fight against poverty (EDUSI)	**Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)** Yes

Action #3. Contact

Main contact: Joan Casanovas, Fundació per la Indústria
Jordi Grané, advisor, City promotion and innovation area, Municipality of Sabadell
Iolanda REPULLO, chief, entrepreneurship promotion, Promoció Econòmica de Sabadell SL

Action #4. DIGITAL PLATFORM FOR SHARED SPACES + MAKER SPACE CONNECTED WITH THE CIRCULAR ECONOMY

What current problem is the project trying to solve

In the city there are a large number of public or private vacant spaces for living, working, cultural, sport, artistic or social activities. The platform would be the digital "hub" to match the local demand and supply for these empty spaces, allowing citizens –entrepreneurs, students, retired, etc.- to find an existing space as close as possible to their convenience. The platform will indirectly contribute then to reduce the city carbon footprint, with more activities realised at the city or neighbourhood level, especially in those neighbourhoods that currently suffer from a deficit in terms of public/private infrastructures and service. It will also promote the participation of disadvantaged groups which are currently not participating much in social activities. At an early stage, the rationale behind the platform will be to promote non-monetary exchanges (only free or in-kind). This platform will encompass not only spaces but resources (like equipment, machinery, materials, tools, etc.) for the use of the local "maker" community.

In parallel a "maker" space to promote local "proximity" manufacturing/prototyping by individuals will be promoted, based on recovering waste and eco-designing products and prototypes. It will be a space for training and prototyping combining a purpose of leisure as well as to promote entrepreneurship, to attract different segments of users.

Related MS Indicators	Related Action Fields	Related Impact Factors
S48; S58; S59; P1	IT2A; IT3A; OS4A	I1; I3; I3A

Action #4. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

The platform will allow citizens –entrepreneurs, students, retired, etc.- to find an existing space as close as possible to their convenience. The platform will indirectly contribute then to reduce the city carbon footprint, with more activities realised at the city or neighbourhood level, especially in those neighbourhoods that currently suffer from a deficit in terms of public/private infrastructures and service. Platform can evolve as a resource sharing platform for the local "maker" community.

Installation and development of a "maker" space acting as a space for training and prototyping products at the local level, with a focus on reusing waste materials/prototyping recyclable items.

Core Value

What kind of value does the project create for the city and city stakeholders?

The platform will contribute to give value to spaces/resources currently underutilised, promoting their modularity and concretising the idea of a multifunctional city –for living, working, studying, artistic, cultural, sportive- which fits Sabadell as the "Western Vallès" county capital city within Catalonia.

The maker space will promote local manufacturing, with new potential careers for the participating "makers", and reuse of materials which otherwise would not be valorised. New models for economic growth with social impact at the local level.

Consortium

Who should be partner in this project and why?

IT partner

Legal partner (it could be the City of Sabadell's legal department)

End-user engagement partner

Civic associations, entrepreneurial associations

Industry & education partners: focus on the 12 to 15 year-old students, which have energy and time, matched with the industry, which have innovation resources.

Sabadell entities related to the "maker" sector: Centre d'Estudis Sabadell (CES), Codelearn, UAB Engineering school, Superior school of Design (ESDI).

Waste generators

Action #4. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
IT platform, including geopositioning of existing vacant spaces/resources
End-user engagement activities (proactive search of vacant spaces/resources for "makers" and potential demand)
Marketing and advertising activities
Platform maintenance
Clarification of the legal framework behind the initiative, including insurances, safety, etc.
Ensure diversity of spaces/resources to satisfy demand needs (platform).
Map of waste generators at the local/county level
Physical space to implement the maker activities, ideally repurposing an existing building (circular building)
Regarding participation of students at the "maker" space, it should be a voluntary activity for students (extra-curricular activities), so that it is not seen as an obligation (10 hours/week).

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Co-design of the digital platform and the maker space with end-users
Conceive the "Vallès" county as a single resource platform for the "maker" sector
Need to plan training on using complex machinery/equipment for makers (usually old machines do not require high training)
Operate the maker space in a "quadruple helix" framework (citizen, private, public, academia)

Could have

What are optional solutions and components that help us better deliver the project?
QR or augmented reality "stickers" attached to the concerned buildings or urban land, helping to identify vacant spaces.
Allow monetary exchanges between the platform's supplier and demanders, under certain conditions.
New start-up and entrepreneurs originated from the "maker space" activities

Action #4. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

The idea appeared initially during the Sabadell's on-site assessment held in March 2016, proposed by local stakeholders. Since then, it has been studied with certain municipal departments which could provide vacant spaces (Education, culture, sports, civic centres), pointing out the legal complexity in conceding the use of a municipal space to third parties.

The idea was submitted to the H2020-CIRC01-2017 call as part of a bigger project but it was not approved.

The maker spaces should focus on customise, repair and transform existing materials & products and/or design of new products with circularity principles embedded (e.g. recyclable products).
Potential locations for the maker space: Mediastruch, Torreu-Romeu market, Vapor Badia library, "Can Roqueta" Centre for industrial start-ups, etc.
Need to adapt to the language of each end-user (big company, student, SME, micro-company).
Focus on a "Win-Win" exchange
Mapping/inventory of available physical resources: urban gardening, scrapbooking, patchwork, advanced software/hardware for videogame designers
Strong communication activities
Needs detection & restrictions by type of user
Meeting spaces between entrepreneurs and students
Start by a pilot test with a specific type of user (e.g. focus on high schools)
Focus on waste sharing; mentality for reuse exists
Potential focus sectors: textile & health; focus on sensors or technologies with social impact
Define the purpose of the organised activities: leisure *vs*. organise challenge to build sensors
Use existing machinery for the use of makers, based on a non-monetary exchange: e.g. the municipality pays rent for the machines offered to associations
Engage in priority companies interested in social impact

Technologies

Which Technologies are to be implemented in the project?

IT platform: open source, or reusing/adapting existing platforms (e.g. social networks applications) available for free.

QR or augmented reality "stickers" attached to the concerned buildings or urban land, helping to identify vacant spaces.

Hardware & software for the use of makers at the maker space.

Technological products and prototypes developed at the maker space

Action #4. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

It is an original idea conceived in Sabadell. Within the Triangulum project, the idea of community platforms for sharing was applied in City of Helmond (Eindhoven region), at the neighbourhood level, using Facebook. Outside of Triangulum, the City of Peterborough (UK) has also promoted a powerful sharing resource platform.[xv]

Synergies with the project developed by the Sabadell's IT department (IAS) of a digital application to facilitate the request and reservation of municipal space by third parties (e.g. cultural, sports facilities, civic centres).

"Refill" proposal to Creative Europe programme (Diputació de Barcelona, Provincial Council of Barcelona, not funded).

"Refill the City" URBACT Project [xvi]

Maker spaces are being developed in many European cities (e.g. "Ateneus de Fabricació" in Barcelona, "Repair café" in Eindhoven) [xvii]

Products & Tools

Add your products and tools that are suitable for getting the project realized.

Circular maker space

IT platform: open source, or reusing/adapting existing platforms (e.g. social networks applications) available for free.

QR or augmented reality "stickers" attached to the concerned buildings or urban land, helping to identify vacant spaces.

Prototypes and products developed at the maker space

Action #4. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Platform for shared spaces/resources: Estimated CAPEX & OPEX budget (2017-2020): 60.000 Euros

Maker space: 240,000 Euro (setup costs)

Potential income arising from commercialisation of products and prototypes developed at the "maker" space

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Calls similar to H2020-CIRC01-2017 call (Application submitted but not approved)
ERDF funds
Urban Wins H2020 project (approved, with participation of Sabadell)
Fee to end-users

Action #4. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?
Number of end-users involved
Number of vacant spaces made available
Number of transactions in the platform
Carbon footprint reduction impact
Number of prototypes at the maker space
Number of participants at the maker space

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Connected with MUNICIPAL STRATEGIC PLANNING: Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

Action #4. Contact

Main contact: Oriol LLEVOT, chief, innovation and knowledge section, Municipality of Sabadell

Action #5. “CITY BEACONS” (INTERACTIVE SCREENS IN THE PUBLIC SPACE IN CROWDED AREAS)

What current problem is the project trying to solve

The local government has put the emphasis in providing the maximum information to citizens, being transparent and involving them in decision-making. This action will contribute to this goal through and interactive and dynamic IT tool, as there are still many citizens who are not aware of the municipality actions.

Related MS Indicators	Related Action Fields	Related Impact Factors
S48; S58; S59	IT2A; IT3A; OS4A	I1; I3; I3A

Action #5. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Interactive screens installed in crowded pedestrian areas, following the example of Eindhoven's "City beacon" [xviii]. The screen and its associated column includes devices such as: safety and security camera, air quality, UV level and audience analytic sensors, speakers and screen (55-inch), communication with emergency services, NFC/RFID payments for local services, adjustable lighting. The form of free pilot test will be prioritised. The "beacon" screen could be also shared with other local stakeholders (e.g. non-profit associations, cultural entities, etc.). Local industry and retailers can advertise

Wi-fi hotspot

Core Value

What kind of value does the project create for the city and city stakeholders?

More knowledge about the city actions and events; more real-time information for the municipality through the devices installed in the beacon's column.
Public surveys to citizens (Multiple choice, not free text).

Consortium

Who should be partner in this project and why?

Municipality of Sabadell
City of Eindhoven & CityBeacon in order to learn from their experience and potentially implement a new pilot test in Sabadell.
City associations, in order to co-create the beacon functionalities.

Action #5. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Beacon with the basic functionality of providing municipal and city information through a screen and speakers.
Surveys to obtain opinion and view of citizens

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Provide interactivity with citizens (e.g. access to public services, RFID/NFC payments) through the beacon.
Remote management and maintenance of the beacon from a central office

Could have

What are optional solutions and components that help us better deliver the project?
Sensors, Wi-fi hotspot, USB charger, emergency call point
Co-design of city beacons with citizens
Provide information collected from the beacon's sensors in the municipal open data portal & Sentilo platform (action #1)
Use of open source hardware/software

Action #5. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- Input study on best practices related to digital channels for participation and communication with citizens (contracted to an external consultancy, May 2017)
- Information exchange with the Municipality of Eindhoven
- EU state of the art review regarding city public screens
- Secure funding for a 1 to 6 city beacon installation in Sabadell in geographically diverse areas (north, south, centre)
- Selection of locations
- Elaboration of terms of reference for a public tender on city beacons
- City beacons installation
- Marketing & advertising efforts oriented to citizens and city associations to inform about the new tool and encourage them to use it.
- City beacon maintenance & evaluation

Technologies

Which Technologies are to be implemented in the project?

- "Beacon" (Physical column)
- Software
- Hardware (including sensors, lighting, etc.)
- Telecommunications
- Electric connection

Action #5. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

Reference from Eindhoven "City beacons" (potential for free pilot test in Sabadell).

Other references: "Engagement hubs" (Glasgow, Scotland), "Tuba Lyon" (France), Urban Flow Helsinki, Legible London, several UK cities (Leeds, Liverpool, Dover, etc.).

Products & Tools

"Beacon" (Physical column)
Software
Hardware (including sensors, lighting, etc.)
Telecommunications
Electric connection

Action #5. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

40.000 Euros/beacon x 6 beacons = 240,000 Euros (but potential for free pliot test like in Eindhoven should be studied)

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Pilot test from the company in charge of implementation in Eindhoven.
EU funding
Municipal budget

Action #5. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of users/year
Number of breakdowns
End-user satisfaction index (survey after use)
Level of knowledge of municipal projects & actions

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Foster the neighbours participation in the design of the public space; promote a plural and deliberative political participation (Plan of legislature 2016-2019)
Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

Action #5. Contact

Main contact: Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

Action #6. INNOVATIVE PUBLIC LIGHTING: ADAPTED TO THE NATURAL PERIRUBAN ENVIRONMENT, FESTIVITIES/COMMEMORATIONS, DECORATIVE PURPOSES

What current problem is the project trying to solve

Lack of citizen participation and identification with the city, lack of city branding.

Related MS Indicators

P4

Related Action Fields

IB2A
E3A

Related Impact Factors

I2
I3

Action #6. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Innovative uses of outdoor lighting, taking the example of Eindhoven (e.g. running circuits). Understand public lighting as an IoT connected device, which can offer new innovative services to citizens. Associate lighting with events going on in the city.

Understand the lighting post as a component-based technology.

Core Value

What kind of value does the project create for the city and city stakeholders?

Improve the city branding as innovative and offer new services to citizens (e.g. lighting for guidance in outdoor running circuits).

It continues the efforts undertaken by Sabadell to modernise public lighting (30% of the city with LED lighting, new installations foreseen in the coming years)

Consortium

Who should be partner in this project and why?

Lighting technological provider
ICT tech provider
City of Eindhoven
City associations (e.g. runners)

Action #6. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
New lighting poles offering different functionalities, at least 1 of the following must be tested:

- In the periurban environment: lighting colour adapted to the special needs of the natural and animal species
- In the urban environment: Modify lighting colour over time according to relevant city/nation events and festivities like Christmas (e.g city centre pedestrian areas), big sports event, etc.; use lighting as guidance for runners in outdoor urban circuits (e.g. *Parc del Nord* running circuit)

Remote control and monitoring of the system.

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Complete the 3 proposed functionalities (protection of natural species, reflect relevant city/nation events, running circuits).
Big data exploitation (Integration into Sabadell Sentilo's platform, see Action #1)
Warn pedestrians when bus approaches (red colour)
EV chargers for motorbikes and e-bikes
USB chargers/Electric sockets
Motion sensors

Could have

What are optional solutions and components that help us better deliver the project?
Co-design the new technologies and services with citizens (design of the lamppost)
Suggest new uses of lighting E.g. Adjust lighting in the event of emergency situations, crimes or incivilities according to the type of noise captured by accoustic sensors.
Open source software/hardware; Standards
Synergies with the Sabadell's health & sport innovation cluster (running circuits)
LED; Sensors installed in the lighting (sensor hub); solar panels for lighting.
Procurement as part of an innovative contest (as the I-city tender in Eindhoven) or through demand aggregation with other municipalities
Concession of limited area of public space for a minimum of years (offer third parties the possibility to install sensors) (for 3-5 units, 50-100 linear metres). Preferably pedestrian zones or serving to give light walksides. Light lampposts 5 metres high, without interference/shadow from trees (facilitate charging of solar panels). Self-consumption or preferably connected to the grid (need connection to energy grid). Less than 10Kw solar installation. Discern between granting power to sensors or to light (winter time). 90% of consumed energy comes from sun. Environmental sensors, flow of vehicles and pedestrians. Cloud platform that is Sentilo-complier. Associate it with a renovation of public space (pedestrian street, square).

Action #6. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- Information exchange with the Eindhoven city council
- EU state of the art review related to innovative lighting
- Secure funding
- Selection of locations: Vapor Cusidó urban plot (old textile site), Sant Pere street, Parc del Nord or Ripoll River banks as potential pilot sites
- Elaboration of the tender's terms of reference
- Innovative public lighting installation (2018)
- Dissemination campaign among end-users (e.g running circuit)
- Service maintenance
- Action's evaluation

Technologies

Which Technologies are to be implemented in the project?

- LED Lighting poles
- Telecommunications
- Electric connections
- ICT for managing and monitoring the system

Action #6. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

City of Eindhoven (Eckart-Vaartbroek, Strijp-S and Stratumseind areas)
Sabadell has committed with the topic of Integrated infrastructures (including lighting) through its commitment 1796 at the EIP Smart Cities and Communities [xix]
Other references: Munich (Germany), Tartu (Estonia), Rotterdam (The Netherlands)

Products & Tools

LED Lighting poles

ICT for managing and monitoring the system

Action #6. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

150,000 Euros.

Potential income if the lamppost is "rented" so that third parties can install certain ICT components and devices (e.g. telecom companyies)

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***
- Municipal Budget
- Potentially assumed partly the ESCO company managing public lighting

Action #6. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of users / year (e.g. running circuits)
Energy consumption / year
Number of breakdowns
Maintenance costs per unit installed

City vision

How does the project relate to the larger scale city vision for sustainable urban development?
Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)
Foster neighbours participation in the design of the public space; promote a plural and deliberative political participation (Plan of legislature 2016-19)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

Action #6. Contact

Main contact: Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

Action #7. APPLICATION OF ENERGY EFFICIENCY MEASURES TO EXISTING RESIDENTIAL BUILDINGS

What current problem is the project trying to solve

Private owners do not consider energy while renovating apartments. It is needed to encourage them to take this “extra” aspect into account. It is required to encourage private owners to undertake energy refurbishments in buildings. For this, monitoring is very important (energy certificates for awareness raising). Count on subsidies of the Catalan government for energy renovation.
Need for an energy retrofitting of the Sabadell housing stock.
Need to improve the energy comfort of refurbished housing and thus combat energy poverty by reducing the energy costs of households.
Need to reduce CO2 emissions.
Encourage the economic activity of small and medium-sized energy refurbishment companies.

Related MS Indicators

I2/I3 CO2 emissions
P6 Total electrical energy use per household
P7 Share of electricity demand of private customers
S8 Renewable energies in the grid
S9 Cost for electricity
S10 Cost for heat
S43 Number of buildings owned by the city AND % of total building stock owned by city
P30 Spatial distribution of GFA (residential and commercial and industrial)
P31 Operational energy use/final energy demand-total building stock
P33/P34 Rent level
P35 Rental increase (average of last 3 years)
I8 Rate of new construction
I9 Rate of refurbishment

Related Action Fields

SP2 Definition of indicators, creation of a performance measurement system for sustainability and climate change
SP7 Negotiated / Voluntary agreements to higher social and environmental standards
UP2 Development of goals and guidelines for a sustainable district development.
UP4 Innovative bottom up housing concepts.
RD3 Creation of "city labs" (experimental areas) for deploying innovative technologies)
B1a Energetic refurbishment
B2a Tightened standards for new buildings and for modernization of buildings
B3a Certification systems for buildings

Related Impact Factors

Action #7. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

-Promote energy retrofitting, taking advantage of the opportunities put in place by the current legislation for the promotion of retrofitting.

-Help those who really suffer from a lack of resources so that they do not prevent the possibility of retrofitting of the rest in the condominia of owners.

-Reduce the energy expenditure and CO2 emissions of the Sabadell housing stock.

Core Value

What kind of value does the project create for the city and city stakeholders?

-Dissemination among citizens of the improvement of energy efficiency in housing.

-Promote the economic activity of companies and retrofitting professionals.

-Decrease the energy bill of dwellings (with better insulation, heating effort to attain the comfort temperature is much smaller).

Consortium

Who should be partner in this project and why?

-Habitatges Municipals de Sabadell, SA (VIMUSA). It is the agent who has to channel the action implementation.

-Ajuntament de Sabadell, who supports VIMUSA and determines the regulatory framework of the city.

-Condominia of owners. They must promote retrofitting works.

- Association of real estate builders (Gremi de Constructors), representing the companies that will execute the works. Take advantage of their commercial capabilities to influence the retrofitting of energy.

-Architect professional associations (Col·legi d'Aparelladors, Arquitectes i Enginyers de l'Edificació de Barcelona i Col·legi Oficial d'Arquitectes de Catalunya). They help to spread and convince condominia of the advantages of energy retrofitting.

-Academic University Schools: They help to make studies on the implementation of the retrofitting programme.

Action #7. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

Help the owners with less resources within the condominia so that they do not prevent the energy retrofitting of the building.
Help the condominia in general by obtaining money from the subsidy before undertaking the works.
Differentiate refurbishing that must be done for use and security reasons from the one related to energy retrofitting.
Technical support to the condominia to be able to follow the retrofitting work process.

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Check that the taxes are effectively deducted when energy improvements have been completed: better energy rating involves less taxes (Decrease in the real estate municipal tax -*Impost de béns immobles*- due by owners).
Campaign to raise awareness of energy retrofitting, with the experience of examples that have already been done
Focus in buildings of the city northern districts (2-3-4)

Could have

What are optional solutions and components that help us better deliver the project?
Workers in situation of unemployment, living at the building blocks to be refurbished, are recruited by real estate companies.
Increase the construction density in an existing building, if it is not already exhausted, in order to be able to finance the retrofitting.
Apply retrofitting intensively in a city area as a public development (model of the city of Santa Coloma de Gramenet, Pirineus street).
The area in which the action is implemented is also the object of other Triangulum actions

Action #7. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***

Information on governance during and after Triangulum

2 main operations are proposed for energy refurbishment:

1. Soft loans to finance owners without resources that cannot pay the common quotas/fees to refurbish a building energetically.
2. Creation of a fund that advances the money from the subsidies granted by the Government of Catalonia for the retrofitting of existing buildings.

With what sequence and time?
The 2 activities would be based on money funds that would be revolving. That is to say, as the money is recovered, with the pay-back of the soft loans and the payment of subsidies by the Government of Catalonia, the incoming funds are used to continue investing in other condominia of owners.
Lines of credit would be opened with financial entities for a period of 3 years that could be renewed after this term, depending on the volume of funds spent.

Technologies

Which Technologies are to be implemented in the project?

Innovative constructive technologies such as exterior isolation systems (ETICS), with sustainable materials, will be used:

- More energetically efficient materials for windows
- Improved insulation for façades and roofs
- Solar thermal installation

Action #7. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

City of Eindhoven:
It has been conceived as a project to replicate in Sabadell the retrofitting done in Eindhoven.
Woonbedrijf (WB) is the Eindhoven social housing promoter. It is a non-profit private company that manages a park of 30,000 social rental housing. Most of the company's homes are old and have an energy rating around the letter "E".
The company is carrying out an action within the Triangulum project that consists of the energetic retrofitting of 1,300 homes with energy efficiency measures in the Eckart-Vaartbroek neighborhood.

Santa Coloma de Gramenet (Barcelona outskirts): Energy renovation with a focus on a specific area.
The other project that has been taken as a reference is in Santa Coloma de Gramenet where the buildings of the Pirineus street have been refurbished. The project "Renovem els barris" makes the City Council lead the retrofitting of private properties, advancing money and managing all the preparation and execution of the work [xx].

Products & Tools

Soft "social" loans

Municipal fund as advanced money (prior to receiving Catalan subsidies)

Insulation materials

Solar thermal technologies

Action #7. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs
The costs of the project are: Interest rates of the project financing and the personnel that takes care of the management of the project -technical officer and an administrative officer.

Financing costs:
With the following hypothesis:
20 actions of 150,000€ of cost of the work with the subsidy of the Government of Catalonia and 3 owners of the building with soft credits.

Model of a building with 10 apartments with an interest of 2%:
Interest subsidy financing: 1,837€
Interest in credit soft financing: 9,040 €
In a building: 10,877 €
Exported costs to 20 buildings and 200 homes: 217,480 €

Costs of personnel:
1 administrative officer: 30,000 € / year
1 technical officer: 50,000 € / year

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

The retrofitting project is paid by the owners of the houses themselves, the project only helps to finance.

Financing of the interests with the funds of the EDUSI strategy.

Action #7. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of buildings refurbished in the city of Sabadell.

Increase in economic activity among retrofitting companies.

Decrease in energy consumption of the households (% and Kwh)

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Improvement of the urban environment, in terms of safety, aesthetics and the reduction of pollution.

Improvement of the energy efficiency of housing.

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

It is a replicable model in other cities that have old residential buildings and with atomized property.

Action #7. Contact

Main contact: Ricard PERICH, technical director, VIMUSA (Habitatges Municipals de Sabadell SA)
Jaume PONT, architect, VIMUSA (Habitatges Municipals de Sabadell SA)

Action #8: INCENTIVES FOR THE GREEN LAST MILE URBAN DELIVERY OF GOODS

What current problem is the project trying to solve

Sabadell lacks to implement innovative policies for the delivery of goods (conclusion after applying the Morgenstadt indicators and action fields)

Need for pollution reduction. Increase in the quality of life. Reduce health problems (respiratory illnesses).

Need to recover the urban environment for the citizenship

Need to rationalise freight traffic in the city

Need to avoid the invasion of middle-sized vehicles and its consequences (pollution, noise, invasion of pedestrian areas). Damage and tear of urban elements (e.g. big vans breaking the pavement).

Make operators participate, use the mini-hubs, and reduce their delivery time

Related MS Indicators

P24
P25

Related Action Fields

T1A TO T1D
T2A TO T2D

Related Impact Factors

I12
I2
I3
I4
I5

Action #8: DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Last-mile distribution with clean vehicles originating from a micro distribution hub that is accessible by bike and truck, in the Sabadell central area. The project aims to promote the delivery of goods with light vehicles or walking without emissions, indirectly promoting the use of bicycles or electric vehicles, creating new business models and making an impact.

Need to identify a neutral operator for the hub.

Align it with new regulations restricting traffic and pedestrianisation at the Sabadell central area

Improve the citizen's quality of life

Facilitate entry and exit of operators interested in providing the service

Core Value

What kind of value does the project create for the city and city stakeholders?

Provide a new service to local small companies (e.g. oriented to e-commerce) to boost local economy. Decrease use of plastic (waste)
Combination of different types of good movements: waste collections, pharmaceutical products, parcels, registered mails and courier services.
Reduce packaging and travel length through more direct delivery.
Reduce traffic/noise/pollution in the city
Long-term: include all possible good services into the hub to be delivered into the city centre.
New mobility model in relation to delivery of goods
Solidarity; Autonomy
Integrate more services that help less favoured communities (for free or looking for value, e.g. collect oil)

Consortium

Who should be partner in this project and why?

CENIT (Centre for innovation in transport)
UAB
Bicinity
Association of retailers
E-commerce operators
Freight delivery operators (e.g. postal company)
Other public administrations
Chamber of commerce
Association of retailers
Sabadell City Council
Som EcoLogística cooperative
Postal service

Action #8: Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Incentives scheme for clean urban freight delivery in the Sabadell's central space
Bikes/small electric trucks offered to freight operators for urban delivery in the central space (for free/against fee payment)
Sensitise retailers; easy to adhere platform, promoting local products commercialisation
Enforcing legislation after the sensitisation time
Priority to clean vehicles. Restricted access only to non-polluting vehicles. Hubs conceded by the municipality.
Webpages, applications, suitable public spaces: bike lanes, signalling

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Micro distribution hub as storage facility located in the Central market, Exhibition centre, etc.
Guidelines on recommended routes for freight delivery in the central space.
Prize for using these services that will benefit the community reducing emissions and improving health. Information to citizens with data regarding environmental improvement (decrease CO2 emissions), social and economic improvement, derived from the new service.
Dissemination that promotes responsible consumption of clean transport among the citizens.

Could have

What are optional solutions and components that help us better deliver the project?
Synergies with the actions of "parking sensors" and "charging points for electric vehicles" at EDUSI. E.g. app informing delivery operators in real-time about the occupancy of freight delivery parking spaces
New regulation with restrictions to polluting transport
Install environmental sensors at the delivery bikes
Advertising

Action #8: Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- 1st project ideation (March 2016)
- Information exchange with the city of Manchester (Corridor's experience)
- EU state of the art review
- Study on urban freight flows in Sabadell linked to priority streets or traffic lights
- Incentive scheme for clean freight delivery
- Involvement of freight delivery operators & Sabadell retailers
- Purchase of bikes/mini-trucks/vans
- Adaptation of space as mini-hub, facilitating its use by operators
- Action's evaluation
- Manage the system through a cooperative company
- Study on retail activity of Sabadell as a starting point
- Working group on last-mile delivery contacting bilaterally with freight companies potentially interested in this service
- Incentive and subsidies to start-up companies
- Restriction to traffic of heavy vehicles
- Map potential locations for the municipal hubs that could be rented to companies
- Map commercial areas
- Choose of the most appropriate model for Sabadell (bike or electric mini-van)
- Elaborate municipal norms mandating/incentivising retailers to use the last-mile system.
- Network creation among the potential users, involving as much entities as possible in the project.
- Ideate the mobility system ideal for the use of public space for this purpose
- Impact study

Technologies

Which Technologies are to be implemented in the project?

Bikes/Tricycles/electric bikes

Electric mini-trucks/vans

Parking space sensors

Platform for data analysis

Digital platform, webpage and apps required for the project implementation

Action #8: References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

The Manchester's corridor will be taken as a reference (however in Sabadell there are not main streets connecting key infrastructures like university-hospital-city centre)

Micro-distribution centres with bikes have also been implemented in Barcelona as part of the "Grow Smarter" lighthouse project, as well as the SMILE and NOVELOG EU projects.

The action is under the framework of the "Reordination of the central space" project, with incentives and regulations in order to favour soft mobility modes and citizen activities in the public space in this area.

Potential connection with the Catlabs urban living lab on urban mobility/smart cities (coordination: UAB)

Project in Saint Sebastian (Basque Country): in order to identify which product types have been delivered through this system.

Products & Tools

Add your products and tools that are suitable for getting the project realized.

Bikes/Tricycles/electric bikes

Electric mini-trucks/vans

Freight delivery Mini-hub

Parking space sensors

Incentives scheme for clean freight delivery

Computer and mobile applications to create the network.

Network dissemination and communication (advertising campaigns)

Dissemination of benefits of last-mile delivery

Big data exploitation

Digitalisation

Action #8: Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Estimated 100,000 Euros:
- Purchase of mini-trucks, vans, bikes
- Last-mile freight delivery mini-hubs

Financing

How can the project be financed?
- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

EDUSI ERDF funding

Action #8: Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?
Kg. freight delivered / year
CO2 emissions decrease
Number of operators involved in the project
Freight delivery efficiency (compared to the previous system)
Number of services (shops, citizens) using the system
Type of shop/retailers using the service (e.g. surface)
Local job creation
Evolving in consumer habits
#, Kg, m3 of freight
# of destination points

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)
Improve the environmental quality (absence of noise, urban quality).
Promotion of areas of protected environment, more pedestrian areas, and new mobility.

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes
Other neighbourhoods in the same city.
Connect cities by interurban clean transport
Incentivise medium and long length transport by train

Action #8: Contact

Main contact: Josep CANALS, advisor for Public space and urban land, municipality of Sabadell
Jaume ENCISO, chief, urban environment, Sustainability and ecosystems management department, municipality of Sabadell
Rosa MARTINEZ, chief, Strategic territorial planning, municipality of Sabadell
Mercè RUIZ, chief, department of Commerce, municipality of Sabadell

Action #9. RENEWAL OF THE MUNICIPAL FLEET OF VEHICLES WITH SUSTAINABILITY CRITERIA

What current problem is the project trying to solve

Amidst private vehicles, the use of electric vehicles is very low in Sabadell. Sabadell pioneered being one of the first cities in Catalonia to install EV charging points in 2009, but since then there has not been a new impulse.

In parallel, Sabadell has a very old fleet of municipal vehicles oriented to maintenance of buildings / public space, largely underutilised, and for this reason in the coming years the fleet will be reduced by 50% and the remaining fleet should be replaced by greener vehicles. Currently the fleet for maintenance of buildings/public space accounts for around 100 vehicles, composed of old vehicles (>15 years on average), and running only 3,000 Km./year (12 km./day)

Overall in this moment urban mobility is one of the main factors contributing to the city CO2 emissions, together with energy consumption of buildings.

Related MS Indicators	Related Action Fields	Related Impact Factors
S26; S28; S21; S8; S6; S9; P4	T3A; IT2A; IT3A; IT4A; E6A	I2; I3; I4; I5

Action #9. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Renew the municipal fleet with electric vehicles, and implement a car-sharing system for the use of other city stakeholders, when the municipal car are not used (weekends & holidays).

Core Value

What kind of value does the project create for the city and city stakeholders?

Reduce the city carbon footprint related to urban mobility.

Offer new opportunities for clean mobility to citizens.

Consortium

Who should be partner in this project and why?
!

LIVE association (Association for the promotion of electric mobility at the Barcelona metropolitan region): http://www.livebarcelona.cat/
(Sabadell is member of this association)

Car-sharing operators

Delivery companies as potential users

Action #9. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

ICT and energy flow management system to allow optimal use by end-users and remote control/management by the municipality.
In 2018: Purchase of 6 electric cars + 1 electric van; Pilot test with NISSAN (1 car + 1 van); Framework agreement with the Catalan association of municipalities (ACM) for the purchase of EVs (joint procurement, tender by ACM)

Should have

What is the extended set of solutions that increases the value of the project to the next level?

Foresee payment system
Big data exploitation
Connect with the vision to have a “car-free” city centre.
New company taking care of the car-sharing (VIMUSA)
ICT system for fleet management

Could have

What are optional solutions and components that help us better deliver the project?

Offer municipal vehicles for the use of citizens (car-sharing) during the time slots in which they are not needed for municipal duties. Complexity to put it into practice. It is interesting to provide new services to citizens. Holidays and weekends
Open source hardware / software

Action #9. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- Input study "proposal for a renovation of the Sabadell's fleet of vehicles", 2015 (Evectra)
- First ideation (1st semester 2016)
- Funding secured (municipal budget)
- Information exchange with Manchester/Eindhoven
- Elaboration of the tender terms of reference by the Catalan association of municipalities (ACM).
- Vehicles purchase: Start vehicle replacement by most-used vehicles (in terms of ran km./year). 20 old vehicles replaced by 6 new electric vehicles
- Dissemination campaign among potential end-users
- Equipment / vehicles maintenance
- Action's evaluation
- Detailed preliminary study on the citizen's interests before deploying the car-sharing system

Technologies

Which Technologies are to be implemented in the project?

ICT management system (reservation, monitoring, remote control)

Telecommunications

New electric vehicles

Action #9. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

City of Manchester and Eindhoven's car-sharing systems.
City of Reus (Catalonia) [xxi]
Car2go car-sharing system [xxii]

Products & Tools

- ICT management system (reservation, monitoring, remote control)
- New electric vehicles

Action #9. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Renewal of the municipal fleet with greener vehicles: 260,000 Euros (not including ICT software and car-sharing system)

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal fleet of vehicles:
Municipal budget (already secured)
Spanish subsidies (MOVALT) [xxiii]

Action #9. Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of users / year
Energy consumption / year
CO2 emissions reduction
Number of breakdowns
Maintenance costs per unit installed

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

30% of municipal fleet vehicles with energy efficient technologies (Agenda 21+10); Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

Action #9. Contact

Main contact: Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

Action #10. PROMOTION OF GREEN MOBILITY AT SCHOOLS

What current problem is the project trying to solve

Increase the use of bicycle (still low), especially among young generations, in accordance with the Managing plan on bicycle which foresees to increase the use of bike to 5% of the total mobility share by 2020.

Related MS Indicators	Related Action Fields	Related Impact Factors
P23; S21; S28	I1A; I2A	I2; I3; I4; I5

Action #10. DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

In line with the Managing plan on bicycle and the municipal interest in introducing environmental concepts at schools/educational centres:
- Offer (temporarily or permanently) bikes to educational centres, as a reward to the most involved and committed with environmental topics (contest between schools)
- When students leave the school, bikes are transferred to the next "generation".
- Introduce gamification between users to promote that they use the offered bikes.
- Anonymously track bicycles movements and other parameters (installing at the bikes GPS devices and environmental sensors).

Core Value

What kind of value does the project create for the city and city stakeholders?

Increase the city branding as the "city of the bicycles"

Increase in the number of urban "bikers", catalysed from the school students to their families and friends.

Reduce CO2 emissions by reducing traffic congestions at the times when students enter or leave schools.

Develop the "living lab" concept, as a new model for quadruple helix R&D connected with the "citizen science" concept.

Promote healthier life habits among the Sabadell's population.

Consortium

Who should be partner in this project and why?

4 Sabadell public educational centres

Autonomous University of Barcelona (R&D associated with the project)

Main Foundation (setup, maintenance and reparation of bikes)

Bike providers (e.g. "Bicis Escapa" in Sabadell)

Schools of design (Illa, ESDI) of the bike co-design process.

"Amics de la bici de Sabadell" association

Association of parents of schools (AMPAs)

Action #10. Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Make 200 bikes available to 4 Sabadell educational centres (possible focus in schools poorly deserved by public transport/where private cars are the most used for attending school)
Install sensors to anonymously track the bike use (big data exploitation)
Organise training on safe bike riding, safe urban itineraries to move from/to school and bike ordinary maintenance.
Need to count on a local influencer at each school (e.g. teacher)

Should have

What is the extended set of solutions that increases the value of the project to the next level?

Need to ensure safe bike parking spaces nearby or inside the educational centres where the action will be implemented, as well as safe cycling paths.
Co-design of the bicycles/sensors with the students
Reward to students with the highest bike use/best maintenance of their bike.
Integrate the initiative as part of the strategy of school "environmentalisation" so that it is not perceived as an isolated action oriented to relatively few people.
Connect it with the promotion of other soft mobility modes to go to school (skate, walking, electric scooter, etc.)

Could have

What are optional solutions and components that help us better deliver the project?
Extend the system to workplaces, involving companies and their workers.
Obtain a sponsorship for the action, in exchange of having brand visibility in the bikes (like Vodafone in Barcelona)
Use recycled bikes (second hand, waste)
Integrate data in Sentilo platform (action #1)

Action #10. Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- First ideation (1st semester 2016)
- Inclusion in the Urban innovative action 2017 application (not successful)
- Second ideation (June 2017) as part of the Catlabs innovation camp
- EU state of the art review
- Prototype as part of a "Catlabs" urban living lab (coordination: UAB) related to urban mobility/smart cities
- Secure funding
- Implementation as part of a "Catlabs" urban living lab related to urban mobility/smart cities
- Dissemination campaign
- Action's evaluation

Technologies

Which Technologies are to be implemented in the project?

Co-designed bikes

Sensors

GPS tracker

Software for the system monitoring

Gamification software

Action #10. References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

Synergies with the “Ciutat I Escola” Programme and the “School Agenda 21”. Integrate the initiative as part of the strategy of school “environmentalisation” so that it is not perceived as an isolated action oriented to relatively few people.

City of Manchester (Sustrans, UK cycling promotion body); City of Stockholm (project on bike commuting).

Products & Tools

Co-designed bikes
Sensors
GPS tracker
Software for the system monitoring
Gamification software
Guidelines for safe riding/maintenance of bikes.
Bike repair garage.

Action #10. Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Estimated 50,000 Euros

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal budget

Possibility to include it as part of the urban "living lab" proposed by UAB, under the framework of the "Catlabs" network (then it would benefit from 50% ERDF managed by the government of Catalonia).

Possibility to include it in the Urban Innovative Action 2018 call [xxiv]

Action #10. Expected Outcomes

Measuring success	City vision	Beyond the city
Which indicators are suitable to measure the success of the project? Number of students involved Decrease in CO2 emissions Increase in the number of bike users catalysed by the action	**How does the project relate to the larger scale city vision for sustainable urban development?** Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI) Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)	**Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)** Yes

Action #10. Contact

Main contact: Oriol LLEVOT, Chief, innovation, knowledge and media section, municipality of Sabadell
Montse DURAN, Chief, Education service, municipality of Sabadell
Jaume ENCISO, Chief, Urban environment section, Sustainability and ecosystems management, municipality of Sabadell
Rosa MARTINEZ, Chief, Strategic territorial planning department, municipality of Sabadell

6. Conclusions and next steps

With the present deliverable, the Municipality of Sabadell (Barcelona, Catalonia) and its linked third parties VIMUSA, IAS and PES commit to **a short-term urban innovation agenda** for the Triangulum project implementation (2018-20). It is the conclusion of 3 years of exchanges with the lighthouse cities, the follower cities, the local stakeholders, as well as of assessments on urban indicators.

This implementation strategy allows the definition of integrated actions (either existing or new initiatives) which will be the most excellent in terms of generating the highest impacts on energy efficiency, emissions reductions, resources optimisation, economic development and citizenship involvement. It is a proof of the city commitment with sustainable economic growth and making Sabadell a more attractive place to live, while reducing the city environmental impacts.

With an estimated financial effort of more than **1.5 million euros**, 10 actions have been established, with 3 actions already on-going or with funding secured, while for the others fund-seeking will be required during the strategy implementation phase, with a priority for blended financial solutions: public/private, crowdfunding, user fee, free pilot test, etc. **5 actions out of 10 refer to ICT, 1 to smart economic development, 2 to mobility and 2 to energy.**

This strategy will contribute to the Triangulum project efforts to create new markets in the urban innovation fields, and upscale solutions implemented in the lighthouse cities. In this vein, there are 3 actions clearly replicating a solution implemented in Eindhoven -city beacon, acceleration programme for start-ups and innovative lighting; 1 in Manchester -green last-mile delivery of goods; and 1 in Stavanger -videoconference applied to home care. The rest are also connected, even if less directly, with actions implemented in the lighthouse cities.

For the implementation phase, it will be very useful to have a permanent peer-review and know-how transfer from the lighthouse cities representatives, in order to ensure success in the Sabadell's implementation, based in the real difficulties, success factors and challenges encountered in the lighthouse cities. This includes not only the 3 lighthouse cities in the Triangulum, but all the community of the H2020-SCC-1 beneficiaries.

Now it is thus the time for the effective implementation and real test in Sabadell of these pre-defined actions, with a timeline that has been established to ensure that most of the actions can be well advanced by the end of the project (January 2020). **The challenge is to continue to involve local stakeholders in this implementation in quadruple helix, as it was the case during the elaboration phase, establishing the appropriate rules and incentives.**

In coordination with WP2, streamlined monitoring protocols for the Sabadell's follower city implementation strategy will be also established, taking advantage of the new smart data collection platform aligned with the Triangulum's joint ICT reference architecture.

Finally, the smart city decision making tool developed under the project Work package 6 will also contribute to this refinement process during the implementation phase.

The Triangulum implementation strategy is going to be officially approved by the competent municipal body once this deliverable has been accepted by the European Commission.

7. Appendix

For each of the document chapters, larger information is included in this appendix, allowing for a detailed understanding of the ideation and assessment processes leading to the implementation strategy presented in this deliverable. Moreover, potential actions analysed during this process but finally not included in the strategy are annexed in sub-chapter 7.4.

7.1. City context and definition of the initial problem/ policy challenge

- Location of the city

Figure 01: Location of Sabadell in southwestern Europe

Figure 02: Location of Sabadell (in yellow colour) in the urban continuum of the Metropolitan region of Barcelona. Source: Google Maps + Municipality of Sabadell

Figure 03: Topographical map of Sabadell with the position with respect to neighbouring municipalities. Source: Barcelona

Figure 04: Map of Sabadell with main road urban and interurban axis. Source: Google Maps

Figure 05: Relevant buildings and public space from the city of Sabadell. Source: Municipality of Sabadell

Figure 06: Airport and university facilities. Airport is used for light aircrafts, specially training purposes; university is a secondary campus from the Autonomous university of Barcelona's main campus, based 10 km. away from Sabadell. Source: Municipality of Sabadell

Figure 07: Sport facilities in Sabadell. Source: Municipality of Sabadell

Figure 08: Central municipal food market of Sabadell

Figure 09: Fair and congress building. Source: Municipality of Sabadell

Figure 10: Perirurban ring (*"Rodal"*)

Figure 11: New shopping area in "Sant Pau de Riu-sec", with a successful demand for shopping centres but where developed land attributed to offices is still empty.

Figure 12: New neighbourhoods with less density and a more comfortable public space but with insufficient decentralised public services (health, education, etc.)

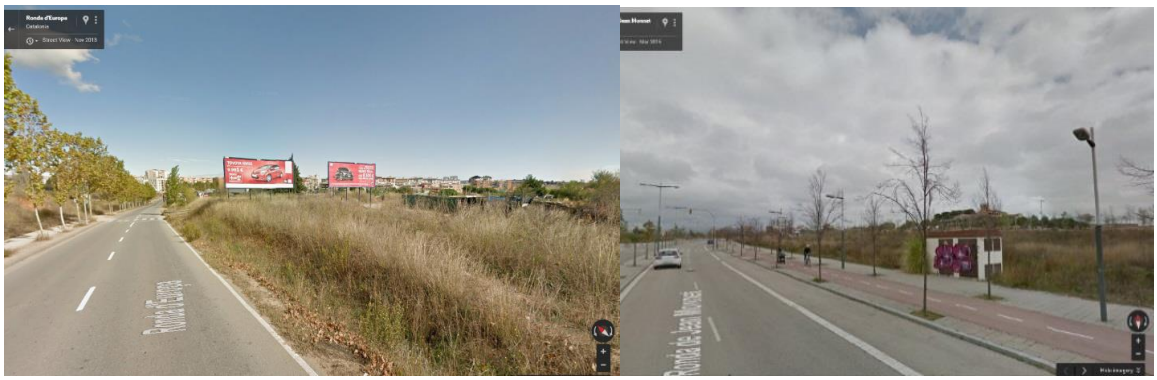


Figure 13: Developable land with urbanised public space but no private constructions

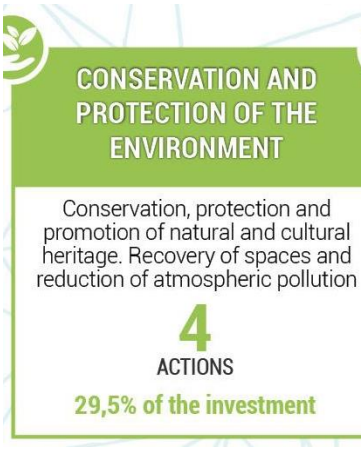
Figure 14: Old industrial warehouses pending to find new usages

Figure 15: Post-war residential buildings in need for refurbishment

- Summary of relevant Operational Programmes (ERDF and ESF) covering the city

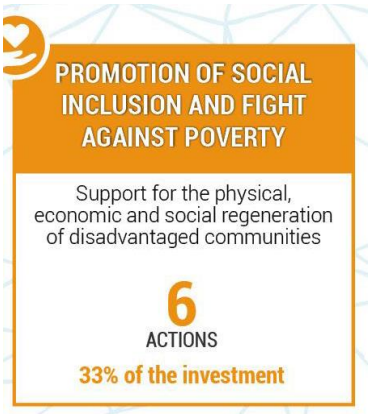
List of the 24 EDUSI's actions:

ERDF Thematic objective 6:



- Agricultural park: 700,000 Euro.
- Connected green spaces creation: 2,000,000 Euro.
- Quiet areas creation: 1,200,000 Euro.

ERDF Thematic objective 9:



- Refurbishment/repurposing of industrial heritage (spaces for co-working, start-up; new creators; cooperatives): 1,200,000 Euro.
- Refurbishment of a municipal market so that it becomes a point for social and intercultural exchange: 2,100,000 Euro.
- School paths in disadvantaged neighbourhoods: 500,000 Euro.
- Collaboration with schools and professional schools in disadvantaged neighbourhoods: 200,000 Euro.

- Refurbishment of housing as a social emergency fund: 300,000 Euro.
- Implement the municipal agency for renting empty or "for sale" apartments: 2,300,000 Euro.

Current state of play with regard to smart city development strategy and policies

The City of Sabadell has developed in the last years several strategies and plans with influence in the areas of energy, mobility and ICT tackled by the Triangulum (reflected in **blue**, the most relevant for the Triangulum's IS):

Id.	Plan/programme/Strategy	Year/period	Main domain
1	**Plan of legislature 2016-2019 (+yearly municipal action plans 2016-17-18-19)**	2016-2019	Cross-city
2	**Government's "commitment"**	2015-2019	
3	Strategic plan of Sabadell (under elaboration)	2017-?	
4	Plan of internationalisation of Sabadell	2017-?	
5	Strategic plan of social action	2016-2025	Social action
6	General plan of urban ordination (PGOU) and its modifications	1993	Urban planning
7	Project of integral recovery of the Ripoll river; Plan of the Ripoll River	1995 2012-2016	Sabadell's periurban ring (*Rodal*)
8	Special plan of pathways	2015	
9	**Strategy of Integrated and sustainable urban development (EDUSI)**	2017-2020	Sustainability/Territorial and strategic planning
10	**Action plan for the improvement of acoustic quality of Sabadell**	2012-2017	
11	**Agenda 21+10**	2011-2020	
12	**Plan for the improvement of air quality**	2017-2022	
13	**Managing plan for the use of water external with respect to the drinking water distribution network**	2014-2024	
14	**Action plan for sustainable energy**	2016-2020	
15	Plan to recover the pre-industrial heritage in the Ripoll river	2006	Municipal heritage
16	Special plan for the intervention in the public landscape (PEIPU)	2006	
17	Pla Especial de Protecció del Patrimoni de Sabadell (PEPPS)	2007	

18	**Urban mobility plan (new plan under elaboration)**	2009-2014	Mobility
19	**Managing plan of the bicycle**	2017-2020	Mobility/Territorial and strategic planning
20	Strategic plan of tourism	2017-?	City Promotion and participation
21	Territorial competitiveness and specialisation plan (PECT) *"Vallès county RIS3 Territorial specialisation. Industrial Vallès: Innovation and design of the European industry "*	? Pending approval and funding from the Catalan government ERDF	

Table 1: Source: Municipality of Sabadell

7.2. Brief overview over the Morgenstadt Methodology and the on-site assessment process

The actions to be included in the Sabadell's Triangulum implementation strategy are the result of several participatory processes and assessments held under the Triangulum, as part of Work Package 6 "*Smart city framework and replication*":

PRIOR TO THE SABADELL ON-SITE ASSESSMENT HELD IN MARCH 2016:

- "Morgenstadt" indicators and action fields assessment:

As a result of applying the "Morgenstadt" methodology from the research institute Fraunhofer IAO, information has been compiled about the city of Sabadell through several pre-set indicators.

The scores (positive/to reinforce, negative/to improve) have been established comparing the values obtained in Sabadell for each indicator with the pre-set thresholds.

The use of this methodology was one of the requirements that were established in the Triangulum project and the city of Sabadell could not make any changes, neither for the indicators nor for the thresholds, and the rating (positive or negative) that follows from the values obtained. Therefore, the rating obtained for some indicators as "positive" or "negative" may surprise, as well as the indicators themselves, which inevitably imply a priority and emphasis on certain aspects, leaving aside others that they could have also been relevant.

The advantage of this selection of indicators is that it allows international comparability Sabadell with other European cities that have applied the same Morgenstadt methodology.

Finally, since the data was collected on the 2nd semester of 2015, the current data for some indicators and action fields has evolved (mainly to improve), although this is not reflected, as the data was "frozen".
For more information:
http://www.morgenstadt.de/en.html

According to the Morgenstadt methodology, 106 indicators have been defined grouped into 3 categories:

- *Pressure indicators* in the city system arising from different sectors and considering the social, economic and environmental viewpoints.
- *State indicators*, describing the current state regarding society, economy and the different technological sectors.
- *Impact indicators*, showing the impact that the city system has on the environment, the society and the economy, and its long-term resilience.

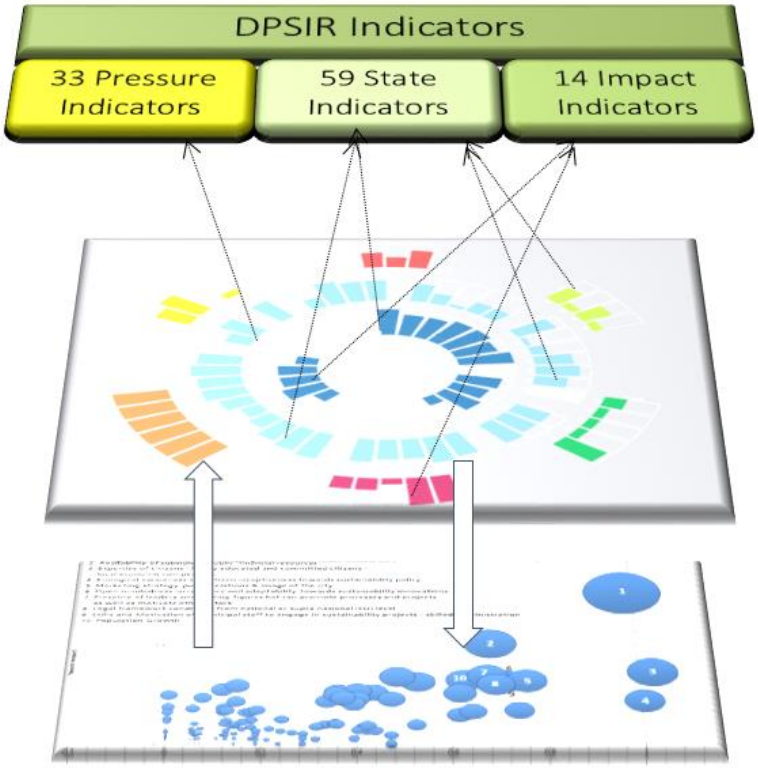


Figure 15: Categories for the "Morgenstadt" indicators assessment, based on the DPSIR methodology (Drivers-Pressures-States-Impacts-Responses). Source: Fraunhofer IAO

The next step was the action fields assessment. The actions fields describe different types of sustainable actions and the expected city responses. The system has identified 83 action fields, classified into 3 categories:

- Urban leadership (policy, planning, management, and development structure)
- Levers (urban planning, incentives, regulations, information, education, etc.).
- Points of action (smart grids, big data, renewable energy, urban heating, energy refurbishment, rainwater management, etc.).

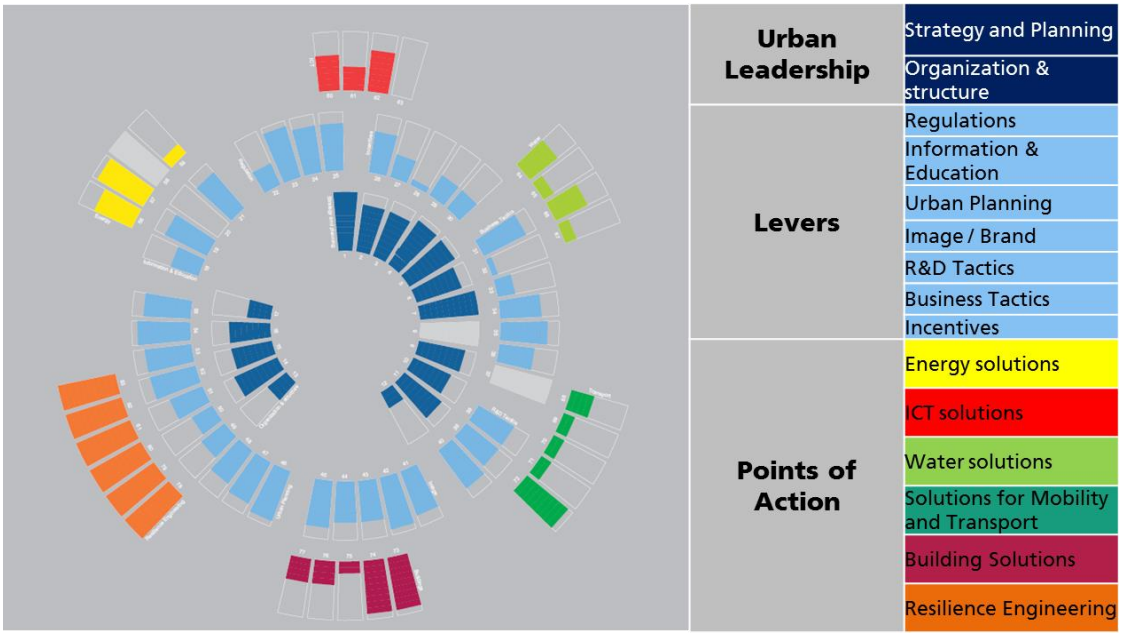
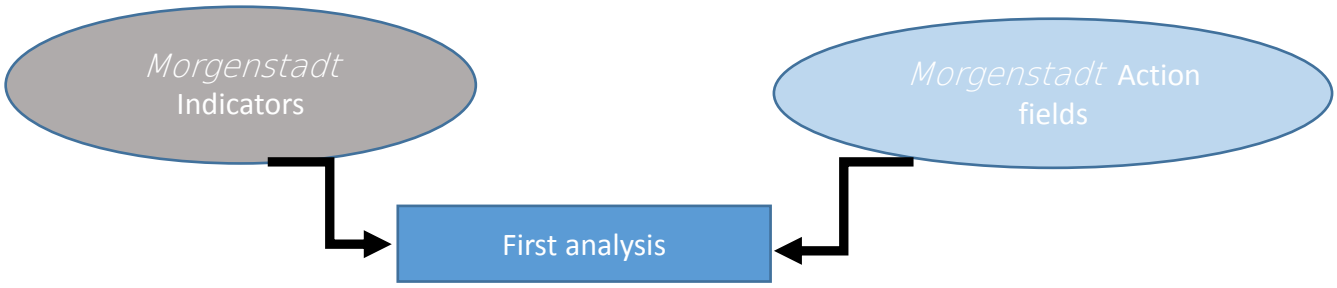


Figure 16: Categories for the "Morgenstadt" action fields assessment. Source: Fraunhofer IAO



The Sabadell data regarding indicators and action fields was uploaded at the following website during the 2nd semester of 2015:
http://mci.iao.fraunhofer.de

- Preliminary ideation meetings with municipal departments

During the last quarter of 2015 and January-February 2016, internal sectoral roundtables were organised to review the *Morgenstadt* assessment results and extract ideas of actions that could be in line with the city strategy and inspired from the Triangulum's lighthouse cities, as a previous step before the Sabadell on-site assessment.

Internal Round tables (ICT, Mobility and Energy)

Inputs:
- Significant weak & strong points coming from the first analysis (Morgenstadt assessment)
- Project compilation coming from EDUSI (as at that moment funding for EDUSI was not yet secured)
- Draft project ideas not implemented or elaborated until then

Results:
- First project list that could fit in the Triangulum framework
- Stakeholders list for the Sabadell's on-site assessment interviews and closing workshop

As a result, the following 24 ideas –mobility, energy or ict-related, appeared for further discussion and validation with the local stakeholders at the Sabadell's on-site assessment:

1. *Urban delivery of freight with e-bikes or clean vehicles. Manchester*
2. *100% electric buses EBUSCO. Stavanger*
3. *Electric vehicle charging boxes with ict management system. Stavanger*
4. *Videoconference system with optical fiber/4G for the remote social and health care. Stavanger*
5. *Citizens helpdesk through videoconference*
6. *Advanced bike parking slots. Own idea.*
7. *District heating and cooling with half enthalpy geotherm. Own idea+Stavanger*
8. *Photovoltaic solar installations with light structure in public buildings and post-industrial site, and aerothermy.*
9. *Micro smart grids and with renewable energies (buildings, traffic lights, electric vehicle charging boxes).*
10. *Identification and selection of private condominiums with motivation for their building's energy refurbishment. Own idea+Eindhoven*
11. *Private apartment blocks refurbishment including social and health assessment and follow-up.*
12. *"Inno-energy lab" design and construction.*
13. *Innovative public building energy refurbishment*
14. *Real-time energy monitoring optimisation for public buildings*
15. *Vegetalisation/urban agriculture on the industrial sites roofs/residential building's balconies.*
16. *Devote economic savings obtained in energy efficiency measures to training of the workforce in new innovative sectors contributing to shift the productive model.*

17. *Increase the building's developable volume at municipal's citizens centres in order to include temporary housing and spaces for local associations: mixing uses (housing for young or talented entrepreneurs), innovative constructive elements and energy refurbishment of public buildings.*
18. *Employment plan oriented to training and advise to vulnerable families, reducing the cost of municipal actions as well as creating self-employment.*
19. *Extension of walking circuits at the urban and periurban levels*
20. *Extension of the urban and interurban network of bike lanes.*
21. *Promoting the municipal innovative procurement: technology in a commercial phase, or solutions in a pre-commercial phase.*
22. *Promoting raising awareness campaigns (energy efficiency, energy refurbishment) through social networks and websites, combined with face-to-face sessions.*
23. *Sensoring of municipal services*
24. *Extension of the open data platform with more data about Sabadell from municipal departments and other public and private entities.*

DURING THE SABADELL ON-SITE ASSESSMENT HELD IN MARCH 2016:

From the 29th February to the 9th March 2016, the "on-site assessment" took place in Sabadell, in accordance to the Triangulum's project task 6.5. "*On-site assessment in follower cities*".

From the 29th February to the 9th March 2016, the "on-site assessment" took place in Sabadell, in accordance to the Triangulum's project task 6.5. "*On-site assessment in follower cities*":

"Follower cities receive support at an early stage in the development of their smart city implementation plans through a similar on-site assessment. This allows follower cities to design the right Modules (Technologies + Interfaces + Business Models + Stakeholders + Policies), to build upon crucial success factors and to adopt the ICT reference architecture at an early stage. The on-site assessment to follower cities will similarly consist in a 2 weeks journey of 2-3 Fraunhofer experts and 1 TÜV-SÜD expert. This core team will be mirrored by a local counter team consisting of a development & implementation manager and a local partner.

Throughout the stay 2 workshops with local stakeholders will be conducted and ca. 30 structured interviews will be conducted in each city with the involved stakeholders. Topics to be covered are the current state of smart city project development and the integration of the following categories:

- Citizens and stakeholders
- Technologies and Standards
- ICT Reference Architecture
- Policy & Planning
- Business Models and Finance

Core results of this task will be

a) A knowledge transfer from Lighthouse cities projects to the follower cities at an early stage of their project design
b) An improved project design leading to improved implementation plans
c) An early reality check of the envisaged Smart City Framework

Internal Deliverables
(...)
D.6.5.5 Workshop 1 & 2 Sabadell
D.6.5.6 Sabadell assessment protocol"

After the interviews, the initial 24 project ideas where enriched with new ideas, totalising 33 potential actions or technological solutions:

- Rainwater recovery
- City greening/Vegetalisation
- Last-mile urban delivery of freight with bicycles (ex. electric), from a mini-hub or delivery centre. RETAINED FOR THE SABADELL'S FCIS
- *App* to book freight delivery parking spaces.
- Safe parking for bikes
- Real-time open data on bus service.
- Offer bicycles to high school student in the framework of a contest between high schools. RETAINED FOR THE SABADELL'S FCIS
- Hybrid, electric and Euro 6 busses.
- Traffic light synchronisation for busses and extension of bus lanes.
- Access control to pedestrian zones with surveillance camera and automatic management of fines thanks to car plates identification.
- Recharging boxes for electric vehicles with ict monitoring and management system.
- Renewable energies in public buildings.
- Other energy technologies
- Private and public building refurbishment: "Eco-illa" project (eco-neighbourhood)
- Information screens in public buildings with energy data and new energy management software for the 50 highest consuming buildings.
- GIS software for a "solar map" of Sabadell: geoinformation on the potential to install solar photovoltaic energy, compared to the building's energy demand.
- Installation of PV solar panels at the Ripoll river wastewater treatment plant, in order to obtain energy savings that are devote d to new energy efficiency investments.
- Installation of PV solar panels in public lighting, and that the lighting grid acts as energy distributor.
- Sabadell could elaborate a project at the intersection of health, sport, ict and design.
- How to solve the problem of empty buildings? "Intergenerational hubs of creativity and training"
- Possibility to implement a fablab in Sabadell
- Hackatons to create new applications connected to IoT.
- Need to have a city dashboard
- App/Platform for empty space reservation RETAINED FOR THE SABADELL'S FCIS
- Need to integrate several municipal apps (Police, bus, general information, public space incidents, "Major feast"...) in one single app.
- Open data and digital platforms
- Use of videoconference for heath and social homecare RETAINED FOR THE SABADELL'S FCIS
- Use of videoconference as citizen's helpdesk
- Public wi-fi in the most disadvantaged districts.
- Citizen's card, new ID tool to access public services.
- Participation space within the municipal app
- New ICT tool for citizen participation: screens in leisure places with personalised information RETAINED FOR THE SABADELL'S FCIS
- On-line and off-line vote in citizen participation events

On the 7th March, an internal workshop took place to present and select the ideas which would be discussed during the stakeholder workshop on the 9th March; among the 33 ideas discussed during the interviews, 14 were prioritised for the final workshop. Finally in the closing stakeholder workshop, the 14 ideas were further developed, in small groups and in plenary session:

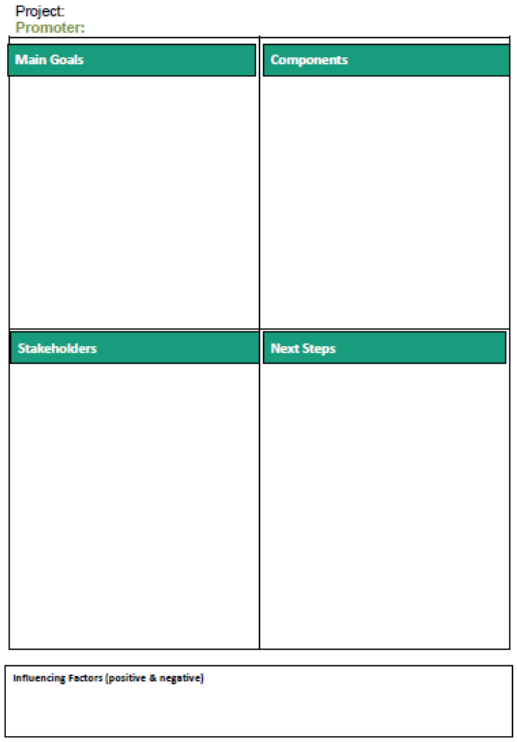
- Use of videoconference for heath and social homecare RETAINED FOR THE SABADELL'S FCIS
- Use of videoconference as citizen's helpdesk
- On-line and off-line vote in citizen participation events
- Private and public building refurbishment: "Eco-illa" project (eco-neighbourhood)
- Information screens in public buildings with energy data and new energy management software for the 50 highest consuming buildings.
- Sabadell could elaborate a project at the intersection of health, sport, ict and design (local cooperative innovation hub)
- City greening
- Last-mile urban delivery of freight with bicycles (ex. electric), from a mini-hub or delivery centre. RETAINED FOR THE SABADELL'S FCIS
- Need to integrate several municipal apps (Police, bus, general information, public space incidents, "Major feast"...) in one single app (SBD 4.0).
- Safe parking for bikes
- Offer bicycles to high school students in the framework of a contest between high schools. RETAINED FOR THE SABADELL'S FCIS
- New ICT tool for citizen participation: screens in leisure places with personalised information RETAINED FOR THE SABADELL'S FCIS
- GIS software for a "solar map" of Sabadell: geoinformation on the potential to install solar photovoltaic energy, compared to the building's energy demand.
- App/Platform for empty space reservation RETAINED FOR THE SABADELL'S FCIS

As a result, 36 interviews, conducted by Fraunhofer IAO, took place between the 29th February and 8th March, with more than 60 representatives of local stakeholders (Municipality, subcontracted companies, universities, business associations, citizen's associations, regional government, etc.), with a focus on mobility, energy, ICT and economic development. During the interviews, a questionnaire was used to check the interviewees' visions on the Sabadell current innovative positioning and challenges for the future, including financing, governance and citizen engagement. It was also the occasion to validate with the interviewees the ideas appeared during the internal roundtables, and raise new ideas of projects or solutions potentially applicable to Sabadell.

After the interviews, the initial 24 project ideas where enriched with new ideas, totalising 33 potential actions or technological solutions in fields like electric mobility, bicycle promotion or ICT for communication with citizens.

On the 7th March an internal workshop took place to present and select the ideas which would be discussed during the stakeholder workshop on the 9th March; among the 33 ideas discussed during the interviews, 14 were prioritised for the final workshop. Finally in the closing stakeholder workshop, the 14 ideas were further developed, in small groups and in plenary session, in the fields of energy efficiency, economic development, bicycle promotion or ICT for citizen participation/communication.

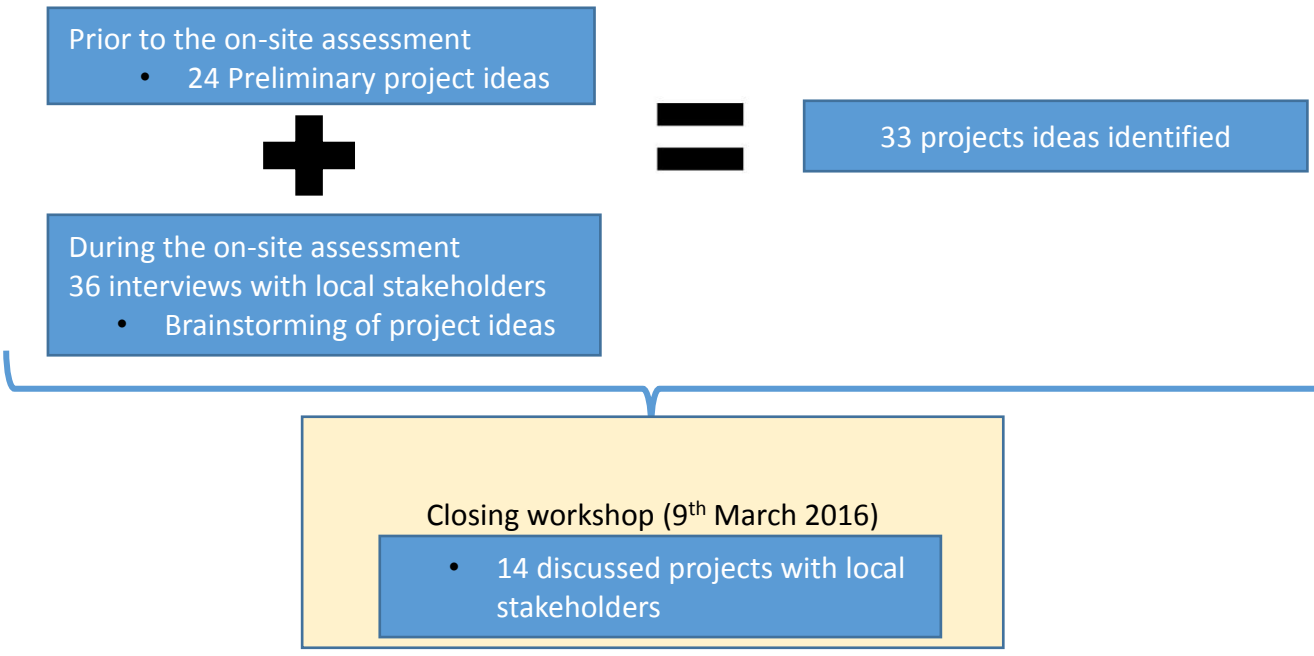
For each project idea the following elements were discussed and developed:



Source: Fraunhofer IAO

These 14 ideas have constituted the basis for the feasibility efforts undertaken after the on-site assessment, during the 2nd half of 2016 and 1st half of 2017.

30 entities -public authorities, research centers, universities, associations and local companies with experience in the field of urban services- participated in the Sabadell's on-site assessment interviews or the closing workshop is the following, including 21 municipal departments and agencies.



30 entities -public authorities, research centers, universities, associations and local companies with experience in the field of urban services- participated in the Sabadell's on-site assessment interviews or the closing workshop is the following, including 21 municipal departments and agencies:

1 AJUNTAMENT DE SABADELL DEPARTMENTS AND DEPENDING AGENCIES/COMPANIES:
MAYOR, ACCIÓ SOCIAL I CULTURA, DIRECCIÓ DE TERRITORI I SOSTENIBILITAT, INFORMACIÓ DE BASE, INFORMÀTICA AJUNTAMENT DE SABADELL (IAS), INNOVACIÓ I CONEIXEMENT, MANTENIMENTS D'ESPAI PÚBLIC, MOBILITAT, OBRES D'EQUIPAMENTS, PARTICIPACIÓ CIUTADANA, PLANIFICACIÓ ESTRATÈGICA I TERRITORIAL, PROMOCIÓ ECONÒMICA DE SABADELL SL, REGIDORIA TIC, SALUT, SERVEIS SOCIALS, SOSTENIBILITAT I GESTIÓ D'ECOSISTEMES, TRANSPARÈNCIA, URBANISME, VIMUSA, HABITATGES MUNICIPALS DE SABADELL.
2 FRAUNHOFER IAO / FOKUS
3 TÜV-SÜD
4 SECRETARIA DE TELECOMUNICACIONS-GENERALITAT DE CATALUNYA
5 SECRETARIA D'HABITATGE-GENERALITAT DE CATALUNYA
6 DIPUTACIÓ DE BARCELONA
7 AJUNTAMENT DE BARCELONA
8 AUTORITAT DEL TRANSPORT METROPOLITÀ
9 FEDERACIÓ D'ASSOCIACIONS DE VEÏNS DE SABADELL
10 CASAL EL TALLARET CREU ALTA
11 FUNDACIÓ BOSCH I CARDELLACH
12 FUNDACIÓ PER LA INDÚSTRIA
13 UAB, UNIVERSITAT AUTÒNOMA DE BARCELONA
14 UPC-CENIT, CENTRE D'INNOVACIÓ EN TRANSPORT
15 INSTITUT DE RECERCA EN ENERGIA DE CATALUNYA (IREC)
16 SOM ENERGIA
17 TUS SCCL
18 MOVENTIA
19 PLATAFORMA LIVE PER LA PROMOCIÓ DEL VEHICLE ELÈCTRIC
20 ALUVISA GRUPO
21 ESTUDI RAMON FOLCH
22 ARCBCN
23 CREAIDEALAB
24 TELEFONICA
25 TUNSTALL-TELEVIDA
26 FEM VALLÈS
27 SIMBIOSY
28 UTE ENLLUMENAT SABADELL (FCC I ALUVISA GRUPO)
29 GESA
30 SUSI PÉREZ (EXPERTA EN MOBILITAT)

AFTER THE SABADELL ON-SITE ASSESSMENT HELD IN MARCH 2016:

Once the on-site assessment was closed, a process of permanent refinement and feasibility analysis of the project ideas began. The main steps in this process have been the following:

- More than 50 interviews took place with the majority of municipal departments as part of a needs detection process completing the results of the on-site assessment (1st quarter 2017).

- The "follower city days" during the 2nd on-site assessment in lighthouse cities have been attended by representatives of Sabadell.
  Transcription of the Triangulum's project document regarding the 2nd on-site assessment in lighthouse cities:
  Task 6.8: Second on-site assessment in Lighthouse cities
  This step reiterates the on-site assessment after large parts of the implementation have been finished in the lighthouse cities. The structure very much follows the first assessment mission (Task 6.4). This assessment mission session aims at cross-checking the Smart City Framework that has been developed meanwhile with the development process that has gone on meanwhile. (Have new barriers appeared? Have solutions been altered? Have new solutions appeared?).
  As in Task 6.4 2 Fraunhofer experts, 1 TÜV-SÜD expert and one representative of each Follower City will travel to each of the Lighthouse cities. This core team will be amended and supported by a local counter team of the city implementation team (city administration, local university and local business partner).
  Throughout the stay 2 workshops with local stakeholders will be conducted and ca. 30 structured interviews will be conducted in each city – preferably with the same stakeholders that have been interviewed in Task 6.4.2. As a result Follower Cities will gain a deep understanding of success factors and obstacles at work during the smart city implementation process and Fraunhofer staff will be able to amend the Smart City Framework & Decision making tool with the deeper insight into the dynamic forces and structures at work.
  Internal Deliverables
  D.6.8.1 Workshop 1 & 2 Manchester (attended by Tianjin)
  D.6.8.2 Manchester Evaluation Protocol
  D.6.8.3 Workshop 1 & 2 Eindhoven
  D.6.8.4 Eindhoven Evaluation Protocol
  D.6.8.5 Workshop 1 & 2 Stavanger
  D.6.8.6 Stavanger Evaluation Protocol
  D.6.8.7 Final revised Version of Smart City Framework
  D.6.8.8 Final revised Version of Decision Making tool

- Training mission for the benefit of follower cities (including workshops and webinars) is taking place in the period February-September 2017. It has included a closing stakeholder workshop on the 13th and 14th November 2017.
  Transcription of the Triangulum's project document regarding the training mission:
  Task 6.9: Training mission to the follower cities
  The training mission to the follower cities concludes the hermeneutic cycle of knowledge generation and project implementation. In order to provide assistance with the implementation and use of the smart city framework and to foster city-to-city learning, a team of 1x Fraunhofer expert, 1 TUV SUD expert and one representative of each lighthouse city will spend 2 weeks in each of the follower cities, assessing their current state of implementation and advising on the process of implementation.

  Internal Deliverables
  D.6.9.1 Workshop 1 & 2 Prague
  D.6.9.2 Workshop 1 & 2 Leipzig
  D.6.9.3 Workshop 1 & 2 Sabadell

7.3. Results of data assessment and analysis

Results by topic:

This includes a summary for each thematic interpreting the results of the indicators and the complete list of indicators obtained.

1.2. Natural environment:

The Sabadell City Council has integrated sustainability into their organization and strategic policy, but lacks collaboration with the scientific world and especially with the business actors. Sabadell is a city with low CO2 emissions and low consumption of water with a high level of recycling (as well as waste) and treatment of wastewater. Almost half of GHG emissions in the city are caused by mobility. Overall, the regulatory framework in the field of local sustainability is stricter than the national one. There are certain incentives for environmentally responsible behaviour but they are limited. There is a low level of use of reclaimed water and reuse rainwater.

Positive aspects / to reinforce:

Very clear milestones on urban sustainability: Reducing greenhouse gases: 27% (2020), 35% (2030)
Agenda 21 (2001) including sustainability indicators
Advisory Council in the field of sustainability (Protocol for energy and climate change)
Transversal unit within the City dedicated to sustainability issues
Budget briefed specifically on sustainability issues
Periodic informal meetings with key players in urban sustainability
Plans to improve the standards of performance of municipal buildings (Action Plan for Sustainable Energy).
Some sustainability projects prepared in cooperation with universities
The Council provides economic benefits to projects that meet high standards of sustainability.
Periodic calculation of the balance of CO2 emissions in the city
Climate protection strategy since 2009.
There are environmental standards on recycling, water and energy, there is a system of measurement, accountability, verification and sanctions in the area of sustainability.
Sustainability is part of the curriculum of teachers.
Awareness campaigns related to environmental sustainability, especially focusing on consumer behaviour.
Issues such as pollution of water systems, the life cycle of the water, the nexus between water and energy and intelligent and resilient water infrastructure have been addressed (e.g. Elimination of nutrients, CHP installation at the wastewater treatment plant of Sant Pau de Riu-sec, reclaimed water network).
Sustainability is present in the educational programs, but no more than the average for Catalonia.
Low CO2 emissions (46% due to mobility, 30% due to residential consumption).
Low water consumption per inhabitant.
High efficiency of resources in the field of water (water conservation, water reuse, etc.)

100% of wastewater is treated
Appropriate age of the sewer system
High rate of recycling.
High number of interconnected green spaces.

Negative aspects / to improve:
Networks of local companies in the field of sustainability have been partially developed.
The various municipal departments do not have a director or a director of sustainability
The business actors are not present in the local council advisor in the field of sustainability.
There is no cooperation between local industry and scientific actors in the field of sustainability (there is a platform for exchange between industry and science).
The Council does not oblige private builders to go beyond national standards regarding performance standards for buildings.
Companies are not required to disclose environmental information in particular, no more than set in the national standards.
There are training programs related to sustainability offered by the City and private entities, but not regularly.
Lack of emissions trading schemes and "local market" in the area of sustainability
Limited regulatory incentives in the field of sustainability (EVs).
Standards to companies in the field of sustainability are not stricter than those that exist in the rest of Catalonia.
Incentives for sustainable businesses are limited to tax exemptions for industrial companies that design and implement their own waste management plan.
Awards have been rarely organized to recognize outstanding companies in the field of sustainability.
There is not an external assessment of the carbon footprint of businesses in the city (not even public companies).
Absence of a master's degree related to sustainability Sabadell.
Absence of municipal subsidies for innovation related to sustainability.
Very few green spaces protected.
Very few green spaces in relation to the population: 9.53 m2 per capita, but the data is better (52 m2 / inhab.) if we include forest area.
Very low level of harvesting and reuse of "rainwater".
Energy efficiency measures in the water sector are being implemented, but not yet evaluated periodically.
Very few water bodies of high quality.
Very low consumption of reclaimed water.
Moderate impact but existing leaks in the water system.
Correct waste collection system, but high rate of collection of waste per inhabitant per year (407 kg).
The energy consumption of the collection and treatment of wastewater is 0.8 kWh / m3, while energy consumption for water distribution is 0.12

1.2. Urban mobility:

Sabadell has a very high percentage of walking, very low public transport and very low bicycle / motorcycle and electric vehicles, although the overall weight of the "soft" mobility modes is high. Mobility is affordable, and the household budget devoted to this concept is low. It lacks to implement innovative policies for the delivery of goods. In recent years the public sector has invested heavily in mobility in the city (extension of FGC). On average residents in Sabadell work relatively close to where they live. The application of technological systems for managing mobility is limited. The fatal accidents due to mobility are low. Strategic planning of mobility policy is essentially channelled through the urban mobility plan.

Positive aspects / to reinforce:
Public transport accounts for only 9.5% of traffic modal, with a high quality of service, but the proportion of transport walking and cycling is over 50%.
The travel time from home to work is less than 25 minutes.
There are restrictions on the circulation of individual motorized transport ("30 zones" and temporary restrictions of access to pedestrian areas), existing priority lanes for buses in certain parts of the city.
Existence of subsidized transport tickets at the metropolitan level.
Possibilities for cycling and walking inside the city (cycle lanes, pedestrian zones reserved).
Private companies are responsible for providing important local public services, despite that a process of "internalisation" is under way for some of them (for example, management of blue parking zones).
The concepts of small-scale distribution of goods are applicable as there are high-density, mixed neighbourhoods.
There are delivery spaces in the city center (freight delivery zones) where time restrictions apply.
There are tax incentives for the purchase of electric vehicles
The average speed in the city is below 40 km / h.
The nodes of public transport and alternative routes have been identified / implemented
A mobile application (App) is in place to plan multimodal routes
There is coordination of schedules between public transport operators
Affordability Index of mobility is correct.
Very high quota of mobility on foot: 61.8%.
Good bike roads share (54.35 km / 100,000 Hab.), but including roads with "30 kmh" restrictions.
Existence of a logistics center in the urban area.
8 train stations in 2017.
Few deaths from traffic accidents

Negative aspects / to improve:
The transport companies in the city are not involved in the development of districts / neighbourhoods.
Lack of traffic campaigns to promote walking and cycling
Lack of financial barriers to restrict motorized transport.
Innovative concepts for urban distribution of goods are not applied
There is not a framework of collaboration between the municipality and logistics companies to achieve an optimized distribution
Freight traffic is more than 5% of total traffic.
No multimodal freight exchange terminals (but there would be land available to build them).
Rail freight is not significant.
No incentives for environmentally friendly freight delivery
There are 0.02 charging stations per electric vehicles in each city
There are few free parking places for electric vehicles in the city
No special lanes reserved for electric vehicles
There is no booking system for electric vehicles
There are permanent traffic bottlenecks in certain areas
Integrated tickets are only available for public mobility, not all mobility.
There is a system for issuing and managing electronic transport tickets on public transport.
Adjusting the general transport system based on real-time data is not yet operational, although the real-time data is partially used in monitoring traffic.
Very low density of electric vehicles / network of fast charging stations (number / km2.): 0.49 and no fast charging point.
Very low share of public transport mobility in general (including taxis): 9.5%.
Very low bicycle mobility: 0.4% (but growing).
Very low motorbike share: 2.2%.
Low share of private mobility (excluding motorcycles and trucks): 26.1%;
Freight delivery modal split (road, rail, water) (%): 100% by road.
Importance of the delivery of goods in urban traffic system: More than 5%

Very low total length of the network of urban roads (km./100.000 inhabitants) 165 km.
Very low km. of roads or lanes dedicated exclusively to public transport (km./100.000 inh.) 3.66 km.
Very partial systems for intelligent control and traffic management (10% stage of development)
Very low percentage of budget spent on individual transportation
Average distance not too long from home to workplace
High public budget oriented to greener mobility because of the extension of intra-urban train line
Strategy in force in the field of mobility (urban mobility plan, the new plan pending approval)

1.3 Energy and housing:

Sabadell has a low proportion of buildings in relation to its population, and correspondingly the demand for energy is quite low. Almost half of the buildings in Sabadell have a residential use. The cost of energy paid by consumers is low. Very little power locally produced. Lack of implementation of renewable energy installations and heating and cooling networks at the district level (DH&C in its acronym in English); there are some experiences of utilization of geothermal energy in public buildings. There is a plan of investments in energy efficiency in public buildings and energy optimization technologies are implemented in 50% of municipal buildings. Municipality-owned social housing is very low, although it is investing, and in general there is very little retrofitting of buildings. The price of rental housing is relatively low.

Positive aspects / boost:
Rental rates have fallen over the last five years, in the city and the center of the city, due to the economic crisis and remain low (less than 6 euros / m2), but are recovering in the 2015 with an annual growth of around 2%.
26% of family income spent on rent payments.
The city is investing in new social housing.
There are financial incentives for private refurbishment (e.g. loans in good conditions).
The use of prefabricated models in large buildings is high.
There are local tax deductions for the installation of solar energy
The potential for energy saving in public buildings and infrastructures has been identified in the SEAP
There is an annual investment plan for energy efficiency in public buildings
New technologies for optimizing the energy Implemented in 50% of public buildings.
A limited number of educational programs aimed at energy efficiency have been developed.
A heat recovery project will be implemented at the Sant Pau de Riu-sec wastewater treatment plant.
Geothermal heat is used in five public buildings, not used in private buildings.
Total energy usage of the city (GWh/capita): 2229.90
Electricity consumption per inhabitant (KWh / year / inhabitant): 2860
Monthly normal electricity demand by private consumers (kWh / year / inhabitant): 3285
Relatively low cost of electricity (cents. /Kwh): 19 ct. Euro.
Relatively low cost of heating with natural gas (cents. /Kwh) 0.07 ct. Euro.
Low level of buildings in proportion to the population
Quite low demand of primary energy in buildings.
Reclaimed water is used.
Reuse of energy products is implemented in buildings

Negative aspects / improve:
New concepts such as cooperative housing have not been implemented, even though there are people who showed interest.
The municipality-owned social housing is very low, representing less than 15% of housing units in the

city (only 1.4%).
Renovation rate is well below the 3% per year, and below 1.5% for private buildings
The local regulations for new buildings are no more stringent than regional or national regulations.
There is no standard of "passive house" from the energy viewpoint that is required in new buildings.
No regulations on building's construction processes to address noise, pollution and traffic.
No heating and cooling systems at district level
There are not special rates for renewable energy
The potential of renewable energies is yet to be analysed
Obligations in local standards for installing renewable energy are not stricter than national and regional regulations
Renewable energy sources are not present in most public buildings.
Very limited use of additional sources of heat (water, air).
Very low weight of renewable energies in local energy production.
Very high annual use of electricity at residential homes (kWh / year / household): 7260 (estimate excluding alternative shops and offices: 3200 kWh / year / household, which would be a normal value)
Very low value of electricity generated in the city (GWh / year and%): 0.014%
Nonexistent energy distribution systems centralized at the district level (DHC) (%): 0%;
43% of the floor area is for residential use (18% for industrial uses, 10% for commercial uses)
Very low rate of demolished or renovated buildings (around 0.12% of the total housing stock), low rate of new buildings (around 0.4% in 2010, 0.10% in 2012) due to the economic crisis.

1.4. Economic development and projection of city

Sabadell has a high rate of unemployment and few jobs / GDP in innovative economic sectors. The educational level of the population is relatively high (over 50% have secondary or higher education). The City Council is designing a strategy for economic innovation based on regional specialization, including surrounding towns with synergies. Missing policy of "marketing" of the city screened internationally. No significant local funds to finance innovative companies, but instead there are tax incentives and expert advice to local companies newly implemented in the city. No experience in creating sustainable business districts. There is not an institutionalized network for a permanent company-university-municipality cooperation. A study on industrial symbiosis has been conducted.

Positive aspects / to reinforce:

Innovation strategy of the "Great Sabadell" (specialization and territorial competitiveness plan) has been designed.
A local strategy for research, technology and innovation is designed as a plan of specialization and territorial competitiveness, which will develop projects until 2020.
"Welcome services" for new citizens have been specifically developed but not beyond the provisions of Law on reception for immigrants and returnees to Catalonia (Law 10/2010).
Strategies have been promoted to attract specific companies and fostering cluster creations (packaging, medical technologies).
The municipality organizes events to promote cooperation in the field of innovation (Innovation and Technology Forum).
The municipality offers support to companies and newly created SMEs: cheaper office rental, networking, counselling, accompanying the initial phase of the company, training ...

There are tax incentives for new businesses (such as having foreign investment in the city, but also any new company).
There are partnerships with private companies in the City, but they are not systematically and formally established.
Networks for waste-Resource symbiosis between companies are not yet implemented, but this topic has been discussed and promoted for three years.
Low proportion of employees in primary and secondary sectors.
Information and advice for new investors are offered by the city council.

Negative aspects / to improve:

There are no institutionalized networks between business, research and the municipality, but there are individual agreements of collaboration between the City and companies / research centers.
The municipality offers physical space or promotes specialization in production, but so far it has not offered an area (i.e. the public space) where companies or researchers have "freedom" to implement their innovative solutions.
Provision of schools and kindergartens is insufficient.
University studies in Sabadell are limited by what they cannot cope with the demand for qualified personnel in the city.
No incentives to attract or retain qualified personnel.
Local businesses are not helped to recruit staff abroad.
There is not a logo of the city for marketing purposes,
There is no cooperation with research and industry partners to promote the city brand
No marketing strategy of the city internationally (no presence in international fairs)
Investment in local experimental & research activities is less than 3% of local GDP.
The municipality has no past experience to help develop sustainable business parks or districts.
Specialized local SMEs with potential synergies between them are not optimally cooperating for economies of scale.
No subsidies or high-risk loans offered by the council to innovative start-ups
No existing incentives for companies to green technology and sustainability.
No funds provided by the City Council for innovation, except for the annual prize for innovative start-up, spin-off or technologically-based companies (€ 2,000 + assignment of office space).
No local development banks.
There has been no identification / optimization of energy flows and resources in industrial districts.
No policies / protocols for continuity of management companies in the event of crisis or disaster, except in the case of closure of the company (advice for the reintegration of workers, and the transfer of the company for the business continuity, under the “Reempresa” programme).
High unemployment.
Relatively low GDP per capita.
More than 50% of the population between 25 and 64 years-old are graduated in secondary education or higher.
Stagnation of the population during the economic crisis.
Low birth rate.
Risk of economic dependence on a small group of companies (the five largest companies to employ 12.34% of the employed population).
Moderate ageing population.
Lack of doctors.
Few jobs in innovative sectors (27.2% of the total employed population).

1.5. Planning and urbanism:

The planning is based on a long-term municipal plan but now to be renewed (dated from 1993). Also regional regulations regarding traffic, energy, climate and land use impact the local level. The political commitment to achieve sustainable neighbourhoods is clear. The city has a green space, a renovated riverfront and a shopping district, but there are not "experimental urban areas" defined and there are certain districts / areas in need of revitalization / restructuring. The city is demographically dense with a low volume of buildings in relation to the population.

Positive aspects / to reinforce:

Regional concepts in the field of traffic, energy and climate protection, land use are applied locally.
The urban planning partly fits the principles of sustainability.
Regular forecasts are elaborated related to traffic.
The office of cadaster is the main source for the evaluation of the data concerning land use and buildings of the city.
New industrial spaces can be developed in the future (river Ripoll, Sant Pau de Riu-sec).
There is a clear political commitment to sustainable development in urban districts
The acquisition of land is legally regulated, although most urban land is not owned by the public sector.
There is a green lung in the center of the city (Park Catalonia).
The waterfronts have been renovated (Ripoll and Sant Pau de Riu-Sec).
Proportion of built land is quite low relative to the population. Low level buildings in proportion to the population.
The concept of "market center" is being applied, retail shopping areas have been identified (areas with higher commercial density, areas with the highest authorized use of the land for commercial purposes), but there are no special rules that only affect certain geographical areas of the city, commercial law is uniform

Negative aspects / to improve:

A long-term plan on the development of the city is in force, but it needs to be updated (1993).
Certain areas should be revitalized.
There is old industrial land available for development and / or renewal -there are abandoned warehouses, Gran Via avenue.
There are districts available for conversion / renovation (e.g. Gràcia Can-Feu), with mixed uses.
There are no geographical areas in the city for experimentation suspending certain regulations in order to innovate.
There are areas suitable for the installation of an experimental area, but there was no evidence of the possibility of suspending certain regulations in a particular geographical area.
The municipality offers physical spaces or promotes specialisation in production (not research), but so far it has not given an area (i.e. the public space) where companies or researchers have "freedom" to implement their innovative solutions.

1.6. Information and communication technology:

The incorporation of new technologies in the City is channelled mainly in the context of municipal tenders. There is a municipal open data portal, but there is no formal strategy on urban big data, urban information is not provided in real time, and there is not an office to manage this information and extract it in a city dashboard. The penetration of internet among citizens is high.

Positive aspects / boost:

Open data local website in operation, although the data searchable catalogues are limited (2016 planned expansion http://dadesobertes.sabadell.cat/), e-administrative procedures are increasing.
High level of Internet subscriptions per 100 000 inhabitants.

Negative aspects / improve:

Cooperation with companies in the development of new technologies is channelled mainly with companies which have been awarded contracts for the maintenance of local public services.
Important information is not provided in real time on the city for citizens (there is not a city scorecard)
There is no formal strategy in the municipality on the use of "big data"
There is not a single centre for analysis of municipal data, except for statistical purposes.
Few mobile internet subscriptions in the city (83/100 inhabitants), less than 90 is not considered optimal.

1.7. Citizen participation:

The City Council has a decentralized structure for citizen participation through councils, councillors and district coordinators, but in the other areas there is not a municipal management at the district level, with an allocated budget. So far the decision making has not been broadly upward (bottom-up) and the public has had a purely consultative role / informative, not binding. An online platform for citizen participation is used (Consensus).

Positive aspects / to reinforce:

Platform available online for citizens to participate in local public affairs (http://www.consensus.cat/sabadell

Negative aspects / to improve:

Lack of participation of citizens in the definition of objectives and vision at city / district levels
Lack of comprehensive information to the public about ongoing projects
Lack of participatory budget process
Citizens do not have the opportunity to contribute their own ideas.
Except for the area of participation, the "District Management" has not been established as a stage in the municipal management.

Bottom-up planning is not formally established and systematically, although there are channels for citizens to inform the council about their goals and guidelines, but these opinions are not binding.
Citizens have only advisory capacity with regard to municipal expenses.
No validation processes implemented at the neighbourhood level for acceptance of new building projects.

1.8. Internal organization of the City:

The Council has an internal working group on innovation, including funding search function. The organizational strategy of the City Council does not encourage interdepartmental work, training, and incentives to workers of high performance. The municipal budget is too focused on administrative expenses or to repay debt with relatively low own incomes.

Positive aspects / to reinforce:

A small proportion of public employees of the city with regard to the general population.
Existence of a municipal manager of innovation.
There is a team from the city administration to draft applications for funding for innovation and sustainability, although it has not received significant funding from development banks (EIB, World Bank,).

Negative aspects / to improve:

The multi-departmental teams are not very popular.
Lack of incentives for employees of high performance.
Poor dissemination of training opportunities for municipal employees.
No scoreboard system is used.
Small weight of public companies owned by the City
The staff at the City Hall is not widely trained to communicate in English.
A high volume of tax revenue is spent on repayment of interest rates on public debt (43%).
A high proportion of the expenses of the municipal budget is for administrative costs (43%), while social expenditures represent about 25% of the total budget.
60% of revenues of the City come from resources or taxes owned or attributed to the municipality.

7.4. Detailed project plan & funding scheme

The following actions have been widely analysed and developed under the Triangulum on-site assessments and training mission, with collaboration between lighthouse cities partners and the Sabadell's quadruple helix (citizen's associations, universities, other public administrations, business sector). However, they have not been finally included in the local Triangulum implementation strategy of Sabadell, as they will be already part of the ERDF-funded "*Strategy for integrated and sustainable urban development – DUSI Sabadell*"[4] or postponed. Nonetheless, it is important that the intense work undertaken during these Triangulum processes related to these actions is reflected in the deliverable as an appendix.

[4] Strategy for integrated and sustainable urban development – DUSI Sabadell (submitted December 2015, resubmitted December 2016, approved by the Spanish government in May 2017): http://www.consensus.cat/sabadell/components/com_docs/files/Document%20final%20EDUSI%20Sabadell-1.pdf

TECHNOLOGICAL TOOLS TO TRACK CORRECT RECYCLING OF GARBAGE BAGS THROWN AT PUBLIC SPACE CONTAINERS

What current problem is the project trying to solve

Low level of recycling at origin (30% vs. PRECAT-Waste prevention strategy of Catalonia's target for year 2020: 60%).

Related MS Indicators

S48; S58; S30; S31

Related Action Fields

IT2A; IT3A; IB3A

Related Impact Factors

I6

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

At the existing waste containers located in the public space (paper, plastic, organic), a tracking system will be installed to check the correct recycling of end-users garbage bags.

The system is capable of identifying the end-user throwing the waste, thus incentivising them to avoid free-riding behaviours. Establishing incentives for them to engage in correct recycling behaviours

This system will have to run in parallel with the implementation of the “door to door” waste collection in Sabadell.

Core Value

What kind of value does the project create for the city and city stakeholders?

The key value is to reverse the situation of low recycling of citizens by unanonymise the act of throwing waste, being able to check/control whether the citizen is recycling correctly or not.

Consortium

Who should be partner in this project and why?

Tech provider for the waste identification technology

Company in charge of waste management in Sabadell

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

RFID technology to identify waste end-users at the moment of throwing their waste bag, scanning an individual card. The bag is also scanned by the end-user and the type of waste and bag weight is registered.
Transparent bags.

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Technology capable of checking that waste inside the bag is correctly recycled.
Big data exploitation
Incentive scheme for end-users (e.g. points allowing discounts on waste tax in case of good recycling behaviour)

Could have

What are optional solutions and components that help us better deliver the project?
Replace individual card by mobile phone
Open source hardware/software

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- Information exchange with the Municipality of Eindhoven
- EU state of the art review regarding technologies for the garbage end-user identification
- Secure funding for the action
- Selection of locations where the technology will be implemented
- Elaboration of terms of reference for a public tender on technologies for the garbage end-user identification
- Definition of incentive schemes to reward good recycling behaviours.
- Dissemination campaign to citizens
- Waste track devices installation
- Waste track devices maintenance & evaluation

Technologies

Which Technologies are to be implemented in the project?

Waste track devices to be installed in containers

RFID cards for end-users

Telecommunications

Electric connection

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

A reference could be taken from the “Carretta Caretta” Ecocard system, applied in several Italian cities:
http://www.carrettacaretta.com/
https://www.youtube.com/watch?v=DDlAH18W-1U

A similar system has also been implemented in the city of Eindhoven.

Products & Tools

Waste track devices to be installed in containers

RFID cards for end-users

Incentive scheme for end-users in reward of good recycling behaviour.

Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Estimated budget: 100 Euro / sensor installed in public container to track recycling x 1,000 containers (plastic, paper, organic) = 100,000 Euros

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal budget

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Increase in the rate of recycling in the areas where the system is installed
Number of breakdowns
Maintenance costs per unit installed

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

Contact

Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

INNOVATIVE RECHARGING POINTS FOR ELECTRIC VEHICLES CONNECTED WITH THE RENEWAL OF THE MUNICIPAL FLEET

What current problem is the project trying to solve

Amidst private vehicles, the use of electric vehicles is very low in Sabadell. Sabadell pioneered being one of the first cities in Catalonia to install EV charging points in 2009, but since then there has not been a new impulse.

In parallel, Sabadell has a very old fleet of municipal vehicles oriented to maintenance of buildings / public space, largely underutilised, and for this reason in the coming years the fleet will be reduced by 50% and the remaining fleet should be replaced by greener vehicles.

Overall in this moment urban mobility is one of the main factors contributing to the city CO2 emissions, together with energy consumption of buildings.

Related MS Indicators	Related Action Fields	Related Impact Factors
S26; S28; S21; S8; S6; S9; P4	T3A; IT2A; IT3A; IT4A; E6A	I2; I3; I4; I5

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Install new recharging points for EV in Sabadell, including an innovative ICT management system for end-users and the municipality remote control.

Renew the municipal fleet with electric vehicles.

Core Value

What kind of value does the project create for the city and city stakeholders?

Reduce the city carbon footprint related to urban mobility.

Offer new opportunities for clean mobility to citizens.

Consortium

Who should be partner in this project and why?

EV Charging points tech provider

La Salle university master students undertaking a study on ICT system, telecommunications, energy management model and definition of KPIs for charging points in Sabadell.

LIVE association (Association for the promotion of electromobility at the Barcelona metropolitan region):
http://www.livebarcelona.cat/
(Sabadell is member of this association)

Stavanger city council / LYSE

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

4 new EV charging points (fast and medium speed) located in main urban axis, Plaça del Mil·lenari (fast charger, near the motorways) and Gran Via avenue (medium charger, near the city congress and exhibitions centre).
ICT and energy flow management system to allow optimal use by end-users and remote control/management by the municipality.

Should have

What is the extended set of solutions that increases the value of the project to the next level?

Foresee payment system
Big data exploitation
Test it before making huge investment

Could have

What are optional solutions and components that help us better deliver the project?

Connect with renewable energies (e.g. solar panels/storage batteries) or municipal buildings with surplus of electric power (buildings with night or temporary consumption)
Offer municipal vehicles for the use of citizens (car-sharing) during the time slots in which they are not needed for municipal duties.
Open source hardware / software
Channel it through a tender establishing a 20 year-PPP about the electric vehicle charging network (100,000 Euros, EU 50% co-financed); Challenge for start-ups.

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- First ideation (1st semester 2016)
- Application to the Catalan government subsidy as part of the Catalan PIRVEC programme: http://icaen.gencat.cat/ca/energia/ajuts/icaen-installacio-dinfraestructures-de-recarrega-per-al-vehicle-electric/
- Funding secured
- EU state of the art review on innovative EV charging points (through the "La Salle" university master students study)
- Information exchange with Stavanger city council / LYSE
- Elaboration of the tender terms of reference
- Equipment installation / Vehicles purchase
- Dissemination campaign among potential end-users
- Equipment / vehicles maintenance
- Action's evaluation
- Define the number of electric vehicle chargers that are required and its location
- Action with a regional scope and funding

Technologies

Which Technologies are to be implemented in the project?

EV charging points

ICT management system (reservation, monitoring, remote control)

Energy flow management system.

Telecommunications

Electric connections

New electric vehicles

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

City of Stavanger's outdoor charging points.
PIRVEC (Catalan institute of energy, ICAEN)

Products & Tools

- EV charging points
- ICT management system (reservation, monitoring, remote control)
- Energy flow management system.
- New electric vehicles

Financing and Investment

Project Costs

What are the expected costs of the proposed project ?
List budget categories & estimated costs

2 fast chargers: 40000 Euro/charger
2 medium speed chargers: 15000 Euro/charger
Renewal of the municipal fleet with greener vehicles: 260000 Euros

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Chargers:
PIRVEC subsidies from the Catalan Institute of Energy (50%)
Municipal budget (remaining 50%)
Municipal fleet of vehicles:
Municipal budget (already secured)

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of users / year
Energy consumption / year
CO2 emissions reduction
Number of breakdowns
Maintenance costs per unit installed

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

30% of municipal fleet vehicles with energy efficient technologies (Agenda 21+10); Promotion of carbon reduction strategies such as sustainable urban mobility and the improvement of energy efficiency (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (eg through dissemination and replication)

Yes

Contact:

Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell (renewal of the municipal fleet)
Rosa MARTINEZ, chief, Strategic territorial planning programme, Municipality of Sabadell (EV chargers)

PARKING SENSORS

What current problem is the project trying to solve

Outdoor parking spaces occupancy level are currently not monitorised in Sabadell, and this confuses drivers which waste time and pollute in an unnecessary way, as they do not know where the free space is. Only underground parking spaces are monitorised.

Related MS Indicators

S48; S58; S59

Related Action Fields

IT2A; IT3A; IT4A

Related Impact Factors

I2; I3; I4; I5

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Complement/improve EDUSI actions oriented to sensoring of outdoor "blue zones*" and freight delivery parking spaces, with a more innovative system than initially expected or expanding the zone covered by sensors beyond what is already foreseen in EDUSI.
The real-time information provided by the sensors related to the parking space occupancy level will be offered to drivers through a dedicated app/website.

** Blue zones are paying outdoor parking spaces managed by the municipality, located in areas with high demand form parking (e.g. city centre).*

Core Value

What kind of value does the project create for the city and city stakeholders?

Reduce the city carbon footprint derived from cars searching for parking spaces, and boost the city economic competitiveness with less "wasted" time in freight delivery.

Consortium

Who should be partner in this project and why?

Sensors provider

Local company managing the "blue zone" parking spaces (VIMUSA?)

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

Sensors installed at outdoor parking spaces offering real-time data on their occupancy level.
Website or app reflecting this information for end-users
Remote management/maintenance of the service by the municipality (e.g. control that all sensors are correctly functioning).

Should have

What is the extended set of solutions that increases the value of the project to the next level?
Big data exploitation (integration with Sabadell's Sentilo platform)
Panels at the public space dynamically orienting traffic in search of parking towards the most suitable areas.

Could have

What are optional solutions and components that help us better deliver the project?
Other automatic systems (cameras/sensors) controlling that parking times are not exceeded.
Integration with existing digital applications (e.g. the one for paying the "blue zone" fee).
Datasets publication as open data
Open source software/hardware

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

  - Information exchange with Eindhoven municipality
  - EU state of the art review
  - Secure funding
  - Selection of locations suitable for installation
  - Elaboration of the tender's terms of reference
  - Parking devices installation, data integration and visualisation tool
  - Parking devices maintenance
  - Action's evaluation

Technologies

Which Technologies are to be implemented in the project?

Parking devices (sensors/cameras)

Integration layer with visualisation tools with end-users / municipality

Telecommunications

Electric connections

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.

Many cities have implemented a parking space sensoring system, as for example, the city of Eindhoven in the Triangulum project.

Products & Tools

Parking devices (sensors/cameras)

Integration layer with visualisation tools with end-users / municipality

Financing and Investment

Project Costs

What are the expected costs of the proposed project ?
List budget categories & estimated costs

Estimated 300,000 Euros for sensorising 1,500 outdoor parking spaces.

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal budget. ERDF EDUSI funds already foresee a certain budget for sensoring outdoor parking spaces.

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

City CO2 emissions decrease
Number of breakdowns
Maintenance costs / unit installed
End-user satisfaction index (survey)
Decrease in traffic congestion

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Adoption of open software as the general rule (Plan of legislature 2016-2019)
Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)

Beyond the city

Is there potential for transfer of benefits to other cities? (eg through dissemination and replication)

Yes

Contact

Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

TRAFFIC LIGHT PRIORITY FOR DELAYED BUSES AND ACCESS CONTROL TO PEDESTRIAN ZONES

What current problem is the project trying to solve

Lack of punctuality of busses due to traffic conditions in a city like Sabadell with few bus-reserved lanes is a problem. This decreases the attractivity of the bus service and public transport in general, without harnessing the opportunities of multimodality.

Pedestrian zones need safe, efficient and reliable systems to allow only the authorised vehicles to access these areas (neighbours, freight delivery vehicles).

Related MS Indicators

P23; S25; S28

Related Action Fields

SP9A; UP8A; R4A; T4A; IT4A

Related Impact Factors

I2; I3; I4; I5

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Complement/improve EDUSI actions in the same line, with a more innovative system than initially expected or expanding the zone covered beyond what is already foreseen in EDUSI:

- Install devices at traffic lights to automatically alter green phases according to the bus schedule (if bus is delayed, green phase is extended, and viceversa if it is ahead of schedule).
- Control through TV cameras of vehicles that access the pedestrian zone of the Centre. The control is done without the vehicle having to stop (dynamic control). The vehicle plate is compared to a database where the plate numbers that are authorised to access the area appear according to their typology and the hours of use. The current pylons of the centre access gateways would disappear.

Core Value

What kind of value does the project create for the city and city stakeholders?

Reduce CO2 emissions derived from bus public transport.

Increase reliability and attractivity of bus service (and thus public transport) for end-users.

Easier and faster access to pedestrian zones for authorized vehicles, while preserving safety for pedestrians

Consortium

Who should be partner in this project and why?

Tech provider

Retailers associations

Neighbour associations

Municipal Police

Bus company (Transports urbans de Sabadell, TUS SCCL)

Company in charge of ordinary management of Sabadell's traffic lights and signaling

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Installation of new/upgraded traffic light regulators, connected with the bus Operation aid system (OAS) which reflects the bus real and theoretical schedules. When the delayed bus approaches the crossroad, a signal is transmitted from the bus to the traffic light regulator, and the green phase is extended accordingly.
Installation of cameras at the pedestrian areas gateways, connected with the database of authorised vehicles and the Police department (start of fine procedure in case of infraction). The system could also be used in streets which are not permanently cut to motorised traffic (e.g. only pedestrian during the weekends).
Remove current “pylons” at the gateways of pedestrian zones

Should have

What is the extended set of solutions that increases the value of the project to the next level?
System monitoring from the municipal traffic control centre
Depending on the available budget, more crossroads could be synchronised.

Could have

What are optional solutions and components that help us better deliver the project?
Use of optical fiber for the telecommunications
System monitoring from the Police central office
Extend the system to other vehicles of public interest (ambulances, police, etc.)
Open source hardware & software

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

  - Information exchange with Eindhoven municipality
  - EU state of the art review
  - Secure funding
  - Selection of locations suitable for installation
  - Elaboration of the tender's terms of reference
  - Smart mobility devices installation
  - Dissemination campaign of the new access to pedestrian zones
  - Smart mobility devices maintenance
  - Action's evaluation

Technologies

Which Technologies are to be implemented in the project?

New/upgraded traffic light regulators synchronised with the bus OAS.

Cameras reading the vehicles plate numbers

Telecommunications

Electric connections

Management software

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

Many cities have implemented a parking space sensoring system, as for example, the city of Eindhoven in the Triangulum project.

Products & Tools

New/upgraded traffic light regulators synchronised with the bus OAS.
Cameras reading the vehicles plate numbers
Management software
Database with vehicles authorised to access the pedestrian zones

Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Estimated 50,000 Euros

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Municipal budget. ERDF EDUSI funds already foresee a certain budget for accessing pedestrian zones / giving traffic light priority to busses in delay.
Potentially, cost can be beared by the company in charge of ordinary management of traffic lights and traffic signaling

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?
City CO2 emissions decrease
Number of breakdowns
Maintenance costs / unit installed
Improvement of bus service punctuality in the concerned bus lines
Bus service customer satisfaction index

City vision

How does the project relate to the larger scale city vision for sustainable urban development?
Provision of ICT mechanisms and instruments for transparency and good governance from the city (EDUSI)
Commit with a sustainable and high-quality public transport (Plan of legislature 2015-2019)

Beyond the city

Is there potential for transfer of benefits to other cities? (eg through dissemination and replication)

Yes

Contact

Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell

PUBLIC GOVERNANCE OF ENERGY AT LOCAL/COUNTY SCALE

What current problem is the project trying to solve

High prices of energy, considered as a public service but currently in hands of oligopolistic companies; a significant % of the population (around 20%) has problems to pay their electricity or gas bills (energy poverty)

Related MS Indicators

P4-7; S6; S8; S9

Related Action Fields

BT2A; BT5A; E2A; E3A

Related Impact Factors

I2; I3

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?

Ensure public management & control of a public service like energy supply, by creating a public company at a local/Western Vallès county level. This company will be in charge of producing / distributing and commercialising energy for different uses (buildings, public lighting, electric mobility).

Core Value

What kind of value does the project create for the city and city stakeholders?

Ensure a green and affordable supply of energy for citizens and businesses.

Consortium

Who should be partner in this project and why?

Western Vallès county municipalities
Catalan Institute of Energy (Government of Catalonia)

Tech provider (renewable energies/ICT management system)

Legal & marketing advisor

Som Energia

LYSE

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?

Setup of the new energy company (legal status)
Setup of the operational infrastructure and personnel to start the company activity (energy commercialisation)

Should have

What is the extended set of solutions that increases the value of the project to the next level?
100% of energy commercialised composed of green/renewable source.
Involvement of municipalities in the Western Vallès county, to benefit from economies of scale
Energy production, especially at the local level, starting by municipal buildings (renewable energies)

Could have

What are optional solutions and components that help us better deliver the project?
Energy distribution
Integrate the company in the "Bank of Energy" initiative (allocate a share of individual energy savings for the benefit of households suffering from energy poverty)
http://bancdenergia.org/sabadell/
Offer aggregated anonymised data on energy consumption patterns in open data formats.

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

- Information exchange with LYSE (Stavanger)
- EU state of the art review
- Secure funding
- Exchange with Western Vallès municipalities to involve them in the project
- Legal configuration
- Formal constitution of the new legal entity
- Provision and installation of the necessary operational infrastructure and personnel to start energy commercialisation
- Marketing and advertising campaign
- Action's evaluation

Technologies

Which Technologies are to be implemented in the project?

- ICT management system to control energy flows, infrastructure maintenance and billing
- Renewable energies technologies

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

Examples in Barcelona and Stavanger/Rogaland (LYSE)

Products & Tools

- Legal setup of the new public energy company
- ICT management system
- Renewable energy technologies

Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs

Pending to be determined

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

Pending to be determined:

- Contribution of municipal budgets from the Western Vallès county municipalities participating in the project (as shareholders)
- ERDF EDUSI funds (400,000 euros foreseen)

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?

Number of customers

Kwh/year of electricity produced/distributed/commercialized

Share of green energies in the overall energy commercialized by the company

Price charged for energy supply (Euro/Kw)

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Recover direct management and public control of most of the municipal services; promote interadministrative conventions with other administrations to provide public services; social, environmental and local economic promotion clauses in public procurement (Plan of legislature 2016-2019)

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes, although the legal framework can vary across countries.

Contact

Josep CANALS, advisor for Public Space and Urban Land, Municipality of Sabadell
Núria CENTELLES, chief, Sustainability and urban ecosystem department, Municipality of Sabadell

ENVIRONMENTAL SENSORS

What current problem is the project trying to solve

Lack of information on: Air quality: PM10, NO2; Noise quality; Mobility
Need to improve lighting quality and level
Need to monitor higrothermic confort (temperature, humidity)
Lack of citizen awareness and willingness to change transportation modes/habits

Related MS Indicators

Related Action Fields

Related Impact Factors

DNA of Project

Job to get done (Goal)

What job is the project trying to get done?
Please describe main purpose here!

Urban space quality

Gather data about: air quality, noise, mobility

Raise consciousness of citizens and change their behaviour toward more sustainable transportation modes

Core Value

What kind of value does the project create for the city and city stakeholders?
Please describe main value here!

Health values

Better air quality

Better lighting

It is necessary to consider the social benefit of the technology, it could have a too high cost compared to its social impact.

Consortium

Who should be partner in this project and why?
Please describe main reason, why the project (or parts of the project) should be delivered by suggested partners!

Bus and parking companies
Sensor providers
Government of Catalonia
CSIC
Street lighting enterprise
Civil society: specific social entities
Academia (PhD analysis)

Minimum viable project

Must have

What is the minimal set of solutions to be implemented in order to deliver the core value (DNA) of the project?
Sensors data
Specific data software
Weather data (real time)
Mobility data (real time)
Air quality modelling
Noise sensors (dBA) real time
Real-time web/app prediction

Should have

What is the extended set of solutions that increases the value of the project to the next level?

The action should have more focus on control and subsequent actions, beyond the mere information to citizens on air quality
Include other purposes, such as more interactivity with citizens
Informational displays on city panels
Mapping areas
Alerts

Could have

What are optional solutions and components that help us better deliver the project?
Citizen science project: borrow low-cost sensors to citizenship
Sustainable knowledge dissemination (schools, social entities)

Process

Activities and stakeholders

- ***What activities are actually being proposed?***
- ***In what sequence and time?***
- ***Information on who will deliver actions – roles and responsibilities of stakeholders***
- ***Information on governance during and after Triangulum***

Identify who is going to analyse all the information provided by sensors
Existing data gathering
Network design
Pilot test with different sensors (2 pilots: dissemination & technical data)
Sensor, software and hardware & network selection
Sensor deployment
Monitoring & maintenance
Dissemination

Technologies

Which Technologies are to be implemented in the project?

Standard sensors (in order to avoid proprietary lock-in from supplier)

Air quality sensors

Data platform

Modelling

GIS mapping

References & Replication

Similar projects

Please add your references (incl. links and contact person) here. Ideally refer to the solutions from the Triangulum lighthouse cities.
Add new slide if necessary

Utrecht
Zurich local network
KUNAK
LIBELLIUM
CSIC (Xavier Querol)
ATEKNEA
Municipality of Barcelona
"My Clean Space" (London) https://our.clean.space/maplondon/
ISGlobal

Products & Tools

Add your products and tools that are suitable for getting the project realized.

Add new slide if necessary!

Medium quality sensors

Data platform

GIS system (for mapping)

Financing and Investment

Project Costs

What are the expected costs of the proposed project?
List budget categories & estimated costs
Pilot test: 20,000 Euro
Network deployment: 220,000 Euro
Consultancy: 20,000 Euro
Monitoring: 80,000 Euro
Maintenance: 6,000 Euro/year
Energy / communication: 3,000 Euro/year

Financing

How can the project be financed?

- ***Summary of potential sources of funding (including but not limited to ERDF and ESF).***
- ***Where possible - include possibilities of innovative financing solutions (co-financing, crowdfunding, etc.)***

EDUSI ERDF 2016-20 (350,000 Euro)

Expected Outcomes

Measuring success

Which indicators are suitable to measure the success of the project?
Number of sensors
How often data are refreshed?
Citizen satisfaction
Data area: Centre, industrial focus and population sensitivity (schools, hospitals, day-care housing)
City situation

City vision

How does the project relate to the larger scale city vision for sustainable urban development?

Mobility transformation
Decisions about urban space transformation
Support to decision making

Beyond the city

Is there potential for transfer of benefits to other cities? (e.g. through dissemination and replication)

Yes

8. References

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[xi] Cafè aventura contest for innovative companies http://www.sabadellempresa.cat/home/noticies-2016/30995-cafe-aventura

[xii] Coinnovem contest on ideas for urban innovation http://sabadell.cat/ca/innovaciosbd/69250-concurs-coinnovemsabadell

[xiii] Eindhoven's I-city tender of urban innovation solutions http://triangulum-project.eu/index.php/2017/05/12/eindhoven-presents-the-winners-of-the-i-city-tender

[xiv] Porto's contest on urban innovation http://www.desafiosporto.pt

[xv] City of Peterborough's (UK) resource sharing platform https://www.sharepeterborough.com

[xvi] URBACT project "Refill the city" on optimising vacant spaces https://refillthecity.wordpress.com

[xvii] Fablab models in Eindhoven and Barcelona http://www.repaircafeeindhoven.nl; http://ajuntament.barcelona.cat/ateneusdefabricacio

[xviii] Eindhoven's city beacon website http://www.citybeacon.info

[xix] European Innovation Partnership on smart cities and communities (EIP SCC), with the "Humble lamppost" initiative related to the Sabadell's commitment http://eu-smartcities.eu/initiatives/78/description

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