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D6.14 mySMARTLife Cities Network replication activities planning

WP6, Task 6.5

Transition of EU cities towards a new concept of Smart Life and Economy

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731297.

Project Acronym	mySMARTLife
Project Title	**Transition of EU cities towards a new concept of Smart Life and Economy**
Project Duration	1st December 2016 – 30th November 2021 (60 Months)
Deliverable	D6.14 mySMARTLife Cities Network replication activities planning Report on mySMARTLife Cities Network with twelve European cities and four cities from outside Europe
Diss. Level	CO
Status	☐ Working ☐ Verified by other WPs ■ Final version
Due date	31/07/2017
Work Package	WP6
Lead beneficiary	SEZ
Contributing beneficiary(ies)	NBK, CAR, NAN, HAM, HEL, BYD, VAR, RIJ, PAL
Task description	Replication will start with the follower cities but should go far beyond these using a replication cascade addressing further committed cities up to a broader target group, focussing on European cities first and then opening to cities worldwide. To ensure this, mySMARTLife will make use of already existing cities networks such as the sister cities and networks directly linked to the cities such as METREX. Some of these cities have been invited to join the mySMARTLife Cities Network which is foreseen as consisting of 16 cities with a high replication potential and interest in exchanging experiences with the mySMARTLife Lighthouse and Follower cities. These cities will be part of a restricted circle which will be granted access to certain information and will be invited to special workshops. An area restricted to the members of the mySMARTLife Cities Network will be integrated in the website (see 8.5.2).The activities under 6.5 will be led by the mySMARTLife Cities Network Secretariat composed of the coordinator (CAR), the WP6 leader (NBK) and the WP8 leader (SEZ). A strong collaboration of all mySMARTLife cities (NAN, HAM, HEL, BYD, VAR, RIJ, PAL) is envisaged.

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19/06/2017	0.2	CAR	Corrections from CARTIF
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31/07/2017	1.0	CAR	CIT foundations, execution and results

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Table of Content

1. Executive Summary....8
2. Introduction....9
2.1 Purpose and target group....9
2.2 Contributions of partners....10
2.3 Relation to other activities in the project....10
3. Objective and expected impacts....13
3.1 Objective....13
3.2 Expected impacts....13
4. mySMARTLife Cities Network: the concept....14
4.1 mySMARTLife Cities Network definition....14
4.2 mySMARTLife Cities Network ambitions....14
4.3 mySMARTLife Cities Network membership....14
4.4 mySMARTLife Cities Network foreseen milestones....16
5. mySMARTLife Cities Network creation process....17
5.1 Invitation to the cities....17
5.2 Commitment from cities....20
5.3 Current status of the network....20
6. mySMARTLife Cities Network foreseen Actions....22
6.1 Member cities of the mySMARTLife Cities Network: Initial Analysis....22
6.2 Common aspects of mySMARTLife Cities Network members....24
6.2.1 CIT Foundations....24
6.2.2 Application of CIT in mySMARTLife....27
6.3 mySMARTLife proposed activities....33
6.3.1 Workshops....34
6.3.2 Study Tours....34
6.3.3 Webinars....35
6.4 Tentative Agenda of activities....37
7. Conclusions....39
Annex 1: mySMARTLife Cities Network letter of invitation....41
Annex 2: mySMARTLife Cities Network letter of commitment....43
Annex 3: CIT indicators and proposed sources of information....44
Annex 4: Data collection and aggregation for mySMARTLife Cities Network....49

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Table of Figures

Figure 1: General scheme of mySMARTLife replication cascade 8
Figure 2: mySMARTLife replication as from a core perspective 9
Figure 3: Overview of the main relationships between the different WPs 11
Figure 4: mySMARTLife replication strategy 15
Figure 5: mySMARTLife Cities Network activities 16
Figure 6: mySMARTLife Cities network: Members' common aspects 24
Figure 7: Example of application of a k-means method 26
Figure 8: Application of CIT with the necessary inputs in mySMARTLife 27
Figure 9: CIT models used in mySMARTLife 28
Figure 10: Groups of cities defined after their finance analysis 28
Figure 11: Groups of cities defined after their mobility analysis 30
Figure 12: Groups of cities defined after their energy analysis 32
Figure 13: Project Actions Implementation timeline 34
Figure 14: Network Activities and transfer of knowledge 34
Figure 15: mySMARTLife Cities network: Activities timeline 38

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Table of Tables

Table 1: Contribution of partners 10
Table 2: Relation to other activities in the project 12
Table 3: Cities in contact with the mySMARTLife LHCs 17
Table 4: Cities in contact with the mySMARTLife FCs 18
Table 5: Analysis of the member cities of the mySMARTLife Cities network 23
Table 6: Indicators of the Cluster Identification Tool (CIT) 24
Table 7: Suggested sources of information of the Cluster Identification Tool (CIT) 25
Table 8: The models (and number of indicators used) proposed by the CIT 26
Table 9: Clusters for finance 28
Table 10: Clusters for Mobility 30
Table 11: Clusters for Energy 32
Table 12: mySMARTLife Cities Network: Workshop schedule 34
Table 13: mySMARTLife Cities Network: Study Tours schedule 35
Table 14: mySMARTLife Cities Network: Webinars schedule 36
Table 15: mySMARTLife Cities Network Agenda (WS: Workshop, ST: Study Tour, WE: Webinar) 37
Table 16: CIT indicators 44
Table 17: Aggregated data for the management layer for Physical Characterization 49
Table 18: Aggregated data for the management layer for People Characteristics 51
Table 19: Aggregated data for the management layer for Governance and Sustainable and Smart Strategies 53
Table 20: Aggregated data for the finance layer 55
Table 21: Aggregated data for the energy layer 57
Table 22: Aggregated data for the mobility layer 59
Table 23: Aggregated data for the infrastructures layer 61
Table 24: Data sources used in mySMARTLife for each indicator 63

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Abbreviations and Acronyms

Acronym	Description
ADAPT	Adaptation Plan to fight against climate change is active
CIT	Cluster Identification Tool
CO	Confidential
CoM	Covenant of Mayors
EIP	European Innovation Partnership
EU	European Union
FC	Follower City
GDP	Gross Domestic Product
GHG	GreenHouse Gas emissions
ICT	Information and communication technology
LH	lighthouse
LHC	Lighthouse City
mySMARTLife	Transition of EU cities towards a new concept of Smart Life and Economy
REMOURBAN	REgeneration MOdel for accelerating the smart URBAN transformation
SEZ	Steinbeis Innovation Gmbh
SC	Smart City
SCC	Smart Cities & Communities
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
ST	Study Tour
WE	Webinar
WS	Workshop
LoI	Letter of Interest
LoC	Letter of Commitment

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1. Executive Summary

This deliverable “D6.14: mySMARTLife Cities Network replication activities planning” is a report on the mySMARTLife Cities Network strategic plan. In this regard, mySMARTLife will be applying a cascade replication procedure. This will be consisted of four stages (as illustrates Figure 1):

- Stage 1: refereed to the LHC, their interventions and replication plan
- Stage 2: is involving the FC, which are going to be learning during the project from the LHC, and will apply their replication plan
- Stage 3: here are considered the cities participating of the mySMARTLife cities network. This cities are going to learn LH and FC experiences
- Stage 4: group the rest of the cities around the world that will be reached through the cities involve in the project and in the network.

Figure 1: General scheme of mySMARTLife replication cascade

The cascade is a concept that will assure the replication going through different levels with a final global influence. With this vision of achieving a global replication, the network is planned to engage twelve European cities and four cities outside of Europe. The cities will be selected regarding their potential for replicating the smart solutions demonstrated in mySMARTLife.

To ensure this, mySMARTLife will make use of already existing cities networks, such as the sister cities, and networks directly linked to the cities, such as METREX. Some of these cities have been invited to join the mySMARTLife Cities Network These cities will have an exclusive access to project results and will be invited to special workshops. An area restricted to the members of the mySMARTLife Cities Network will be integrated in the website (see 8.5.2).The activities under 6.5 will be led by the mySMARTLife Cities Network Scretariat composed of the coordinator (CAR), the WP6 leader (NBK) and the WP8 leader (SEZ). A strong collaboration of all mySMARTLife cities (NAN, HAM, HEL, BYD, VAR, RIJ, PAL) is envisaged.

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2. Introduction

2.1 Purpose and target group

The impact of mySMARTLife will be maximised through dissemination, communication and exploitation measures. For mySMARTLife project, replication is a specific type of exploitation activity, which is related to the use and/or application of mySMARTLife Lighthouse Cities (LHCs) measures/solutions in other cities but following an integrative approach. In this sense, as part of the direct activities of mySMARTLife, both the LH cities and the FC have committed to produce as one of the main outcomes of the project one replication plan each.. In this sense, it can be considered that replication starts with the Lighthouse Cities (LH), continues with the Follower Cities (FCs) and will go far beyond with the mySMARTLife Cities Network, following a multiplier effect that can be considered as a replication cascade.

Figure 2: mySMARTLife replication as from a core perspective

Hence, a stronger and more authentic replication of mySMARTLife solutions is possible if we consider that each city is different, with a different context and has specific challenges and possibilities. This context must be characterised, specially characterizing the City challenges following a city-led approach in order to establish the strategy that pursues to meet this demand side with the supply side. As a final outcome of this process, replication plans will be delivered. Within this Network, the purpose is to bring together those cities interested in Smart Cities (SC) actions and mySMARTLife cities.

As it can be seen in the Figure above, the replication concept is part of the core concepts of mySMARTLife and as explained above, in order to maximise this replication potential, different levels will be defined, what can be considered as a replication cascade.

In order to meet these objectives, the mySMARTLife Cities Network Secretariat will group 16 cities (twelve from the EU and four from non-EU countries) in the mySMARTLife Cities Network, where cities will be invited and committed to exchange their experiences and learn from each other. Additionally, this project will work in close cooperation with the **SCC cluster** (Smart Cities & Communities), promoting a better exchange of knowledge and experience between SC projects. Thus, the partners of the mySMARTLife Cities Network will get valuable information and know-how from other LH projects. This interaction with the

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SCC cluster will be an essential tool allowing a better replication and multiplication of smart cities initiatives in the EU and beyond.

2.2 Contributions of partners

The following Table 1 depicts the main contributions from participant partners in the development of this deliverable.

Table 1: Contribution of partners

Participant short name	Contributions
SEZ	mySMARTLife Cities Network Leadership. Contact cities for mySMARTLife Cities Network as leader of the Task 6.5 and in charge of compiling and leading the D6.14: collection of inputs of the other partners, adjustment of the different sections to the overall document.
NBK	Overall content as WP6 leader. Contact cities for mySMARTLife Cities Network
CAR	Overall content as Project Leader. Contact cities for mySMARTLife Cities Network
NAN	Contact cities for mySMARTLife Cities Network
HEL	Contact cities for mySMARTLife Cities Network
BYD	Contact cities for mySMARTLife Cities Network
VAR	Contact cities for mySMARTLife Cities Network
RIJ	Contact cities for mySMARTLife Cities Network
PAL	Contact cities for mySMARTLife Cities Network

2.3 Relation to other activities in the project

In mySMARTLife, the project team will elaborate a replication plan for each LH and FC. In order to ensure replication of featured solutions from the LHCs in the FHCs and member cities of the mySMARTLife cities network, the main concepts of the process to elaborate these replication plans will be applied to the cities of the network. In addition, mySMARTLife will consider that the current conditions and thus the starting point are different in each city and that each intervention will have a different impact when implemented in one city or another. In the project, all WPs will be contributing to WP6 providing:

- The corresponding assessment and understanding of each city context. Thus, the use of determined actions will be better understood and easily adapted to another city (under different conditions).

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- The place to openly share. In mySMARTLife, LHCs and FHCs will continuously exchange their experiences.
- Lessons learnt from implementation. This will serve as a guide for more feasible interventions.
- An adaptable replication strategy, which will be based on the different situations in the mySMARTLife cities.

The following Figure depicts the relationship among all work packages within the mySMARTLife:

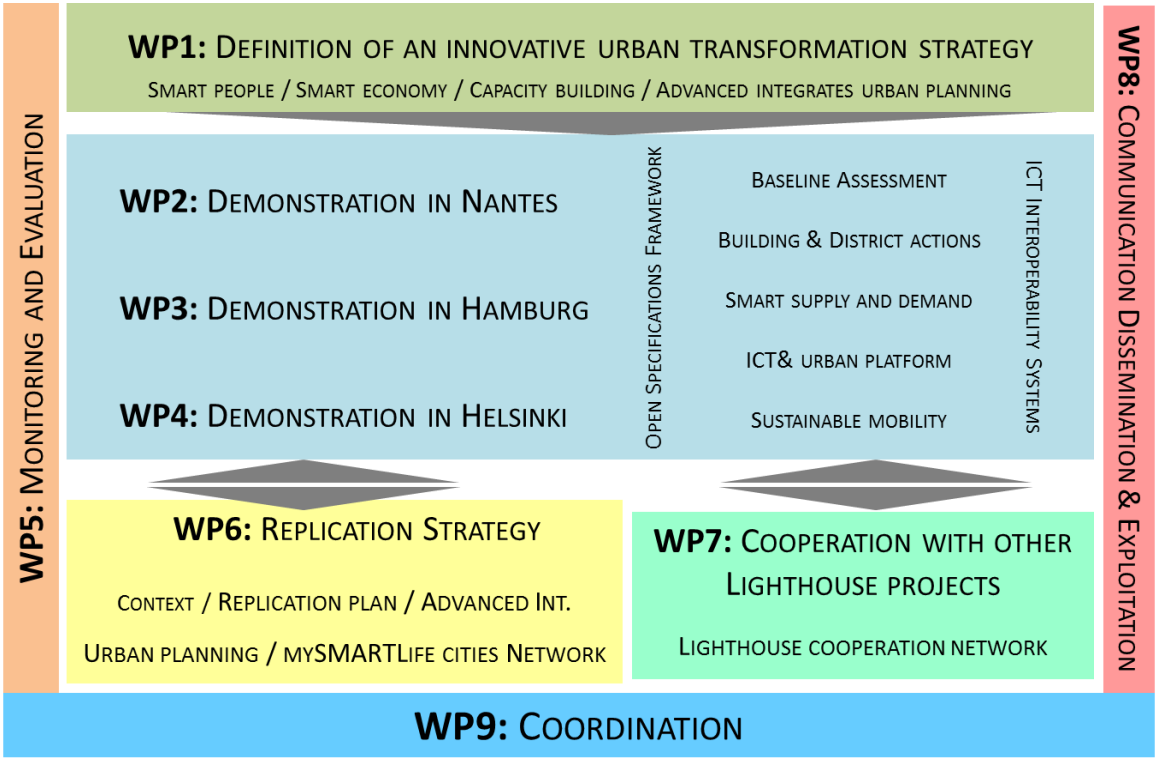

Figure 3: Overview of the main relationships between the different WPs

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The following table shows the relation of the deliverables from other WPs with WP6 and the current deliverable (D6.14).

Table 2: Relation to other activities in the project

Deliverable Number	Contributions
D1.x	These deliverables provide the basic understanding of the city transformation processes based on an Innovative Urban Transformation Strategy.
D2.x D3.x D4.x	These deliverables provide the LH demonstration platforms and learnings to be exposed during the technical study to the LHCs (Nantes, Hamburg and Helsinki).
D5.x	These deliverables will provide the reference for an integrated evaluation, definition of the data sets and requirements, monitoring programmes and their deployment in the three LHCs, as well as data collection and the evaluation of the impacts achieved both at project and city levels.
D6.x	Are related to replication activities and will be contributing in to mySMARTLife Cities Network activities.
D7.x	These deliverables related to cooperation with other LH projects will be used to learn from the replication of other projects funded by the same LH projects initiative as well as other transversal SmartCity projects and initiatives
D8.x	These deliverables on communication, dissemination and exploitation is closely related to WP6 activities. In particular, this relation is due to the fact that replication is an activity that contributes to the exploitation activities, facilitating the creation of the demand side. Moreover, communication and dissemination measures will facilitate the replication activities by promoting the solutions and results achieved.

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3. Objective and expected impacts

3.1 Objective

In this deliverable, the planning of mySMARTLife Cities Network replication activities will be defined. To achieve this, the following steps will be undertaken:

1. Definition of mySMARTLife Cities Network context & objectives
2. Invitation of cities
3. Cities Commitment
4. General analysis of mySMARTLife Cities Network
5. Identification of mySMARTLife Cities Network requirements/problems
6. Plan of activities
7. Launch of network activities
8. Use the networked cities to reach other cities around the world and have a global impact
9. Implement the “replication cascade” concept
10. Achieve a worldwide replication

3.2 Expected impacts

The most important impact that is expected within the deployment of this plan is the network of cities engaged in the network. In this sense, it is expected that the mySMARTLife Cities Network will engage twelve European and four non-European cities. This group of cities will facilitate the replication of the innovative and integrated solutions in the energy and transport sectors enabled by ICT and the accompanying business models that will be deployed inside mySMARTLife. In addition, it is expected that the network will contribute to:

- provide a place to learn and exchange experiences.
- increase the upscaling/replication of mySMARTLife solutions.
- facilitate the exploitation of mySMARTLife results.
- promote mySMARTLife activities inside Europe and around the world, especially the replication concept based on the Innovative Urban Transformation Strategy that will be delivered.
- demonstrate the feasibility and flexibility of mySMARTLife solutions/actions to be adapted to different urban contexts and conditions.
- From the implementation of the replication cascade concept it is expected to have international influence in the implementation of smart cities actions.

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4. mySMARTLife Cities Network: the concept

The mySMARTLife Cities Network will be a venue for the exchange of knowledge and best practices between cities committed to introduce sustainable urban solutions in energy, mobility and ICT. In the coming subsections, the pillars that define this cities network will be introduced. The following questions will be answered: What is the network? Why it is necessary the network under the umbrella of mySMARTLife? Who are (or will be) the members of the network? And finally Where and when the meetings and activities will take place.

4.1 mySMARTLife Cities Network definition

The “mySMARTLife Cities Network” is defined as a novel community of cities interested in becoming smarter by replicating the strategies and solutions developed within the mySMARTLife project. In this regard, the network will prepare activities (meetings, webinars, conferences etc.) that aim at facilitating the exchange and interaction of mySMARTLife LHCs and FCs with the other cities of the network.

4.2 mySMARTLife Cities Network ambitions

The mySMARTLife Cities Network will favour the upscaling and replication of mySMARTLife actions. The network will allow the cities to learn from the actions in the LHCs of Nantes, Hamburg and Helsinki during the implementation phase as well as from the preparatory works in the FCs during the course of the project. This will provide the mySMARTLife Cities Network with a real comprehension of the use of smart cities urban transfromation and the implementation methodology that facilitates the development, operation, use and evaluation of smart solutions, not only from a technical but also from an economic perspective.

The cities participating in the Network will be motivated by the LHCs and FCs to become smarter and learn from the experiences gained by the mySMARTLife cities.

4.3 mySMARTLife Cities Network membership

The mySMARTLife Cities Network Secretariat is composed by:

- SEZ: Leader of mySMARTLife Cities Network, subtask 6.5 and WP8 (communication, dissemination and exploitation). Member of the SCC1 Lighthouse projects Dissemination and Communication group.
- CAR: mySMARTLife project Coordinator. Member of the Board of SCC1 Lighthouse projectscoordinators

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- NBK: Leader of WP6 (Replication Strategy). Member of the SCC1 Lighthouse projects Replication group.

The members of the mySMARTLife Cities Network Secretariat together with the LHCs and FCs will contribute to the identification of cities for the Network.

16 cities with a high potential to replicate mySMARTLife solutions will join the network:.

- 12 European Cities
- 4 non-European Cities

To identify the members of the mySMARTLife Cities Network, already existing cities networks, such as the sister cities, and networks directly linked to the cities, such as METREX, CIVINET, EUROCITIES etc will be considered.

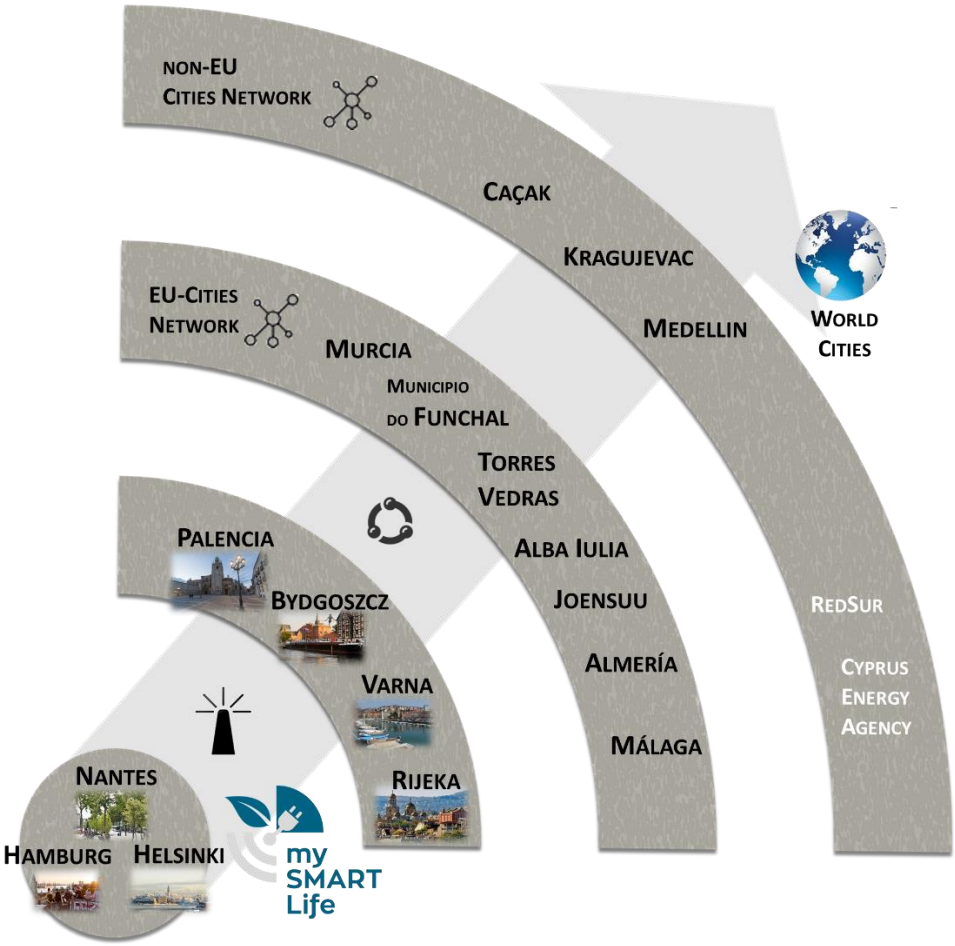

Figure 4: mySMARTLife replication strategy

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Figure 4 illustrates the replication strategy of mySMARTLife, which will advance in radial stages from the LHCs to other cities worldwide. Also, it can be observed in the figure that in a first stage, the replication is starting with the FCs. It is expected that the EU-cities participating in the network can, in a second stage, adapt and use some of the mySMARTLife solutions.

In a further scale, the non-EU members (listed in grey) that participate as observers s) in the mySMARTLife Cities Network will also have the possibility to learn from mySMARTLife and replicate the proposed urban transformation outside the EU. Finally, it is expected that the activities of the network will attract the attention of other cities around the world beyond the mySMARTLife Cities Network.

4.4 mySMARTLife Cities Network foreseen milestones

From the beginning of the mySMARTLife project in December 2016, the mySMARTLife Cities Network has been searching for cities to join the Network.

The mySMARTLife Cities Network activities have started with the identification of the candidate cities to be members of the network. Then, an analysis of the requirements of the mySMARTLife Cities Network will be done. With this analysis, the plan of activities to allow the interaction and exchange of knowledge between the cities will be defined. The first mySMARTLife cities network meeting will take place during the next General Assembly Meeting planned for February 2018 (M15).

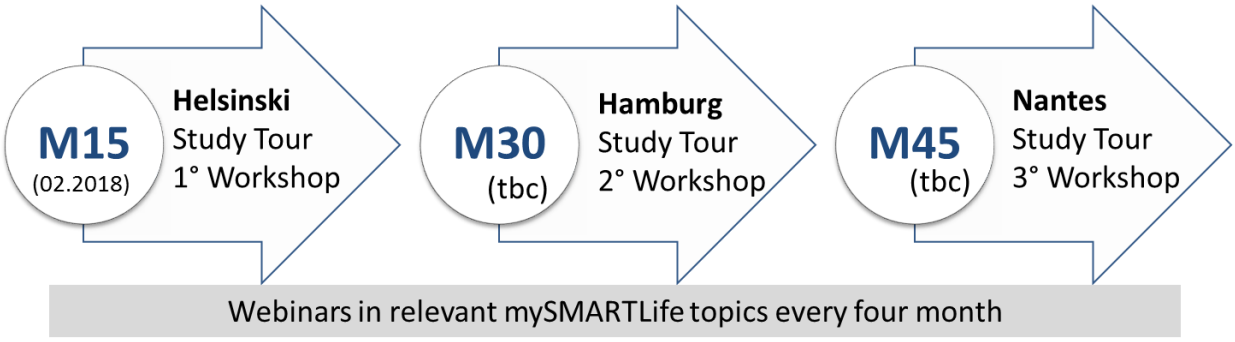

Figure 5: mySMARTLife Cities Network activities

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5. mySMARTLife Cities Network creation process

During the first year of the mySMARTLife project. all the contributing partners of task 6.5 will look for cities that have a high replication potential and that are interested in joining the mySMARTLife Cities Network. For this scope, cities will be invited in a first stage and in a second stage, they will be asked for their commitment to participate in the network.

5.1 Invitation to the cities

To invite the cities to participate in the mySMARTLife Cities Network, a letter of invitation was prepared. In this letter (see Annex 1), the following aspects are mentioned:

- a general description of mySMARTLife Project (funding, members, involved technical topics)
- the benefits for the cities from being members of mySMARTLife Cities Network
- the obligations of the mySMARTLife Cities Network members

For more details, please see Annex 1.

In order to identify the cities with a potential to replicate mySMARTLife solutions and to optimise the invitation process, the LHCs and FCs have completed, in a first round, the following tables with the cities that they could contact. These cities are part of their existing networks, like their sister cities, with the aim to get a better approach and in order to exploit these initial links that are already established among them:

Table 3: Cities in contact with the mySMARTLife LHCs

LHC	sister city	EU	non-EU	low- rep. pot.	high- rep. pot.	cities contacted	positive sign	LoIs signed	LoI received
Hamburg	Dresden	DE							
	Marseille	FR							
	Prague	CZE		x		x			
	Auckland		NZ		x	x	x		
	St. Petersburg		RU	x					
	Chicago		US		x				
	León		NI	x					
	Osaka		JP		x	x			
	Dar es Salaam		TZ	x					
	Shanghai		CN		x	x			
Nantes	Saarbrücken	DE				x			
	Cardiff	UK				x			

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	Cluj-Napoca		RO						
	Tiflis		GE						
	Seattle		US			x			
	Jacksonville		US			x		x	x
	Shashi		CN						
	Bahía Blanca		AR						
	Nigata		JP			x			
	Qingdao		CN		x	x	x	x	x
Helsinki	no official sister cities								
	member of METREX network - see next sheet in this xls								
	special cooperation with:								
	Moscow		RU						
	Peking		CN						
	Tampere	FI			x				
	Tukholma	SE			x				
	Tallinn	EE			x				
	Malmö	SE			x				
	Frankfurt	DE			x				
	Göteborg	SE			x				
	Rotterdam	NL			x				

Table 4: Cities in contact with the mySMARTLife FCs

FC	sister city	EU	non-EU	low- rep. pot.	high- rep. pot.	cities contacted	positive sign	LoIs signed	LoIs received
Rijeka	Rostock	DE							
	Neuss	DE							
	Ljubljana	SI							
	Burgas	BG							

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	Kawasaki		JP						
Varna	Aalborg	DK							
	Bradford	GB							
	Dordrecht	NL							
	Malmö	SE							
	Piräus	GR							
	Rostock	DE							
	Turku	FI							
	Akaba		JO						
	Charkiw		UA						
	Miami		US						
	Noworossijsk		RU						
	Odessa		UA						
Bydgoszcz	Mannheim	DE				x			
	Patras	GR				x		x	x
	Perth	GB				x			
	Reggio nell'Emilia	IT				x			
	Wilhelmshaven	DE				x			
	Kragujevac		RS				x	x	x
	Tscherkassy		UA				x		
	Hartford		US				x		
	Krementschuk		UA				x		
	Ningbo		CN				x		
	Pawlodar		KZ				x		
	Perth		AU					x	x
	Tempe		US						
	Pitesti		RO				x		
Palencia	Bourges	FR							
	Ponce de León	PR							
	civinet network Castilla y León regional energy							x	x

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	agency, EREN								

Thus, with the information listed in table 3 and 4, a detailed list of the cities to be contacted was obtained. In addition, considering that from the invited cities not all will give a positive answer, the other partners were asked to contact and invite more cities.

Finally, 51 cities were contacted from whom expressed their interest to join the mySMARTLife Cities Network.

5.2 Commitment from cities

In order to assure the participation and commitment of the contacted cities, the cities that answered positively to the invitation to join the mySMARTLife Cities Network, were asked to sign a letter of commitment which is taken as:

- declaration to actively participate in mySMARTLife Cities Network activities
- commitment to provide details about their district of concern (such as general information, size, density, types of buildings and number of m^2 housing, energy supply, potential retrofitting plans)
- acceptance to attend to mySMARTLife webinars
- agreement to perform local dissemination activities.

The letter of commitment is included in Annex 2.

5.3 Current status of the network

During the first months of the project, all contributing partners of WP6 were actively working on the invitation of cities to participate in the mySMARTLife Cities Network. In numbers, the actions can be summarsed as follows:

- 52 cities were invited to be part of the mySMARTLife Cities Network
- 10 cities (7 from the EU and Associated countries and 3 from non-EU countries) accepted to participate in the mySMARTLife Cities Network:
  - Murcia (Spain)
  - Almería (Spain)[1]
  - Málaga (Spain)[1]

[1] Málaga and Almería confirmed very recently their participation. However, due to the summer period, the final sigature of the LoC will be done after this period.

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  - Municipio do Funchal (Portugal)
  - Torres Vedras (Portugal)
  - Alba Iulia (Romania)
  - City of Cacak (Serbia)
  - Kragujevac (Serbia)
  - Medellin (Colombia)
  - Joensuu (Finnland)

- 2 institutes working in the field of energy and urban development accepted to participate in the mySMARTLife Cities Network as observers. This is a passive status, which implies that these participants are going to be invited to of mySMARTLife Cities Network events without receiving any financial support.
- 5 cities denied participating in the mySMARTLife Cities Network, mostly for economic reasons.
- 37 cities have not answered yet.

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6. mySMARTLife Cities Network foreseen Actions

All the activities planned for the mySMARTLife Cities Network are closely connected with Task 8.4, where SEZ will moderate the process of knowledge-transfer from the group of LHCs and FCs to the members of the mySMARTLife Cities Network. During the actions planned for the mySMARTLife Cities Network, the identified lessons learnt by the FCs from the LHCs will be presented. This is an essential step in the dissemination and replication strategies of the project as it represents the first link between mySMARTLife partners and the first potential users external to the project consortium.

By participating in the activities, the cities network will acquire the required information to adopt copy and replicate the urban transformations developed inside mySMARTLife. In addition, this knowledge exchange between LHCs, FCs and the mySMARTLife Cities Network will be carried out inside the SCC project activities through meetings, calls, shared online repository, emails. The transfer towards this first circle of potential external “early adopters” will be done through webinars, workshops and study tours.

6.1 Member cities of the mySMARTLife Cities Network: Initial Analysis

A general analysis of the current member cities of the network is the first step to elaborate the most suitable plan of activities that will allow a better exchange of experiences. This initial analysis evaluates the city, the size of its urban city center (not the metropolitan area), the population, climate classification according to the Köppen scale, its GDP (Gross Domestic Product) and the current status of their participation in the Covenant of Mayors initiative (availability of SEAP (Sustainable Environment Action Plan)/Adaptation Plans/SECAP).

For this last parameter, different options can appear. 2020 means that a valid SEAP is approved by the initiative, 2030 means that the new version SECAP has been approved and ADAPT means that for both cases, an Adaptation Plan to fight against climate change is active, complementing either the SEAP or the SECAP. From this very initial analysis, the information identified is summarised in the table below.

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Table 5: Analysis of the member cities of the mySMARTLife Cities network

City	Country	Size (km²)	Population	Climate (Köppen classification)	GDP	Year	SEAP Adaptation plan SECAP status
Murcia	SP	881.86	441,003 (2016)	Hot Semi-arid Climate	18,929 €	2015	2020 2030 ADAPT
Funchal	PT	76.15	111,892 (2011)	Suptropical Mediterranean Climate	21,100 €	2008	2020
Torres Vedras	PT	405.89	79,465 (2011)	Subtropical-Mediterranean Climate	28,100 €	2014	2020 ADAPT
Alba Iulia	RO	103.60	65,536 (2011)	Temperate Oceanic Climate	6,600 €	2008	2020 2030 ADAPT
Cacak	RS	50.10	73,331 (2011)	Humid Continental Climate	5,666 €	2015	No Signatory
Kragujevac	RS	320.90	150,835 (2011)	Temperate Continental Climate	5,852 €	2015	No Signatory
Medellin	CO	382	2,440,000 (2014)	Tropical Rainforest Climate	11,466 €	2016	Non-European
Joensuu	FI	1,173	75,557 (2016)	Subarctic climate	23,200 €	2014	2020
Almeria	SP	296.21	194,515 (2016)	Hot Semi-arid Climate	16,855 €	2011	2020
Málaga	SP	398.25	569,009 (2016)	Mediterranean Climate	17,267 €	2011	2020 2030 ADAPT

From this very initial classification, it can be perceived that the typologies of cities involved in the project range from small-medium cities (Caçak, 73,331 inh.) to mega-cities (Medellín, nearly 2.5 million inh.). Regarding climate, many different typologies can be found, from Subartic to Tropical or even Hot-Semi arid climates. An important reference is the analysis of the participation in Covenant of Mayors initiative. Murcia, for example, has the most complete option: an active SEAP, upgraded to a SECAP and including an Adaptation Plan. Other cities are non-signatories of the initiative.

Thus, the main conclusion of this analysis is that a great variety of conditions can be found in the 3+4+10 cities that currently participate in the project (Lighthouse, Follower and members of the network respectively). In order to focus on the envisaged activities in the project and with the aim to make them more interesting to the cities, a better and more refined classification of the cities involved is necessary. For that, an already developed classification method will be implemented. This method is depicted in Section 6.2

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6.2 Common aspects of mySMARTLife Cities Network members

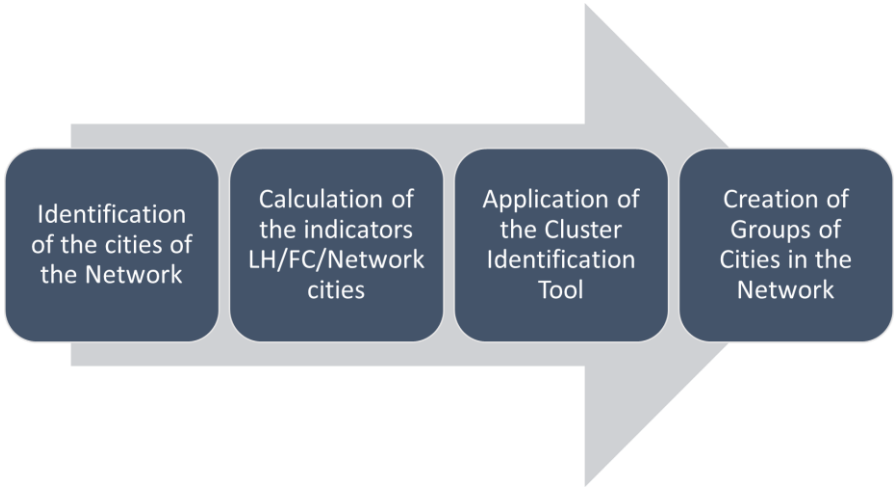

Figure 6: mySMARTLife Cities network: Members' common aspects

As it has been demonstrated in the analysis shown below, the great variety of the cities participating in the network requires the application of a method already proven to better organize the workshops, their activities and discussions that will be made. For that, the Cluster Identification Tool that was defined by REMOURBAN project[2] will be applied.

6.2.1 CIT Foundations

As explained in the aforementioned deliverable from REMOURBAN project, to build the characterisation model, 41 European cities were thoroughly analysed, compiling for each one 41 indicators, split into five different groups.

The groups of indicators and the number of indicators of each group are shown in the following table:

Group of Indicators	Number of Indicators
Management	19
Financing	5
Energy	5
Mobility	8
Infrastructures	4
Total	41

Table 6: Indicators of the Cluster Identification Tool (CIT)

[2] CIT method is depicted in REMOURBAN Deliverable D5.1 "Characterisation Report of European Cities". REMOURBAN is an H2020 project GA No 646511 funded by the H2020-SCC-1-2014 lighthouse projects call.

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In Annex 3, the tables with the detailed information of these lists of indicators are shown. Apart from the definition of the indicators, in the same deliverable from REMOURBAN project, some sources of information were introduced by that project to gather the necessary data to both build the model and to apply it to new cities. Taking these sources of information, mySMARTLife gathers available data and then applies the model to the Lighthouse cities, Follower cities and members of mySMARTLife cities network. Once obtained the most adequate group for each one, a most oriented work can be defined.

The recommended sources of information are the following:

Source of information	Comments
Urban Audit and State of European Cities Report	Updated in 2016 with a survey conducted from June 2015 to measure the local perceptions of quality of life in 79 cities. It includes cities in the 28 Member States of the European Union and cities in Iceland, Norway, Switzerland and Turkey.
Eurostat	Other data that does not appear in the previous Report was also taken from the different databases included in Eurostat.
Covenant of Mayors for Climate and Energy	CoM is heralded as the "world's biggest urban climate and energy initiative" by Commissioner Miguel Arias Cañete. With a new vision, the new Covenant of Mayors for Climate & Energy brings together thousands of local and regional authorities voluntarily committed to implementing EU climate and energy objectives on their territory.
CIVITAS	With an special attencion paid to transport and mobility measures and policies to create cleaner, better transport Europe, CIVITAS in cities in Europe. This source of information is expected to be used to calculate those indicators included in the Mobilty group.
Other EU initiatives EIP-SCC, CONCERTO, CITYKeys	These transversal projects, initiatives or partherships that are transversal to the Smart Cities movement in EU are used as a source of information, mainly qualitative, to calculate some of the suggested indicators

Table 7: Suggested sources of information of the Cluster Identification Tool (CIT)

From these available data sources, a specific suggestion of the most adequate sources for each indicator was made by REMOURBAN D5.1. In Annex 3: CIT indicators and proposed sources of information, this list of indicators and the suggested source of information to evaluate each one is included.

From the number of indicators depicted in Table 6, the CIT method defined then 7 different models (Management - Physical Characterization, Management - Population, Management - Sustainable and Smart City Strategies, Finantial, Energy, Mobility and Infrastructures), based on a predefined classification based on the training set by using the well-known k-means clustering method.

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To build them, a subset of these 41 indicators were used, as depicted in the following Table 8

Model	Number of Indicators used
Management: Physical characterisation	4
Management: People	9
Management: Governance	6
Finance	5
Energy	5
Mobility	8
Infrastructure	4
Total	41

Table 8: The models (and number of indicators used) proposed by the CIT

Each of these 7 models was built by making a partition from *n* observations, where n was the number of cities taken as a training sample (41 in the case of REMOURBAN) into *k* clusters in which each observation belongs to the cluster with the nearest mean (centroid). *k* was set to 5, as this number is considered as an appropriate and understandable partitioning of a given group. For each of the groups, a centroid was obtained, being considered as a prototype description of the ideal member of the cluster.

Thus, the process consists in evaluating the euclidean distance of the vectors that represents each city to the representatives of the groups or clusters (the centroids). Of course, in order to avoid dimensionality problems, all data from mySMARTLife cities network is normalised as a preprocessing step applied in advance. The normalisation method implemented is the Min-Max normalisation procedure, while the Min and Max values for each indicator are defined in the description of the CIT.

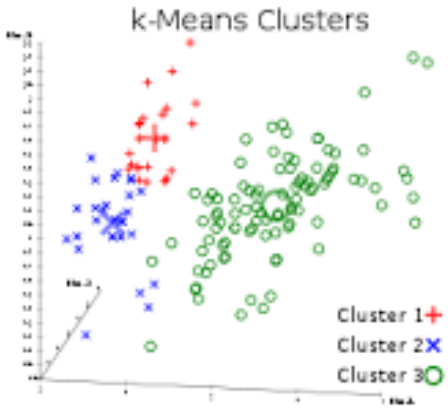

Figure 7: Example of application of a k-means method

A 2-D graphical representation of the effect of the application of k-means method is shown in the following Figure 7. This figure represents the distribution in 3 clusters (red, blue and green) of several datapoints. For mySMARTLife multidimensional classifications are applied (even a 41-dimension clustering in the all option)s applied.

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6.2.2 Application of CIT in mySMARTLife

In the following figure, the necessary stages for the application of the CIT in mySMARTLife are depicted. In the left side of the Figure, the necessary steps that must be carried out in the course of this activity are shown. The right part of the image highlights the inputs that were taken from REMOURBAN and now from mySMARTLife in an analogous way, that are mainly the list of indicators, the different sources of information –depicted in the above subsection–, the necessary min-max values to implement the normalisation and de-normalisation procedures and the most important input, the centroids of each cluster representative, the so called ”City type x“ representative, where x is the number of the group-cluster, ranging from 1 to 5.

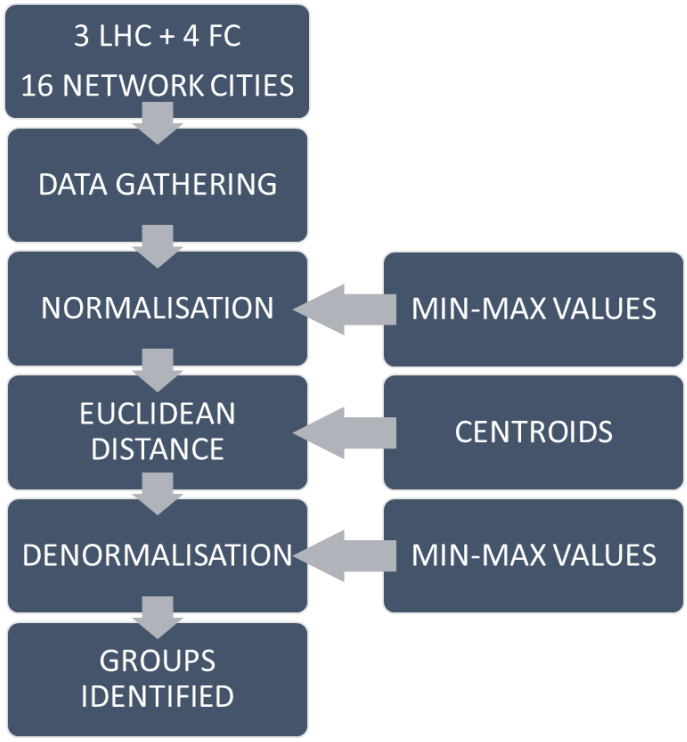

Figure 8: Application of CIT with the necessary inputs in mySMARTLife

As shown in Figure 8, once established the network of cities at a first step, a rigourous data gathering procedure starts. Considering the whole list of cities, for each one, the specific value of the 41 indicators for each of the 17 cities involved in mySMARTLife is calculated, as shown in the Annex 4: Data collection and aggregation for mySMARTLife Cities Network.

Once obtained these indicators, the normalisation method is applied, following a simple min-max normalisation procedure. Once implemented this pre-processing step, the CIT method is then applied, by calculating the euclidean distance of each vector that represesents the cities to the centroid representatives. Once measured the distance, the corresponding group is the one that has the lower distantce to the centroid that represents this group.

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From the list of possible models proposed in Table 8, in mySMARTLife the following were considered as the most appropriate:

Figure 9: CIT models used in mySMARTLife

Thus, the results are the following for each of the selected models:

Model 1: Finance

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Hamburg	Varna	Helsinki	Nantes	Funchal
	Rijeka		Joensuu	Caçak
	Bydgoszcz		Palencia	Kragujevac
	Alba Iulia		Murcia	Almería
	Medellín		Torres Vedras	Málaga

Table 9: Clusters for finance

Taking into account the results obtained after the application of the Cluster Identification Tool for the finance characteristics of the cities, three groups have been defined as can be seen in Figure 10.

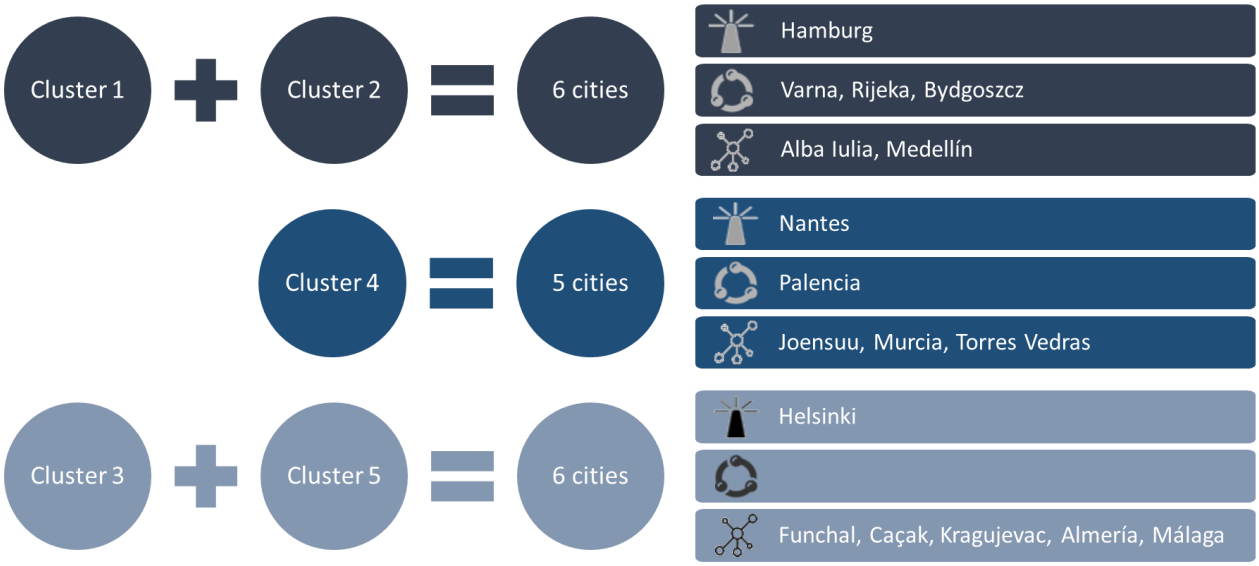

Figure 10: Groups of cities defined after their finance analysis

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The first group is composed of the cities that belong to the **cluster 1 and 2**, the second group corresponds to **cluster 4** and the cities included in the **cluster 3 and 5** have been included in the third group.

In each of these groups, there is one of the three lighthouse cities, which will allow to the other cities taking advantage of the results obtained within mySMARTLife.

The **first cluster** is characterised by the highest disposable income, highest Gross Domestic Product and one of the lowest unemployment rates. In this case, Hamburg fits perfectly with the cluster definition and there would be to highlight that in the case of REMOURBAN, the German cities Köln, Aachen and Rosenheim also were included in this cluster one.

The **second cluster** is characterised by a worse economic condition due to the low figures in GDP and disposable income. These cities share cluster with several cities analysed within the original results carried out in REMOURBAN about CIT, like Ruse in Bulgary, Tartu in Estonia or Miskolc in Hungary. As happened in the first cluster, cities from the same country are located in the same cluster like Varna (Bulgary).

Taking into account the different economic level of the cities belonging to the **cluster 1** and those belong to the **cluster 2**, grouping of all of them can be useful to help to those cities that need to improve their finance characteristics.

The **third cluster** is characterised by a significant economic activity and a high rate of working population with higher education. Helsinki, that has been included in this third cluster, is the second city of the list taking into account its GDP and its disposable income, its unemployment rate is one of the lowest and the proportions of working age population with higher education is the highest of the cities analysed. In REMOURBAN, similar cities like Stavanger, Trondheim, Stockholm or Gothenburg were also included in the same cluster 3.

This cluster has been joined with the **cluster 5** that is characterised by the highest values of unemployment rate and low figures regarding finance in general. The differences among the cities belonging to these two clusters will allow sharing experiences and taking advantage of this clustering.

Finally, the **cluster 4** is characterised by an intermediate position regarding the finance issue. In this case, Nantes stands out among the other cities of this group for its good finance characteristics. In the original CIT classification from REMOURBAN, cities like Liege or La Rochelle were also included in this fourth cluster.

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Model 2: Mobility

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Nantes		Varna	Hamburg	Helsinki
Funchal		Murcia	Joensuu	Rijeka
Torres Vedras		Málaga		Bydgoszcz
Almería				Palencia
				Alba Iulia
				Caçak
				Kragujevac
				Medellín

Table 10: Clusters for Mobility

Once carried out the analysis of the mobility characteristics of the cities and taking into account the results of the Cluster Identification tool, three groups have been proposed. Each of these three groups, as can be seen in the Figure 11, is leaded by one of the three lighthouse cities in order to take advantage of their experiences and share them with the rest of mySMARTLife cities.

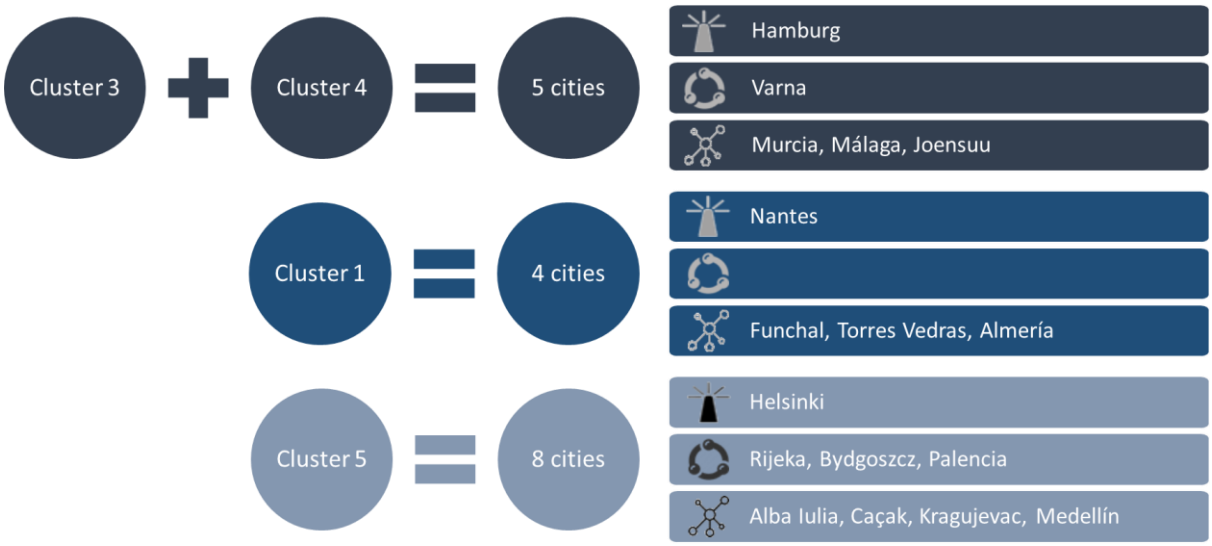

Figure 11: Groups of cities defined after their mobility analysis

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The first group is led by Hamburg. This group is composed by the cities that belong to **clusters 3 and 4**. **Cluster 3** is characterized by the low use of the bicycle and the low percentage of electric vehicle. Nevertheless, the cities included in the **Cluster 4** (Hamburg and Joensuu) have an elevate percentage of electric vehicles and it should be noted that Joenssu is the city with the highest use of bicycle. Furthermore, the **cluster 4** highlights for the low number of people killed in road accidents. This group where **cluster 3 and cluster 4** have been joined can be useful to analyse the different mobility plans of these different clusters of cities and try to improve the sustainability of the cities from a mobility point of view.

The **Cluster 1**, led by Nantes, is the second group of cities. It is characterized by cities that have a very high number of registered cars and a high use of private motor vehicles. Consequently, the GHG emissions have a high value in these cities. Similar characteristics can be found in the cities like Liege, Poitiers or Cork that were included in the same cluster within the analysis developed in REMOURBAN project.

The third group coincides with **cluster 5** and it is composed by 8 cities led by Helsinki. This cluster of cities is characterized by the low rate in use and purchase of private vehicles. Furthermore, the percentage of people using passenger transport or walking in these cities is very high. Similar characteristics have cities like Tartu or Miskolc in contrast to the original CIT results from REMOURBAN project.

After this analysis, the last two groups –coincident with clusters 1 and 5 respectively— could be joined in one group in order to take advantage of the difference of some of their characteristics, as described above, looking for the improvement of those cities in a worse position. In this moment, both groups are separated because there are a lot of cities included in the cluster 5 but the union of both groups could be carried out in the future if it is considered beneficial for the cities.

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Model 3: Energy

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Hamburg		Bydgoszcz	Hamburg	Helsinki
Nantes		Palencia	Joensuu	Joensuu
		Murcia		Rijeka
		Medellín		Varna
		Almería		Funchal
		Málaga		Torres Vedras
				Alba Iulia
				Caçak
				Kragujevac

Table 11: Clusters for Energy

In the analysis of the cities according to their energy features, the characterization has had to be done with national data since there is not enough information at city level. In the original CIT method, this was also taken into account. Using national data, the calculation of the centroids was influenced by the number of cities from the same country within the list. Thus, in order to avoid the influence of the number of cities of each country, only one city per country was included in the original CIT definition.

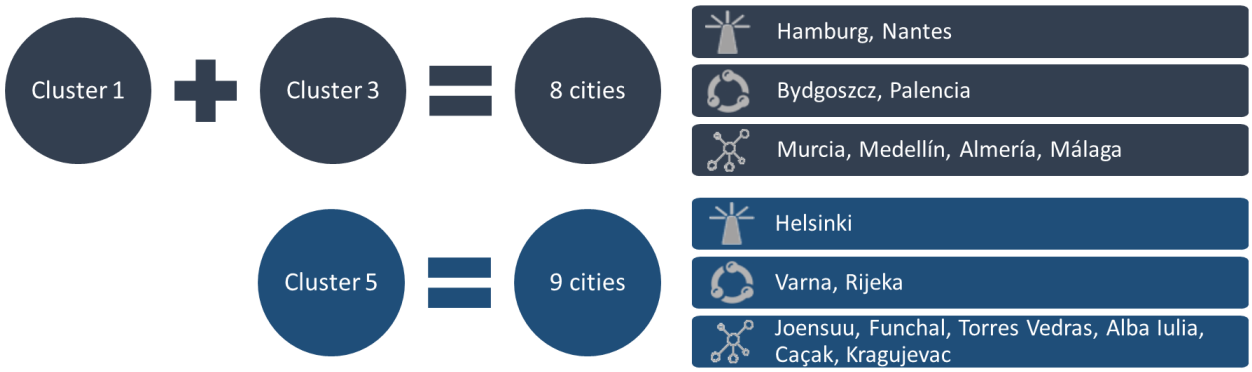

Figure 12: Groups of cities defined after their energy analysis

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In this case, two groups have been proposed taking into account the clusters generated by the Cluster Identification Tool.

As can be seen in Table 11, all the mySMARTLife cities have been included in three of the clusters: 1, 3 and 5.

In **Cluster 1**, there are cities characterised by low/medium values in the ratio of electricity and renewable energies in the final energy consumption in households. These cities (Hamburg and Nantes) have the highest values in the ratio of consumption of gas and high values of final energy consumption in residential sector, so as expected, their GHG emissions are the highest of all cities analyzed. Similar characteristics have cities like La Rochelle or Brugge analyzed in the original CIT execution.

The main features of the cities included in the **cluster 3** are their low final energy consumption per capita in residencial sector and low/medium values for their GHG emissions. These cities also have medium values for the share of gas in the final energy consumption in households.

The second group proposed coincides with the **cluster 5** generated by the cluster identification tool. These cities are characterized by high values for the share of renewable energies in the final energy consumption in households. Furthermore, these cities have low/medium values for their GHG emissions. Similar characteristics have cities like Tartu or Ljubljana also included in the fifth cluster of the REMOURBAN-CIT analysis. Although the cities included in this group have some similar characteristics regarding the points above mentioned (which has caused them to be included in the same cluster), there are also some differences taking into account other indicators like the share of electricity or gas in final energy consumption in households. These differences can be a good starting point for the discussion among cities looking for the improvement of their sustainability.

6.3 mySMARTLife proposed activities

Specific activities will be proposed to the network of cities, according to the classification that has been explained in the section above. Moreover, as aforementioned, the activities of the mySMARTLife Cities Network will be also in close relation with the cluster of SCC projects activities and also with mySMARTLife Task 8.4 (related to Knowledge-Transfer Events.). Besides, these actions will facilitate the implementation of the replication strategy of WP6.

The transfer/exchange actions will be:

- oriented and focused on the cities network.
- defined and restricted to a specific duration.
- established as an open platform to share know-how and experiences.

According to the replication plan of the mySMARTLife Cities Network, the following events will be organised:

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- 3 Workshops on technical and non-technical issues, which will be linked to regular partner meetings
- 3 Study Tours to the demonstration sites
- 7 Webinars on technical and non-technical issues relevant for replication

6.3.1 Workshops

Three WSs will be moderated by SEZ at different key moments of the mySMARTLife project. In order to maximize the cost-effectiveness of mySMARTLife activities,in most of the cases, these workshops are planned together with a General Assembly meeting. They will be held over one entire day or half a day depending on the topics. The table below shows the proposed WS plan.

Figure 13: Project Actions Implementation timeline

Figure 14: Network Activities and transfer of knowledge

Table 12: mySMARTLife Cities Network: Workshop schedule

Workshop n°	Goal
1 (M15)	• Setting the stage by presenting both the group of LHCs/FCs and the members of the mySMARTLife Cities Network • Presentation by FCs of their needs
2 (M33)	• Presentation of exploitable results by the LHCs and FCs • Matching of results between LHCs, FCs and the members of the mySMARTLife Cities Network • Discussion with the LHCs on the possible adaptations and replications on the FCs' demo sites
3 (M45)	• FCs, LHCs and the members of the mySMARTLife Cities Network will bring together and discuss about the lessons learnt • Formulation of best practices for the selected products, services and processes

6.3.2 Study Tours

Three Study Tours will take place during the mySMARTLife project. Initially, they were proposed to be together with the planned General Assembly meetings. However, the location and the dates of these Study Tours will be open for modification in accordance with the upcoming SCC activities. In the schedule of the Study tours are going to be organized a series of workshops on topics relevant to all smart city

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actions and specially related to the hosting city, which is going to have the opportunity to show the innovation actions implemented in relation to smart cities.

These Study Tours at each mySMARTLife demo site (Helsinki, Hamburg and Nantes) will be an opportunity to come and see how sustainability can be integrated into the areas that mySMARTLife will be working in. In each opportunity, participants will be shown the improvements achieved in the transport, energy and ICT areas. To these Study Tours are going to invited coordinators as well as the cities of other SCC projects and also cities located near to the host city. In addition participants from the European Commission, The Innovation and Networks Executive Agency (INEA) are going to be informed with the advances and experiences of mySMARTLife. Like this, the closer collaboration among LH projects will be promoted in agreement with SCC recommendations.

Table 13: mySMARTLife Cities Network: Study Tours schedule

Study Tour n°	Location
1 (M15)	• Study Tour Helsinki
2 (M33)	• Study Tour Hamburg
3 (M45) (tbc)	• Study Tour (Nantes)

6.3.3 Webinars

Seven Webinars will be moderated by SEZ during the project on specific topics according to the needs of the mySMARTLife Cities Network members. These webinars are also going to be use a tool to teach good practices and to show the implementation actions inside mySMARTLife. To this kind of knowledge transfer action are going to be invited the members of mySMARTLife Cities Network but also other type of stakeholders, like universities, researching institutions, energy companies, etc. This will increase replication impact and favor the global impact.

Some of the topics, which will be deciding according to the project evolution, of these webinars will be in the following sectors:

- Citizen Engagement
    - Social awareness
    - Social acceptance
- Urban transformation actions:
    - Smart People
    - Smart Economy

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  - Capacity Building
- Energy
  - Energy Systems
  - Distric Heating
- Mobility
  - Electric vehicles
  - New mobility services (zero CO_2 emission)
- ICT
  - Urban Platform
  - IoT

The programs of each webinar are going to include:

- Short introduction to mySMARTLife and to the partner offering the webinar
- Presentation of the problematic
- Description of the solution proposed
- Analysis of the actions implemented
- Critical aspects to consider
- Next steps to be implement

The final selection of the webinar topics will be done during the first network meeting (m15), where the FCs together with the network members will identify their interests and needs to be or became smarter. In a first approach, the webinars will follow the schedule of the table below.

To extend the participation in this webinars and assure a better replication, these webinars are going to be published in mySMARTLife website, the webinar schedule is also be communicated to the members of the SCC projects and partners of mySMARTLife are going to be encourage to distribute this information with their interested stakeholders.

Table 14: mySMARTLife Cities Network: Webinars schedule

Webinar n°	Topic
1 (M19)	• Citizen Engagement
2 (M23)	• Smart Economy
3 (M27)	• Building Capacity

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4 (M31)	• Urban Transformation
5 (M35)	• Energy solutions
6 (M39)	• Mobility solutions
7 (M43)	• ICT

6.4 Tentative Agenda of activities

In the previous section, activities were listed that are planned for the mySMARTLife Cities Network. All of them are presented chronologically in the following table:

Table 15: mySMARTLife Cities Network Agenda (WS: Workshop, ST: Study Tour, WE: Webinar)

Project Month	WS	ST	WE	Topic
M15	WS 1			mySMARTLife Cities Network setting stage (presentations)
M15		ST 1		Study Tour Helsinki
M19			WE 1	• Citizen Engagement
M23			WE 2	• Smart Economy
M27			WE 3	• Building Capacity
M31			WE 4	• Urban Transformation
M33	WS 2			Presentation of mySMARTLife results and adaptability discussion
M33		ST 2		Study Tour Hamburg
M35			WE 5	• Energy solutions
M39			WE 6	• Mobility solutions
M43			WE 7	• ICT
M45	WS 3			Bring together lessons learnt and best practices
M45		ST 3		Study Tour (Nantes)

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Thus, activities have been planned strategically along the duration of the project. In the mySMARTLife project timeline, the agenda can be illustrated as in the figure below:

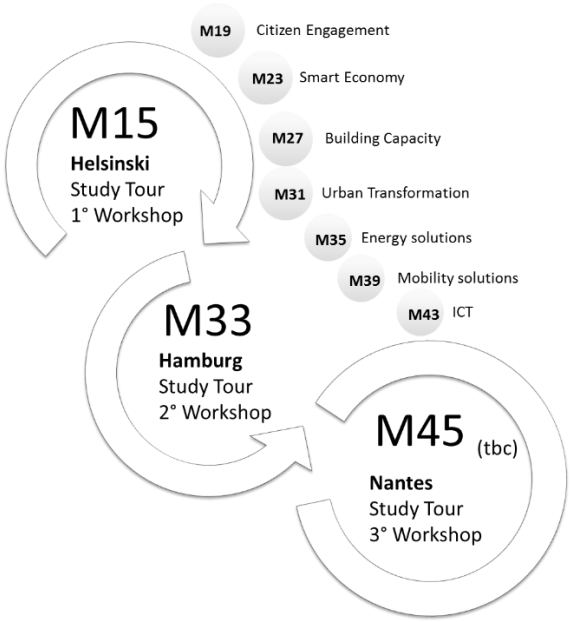

Figure 15: mySMARTLife Cities network: Activities timeline

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7. Conclusions

During the first project period, the parameters that define the Network were identified by the mySMARTLife Cities Network Secretariat which is composed by SEZ, CAR and NBK. This secretariat worked together with the LHCs and FCs to identify those cities with higher and lower level to replicate mySMARTLife solutions.

From the 52 cities invited, 10 gave a positive answer and 37 have not answered yet. Hence, the following cities have joined the mySMARTLife Cities Network:

- Murcia (Spain)
- Almería (Spain)
- Málaga (Spain)
- Municipio do Funchal (Portugal)
- Torres Vedras (Portugal)
- Alba Iulia (Romania)
- City of Cacak (Serbia)
- Kragujevac (Serbia)
- Medellin (Colombia)
- Joensuu (Finland)

It is expected for the coming months to get more positive answers from the other invited cities.

Comparing the amount the cities invited and the commitment achieved for the creation of mySMARTLife Cities Network, we can conclude that:

- The big smart cities networking opportunities make that the cities have difficulties to decide their best options
- The process to acquire or engage cities for SC networks has become very slow and difficult
- Some cities lost their interest in the networks from the SCC, mainly as they were approached by several projects.

In this regard, it was observed that a good approach to solve these difficulties is to reinforce the proposal of creation of a common Network that involve/include all SCC-projects city networks. With the creation of this group, all projects can promote and improve the replication potential of all SCC actions from a

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consolidated perspective. Also the organisation of one big event where all SCC-project networks are participating, will be a helpful action to facilitate the exchange and cooperation between SCC-projects.

Finally, The proposed plan of activities for mySMARTLife Cities Network will be open to modifications depending on the future cities committing to participate in the mySMARTLife Cities Network, the needs of the members of the network and the action plan of the SCC.

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Annex 1: mySMARTLife Cities Network letter of invitation

The **mySMARTLife** project has received funding from the European Union´s Horizon 2020 call SMART AND SUSTAINABLE CITIES (H2020-SCC-2016-2017) under the topic *SCC-1-2016-2017: Smart Cities and Communities lighthouse projects*. This project develops an Innovative Urban Transformation Strategy, addressing tailored solutions in the Energy and Mobility sectors enabled by ICT at district/city scale together with others Non-technical to support this transformation. More than 150 actions will be deployed in the cities of Nantes (France), Hamburg (Germany) and Helsinki (Finland) comprising smart buildings, smart grids, energy storage, electric vehicles, smart charging infrastructures and mobility services.

To guarantee a broad replication, the **mySMARTLife** project uses a replication cascade methodology, based on existing cooperation between interested cities and communities, comprising the so-called **mySMARTLife Cities Network**. This network is set up of additional **16 cities** that have an exclusive access to the **mySMARTLife** project results as well as the chance to learn from the experience of the **mySMARTLife** partners.

During the proposal phase, the following four cities, two city networks and a regional energy agency already confirmed their interest in joining the **mySMARTLife Cities Network**:

- EUROCITIES, CIVINET network, Castilla y León regional energy agency (EREN)
- Lighthouse cities' sister cities: Jacksonville (US), Quingdao (CH)
- Follower cities' sister cities: Kragujevac (SRB), Perth (AUS)

For a stronger and more authentic replication of **mySMARTLife** solutions, it is important to consider that each city is different, has different challenges and possibilities. For this reason, the **mySMARTLife Cities Network** Secretariat *invites you* to be one of the **16 cities** of the **mySMARTLife Cities Network**. As a member of the **mySMARTLife Cities Network** you will get the following **benefits**:

- *The* possibility to *exchange experiences* with **mySMARTLife** Lighthouse cities and Follower cities;
- *The invitation to 3 workshops on technical and non-technical issues, including study tours to the demonstration sites where replication will play a relevant role* (mySMARTLife budget covers partially travel costs, at a maximum of 800 EUR for EU cities and 1400 EUR for those overseas);
- *Free access to 7 Webinars on technical and non-technical issues relevant for replication;*
- A *privileged access to project results* such as methodologies for retrofitting, district scale integrating smart buildings, smart grids, energy storage, electric vehicles and smart charging infrastructures and much more *through dedicated information channels* (web sites, discussion forum and a dedicated newsletter).

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Cities and communities willing to be a member of the **mySMARTLife Cities Network** will **commit** themselves **to**:

- *Attend thethree workshops* organised in each of the three demo sites cities during the course of the project.
- *Participate in Web meetings* with the **mySMARTLife Cities Network** Secretariat (your contact point with the **mySMARTLife** project) for the purpose of data collection and dissemination activities.
- *Perform local dissemination activities* (such as posting information at websites and newsletters etc. in local language).
- *Make provision of technical and non-technological data* for the district as part of the evaluation of its replication potential and the development of a virtual model of retrofitting.
- *Invite key stakeholders to participate in interviews* in order to identify non-technological barriers.

The selection of the cities that will become part of the **mySMARTLife Cities Network** will be based on their potential for replicating the smart solutions demonstrated in the **mySMARTLife** project in terms of geographic and technical deployment of the solutions that will be implemented in the three demo sites. Those cities that will not become part of this network will automatically be invited in our broader dissemination activities.

On behalf of the **mySMARTLife Cities Network** Secretariat:

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https://www.steinbeis2i.de

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Annex 2: mySMARTLife Cities Network letter of commitment

[Organisation legal name] is willing to participate as observer in the Cities Network of the **mySMARTLife** project, funded by the European Commission to develop an Innovation Action project at European level in the European Commission's Horizon 2020 call SMART AND SUSTAINABLE CITIES (H2020-SCC-2016-2017) under topic **SCC-1-2016-2017: Smart Cities and Communities lighthouse projects**. The project will develop an Innovative Urban Transformation Strategy, addressing tailored solutions in the Energy and Mobility sectors enabled by ICT at district/city scale together with others Non-technical to support this transformation. More than 150 actions will be deployed in the cities of Nantes (France), Hamburg (Germany) and Helsinki (Finland) comprising smart buildings, smart grids, energy storage, electric vehicles, smart charging infrastructures, mobility services. As part of Work Package 6 activities, the project will establish the **mySMARTLife Cities Network**, composed by at least 12 European cities and 4 cities outside Europe, in order to increase the potential of replication of the results and favour the dissemination activities.

[Organisation legal name] will commit to participate in the **mySMARTLife Cities Network** in the following way:

- *Provide to the* **mySMARTLife Cities Network** Secretariat *details about its district of* concern (such as general information, size, density, types of buildings and number of m^2 housing, energy supply, potential retrofitting plans, before the *30th of June 2017.*
- *If possible, attend the 3 workshops* organised one in each of the three demo sites during the course of the project (December 2016 – November 2021).
- *Participate in Web meetings* with the **mySMARTLife Cities Network** Secretariat (your contact point with the **mySMARTLife** project) for the purpose of data collection and dissemination.
- *Perform local dissemination activities* (such as posting information at websites and newsletters etc. in local language).
- *Make provision of technical and non-technological data* for the district as part of the evaluation of its replication potential and the development of a virtual model of retrofitting.
- *Invite key stakeholders to participate in interviews* in order to identify non-technological barriers.

The undersigned is the official authorised representative of [Organisation legal name].

Location and date:

Signed by: [Legal representative]

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Annex 3: CIT indicators and proposed sources of information

All the information that will be shown in this annex is part of Deliverable 5.1 ”Characterization Report of European Cities“ (as cited in this deliverable).

Table 16: CIT indicators

Indicator		Formula	Units	Description	Source of Information
Management: Physical characterization					
Population density	MG_PC 1	Total city population / Land area city	Inh./km^2	Population per unit area in the city	Eurostat CPOPCB[3] and State EU Cities Report[4]
Population	MG_PC 2	-	Inhabitants	Total number of persons inhabiting a city	Eurostat CPOPCB[5]
Area	MG_PC 3	-	km^2	Land area city	Wikipedia/Google/local webs
Elevation	MG_PC 4	-	m	Altitude of a city above sea level	Wikipedia/Google/local webs
Management: People					
Population dependency ratio	MG_P1	(Population<14 + Population>64) / Population of adults) x 100	%	Population of children and senior citizen in relation to the adults population	Eurostat CPOPCB [6] and State EU Cities Report[7]
Annual population change	MG_P2	Total population / Total population x 100	%	Change in the number of inhabitants in the last year	Eurostat CPOPCB [8]
Foreigners as a proportion of population	MG_P3	Number of foreigners living city / total city population	%	Population of foreigners in relation to the city population	Eurostat CPOPCB [9]
Students in higher education	MG_P4		Number of students	Number of students in higher education (ISCED Level 5-6)	Eurostat CEDUC[10]
Youth unemployment rate	MG_P5	100 x Total number of unemployed youth / youth labour force	%	The unemployment rate is defined as the number of unemployed youth (typically 15-24 years) divided by	Eurostat CLMA[11]

[3] (EUROSTAT) and http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpopcb (Population by citizenship and country of birth - cities and greater cities)

[4] (Rheinisch-Westfälisches Institut für Wirtschaftsforschung, November 2010)

[5] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpopcb

[6] http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-data/database and http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpop1

[7] (Rheinisch-Westfälisches Institut für Wirtschaftsforschung, November 2010)

[8] See notes 4 and 5 above.

[9] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpop1 (Foreign-born)

[10] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ceduc (Urban audit indicator : Student in higher school education (ISCED level 5-6), total) and http://ec.europa.eu/eurostat/web/products-datasets/-/educ_momo_dst

[11] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_clma and http://ec.europa.eu/eurostat/web/products-datasets/-/tipslm80

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				the youth labour force	
Number of public libraries	MG_P6	Number of public libraries per 10,000 inhabitants	Number of libraries	Number of public libraries as indicator of the level of education of the population.	Eurostat CTOUR[12]
Median population age	MG_P7	-	Years	Median age is the age that divides a population into two numerically equal groups	Eurostat CPOPSTR[13]
Voter turnout in last municipal election	MG_P8	Number of persons that voted in the last municipal election / Total city population eligible to vote x 100	%	Voter participation level	Local authorities website
Percentage of the city's solid waste that it is recycled	MG_P9	100 x Total amount of city's solid waste that is recycled in tonnes	%	Recycled materials shall denote those materials diverted from the waste stream, recovered and processed into new products following local government permits and regulations	Local authorities website
Management: Governance					
Existence of local sustainability plans	MG_G1	-	YES/NO	Is there any specific sustainability plan in the city?	CoM[14]
Existence of Smart Cities strategies	MG_G2	-	YES/NO	Is there any specific Smart Cities strategy in the city?	EIP-SCC[15]
Existence of an Agenda 21	MG_G3	-	YES/NO	Has the city elaborated an Agenda 21?	CoM[16]
Signature of Covenant of Mayors	MG_G4	-	YES/NO	Has the city signed the Covenant of Mayors?	CoM[17]
Mobility Plan	MG_G5	-	YES/NO	Does the city have a smart mobility plan?	Local city website or EIP-SCC[18]
ICT citizen oriented platforms	MG_G6	-	YES/NO	Is there any public ICT global platform available for citizen offering general information about the city?	Local authorities website
Finance					
GDP per inhabitant	FI1	Gross Domestic Product at market prices/ total city population	M€/inh	It is a measure for the economic activity of a city and it is defined as the value of all goods and services produced less the value of any goods or services used in their creation	Eurostat[19]
Average disposable income	FI2	Gross Domestic Product at market prices/ total city population	€/inh	The amount of money that households have available for spending and saving after income	Eurostat[20]

[12] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctour (Urban audit indicator: Number of public libraries).

[13] http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

[14] http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans_en.html and See also Excel sheet from CoM provided by SER (SEAP sheet)

[15] EIP-SCC platform (https://eu-smartcities.eu/eu-projects). Consider ok if the city appears in website EIP-SCC, in EU Projects for instance

[16] http://www.covenantofmayors.eu/. See also Excel sheet from CoM provided by SER (SIGN sheet)

[17] Ibid.

[18] https://eu-smartcities.eu/sustainable-urban-mobility

[19] http://ec.europa.eu/eurostat/en/web/products-press-releases/-/2-21062010-AP

76 http://ec.europa.eu/eurostat/web/products-datasets/-/nama_10r_3gdp

[20] http://ec.europa.eu/eurostat/en/web/products-statistical-working-papers/-/KS-RA-07-007

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				taxes have been accounted for	
City unemployment rate	FI3	Number of citizens unemployed / Total labour force x 100	%	Unemployed citizens in relation to employed and unemployed who are legally eligible to work	Eurostat[21]
Proportion of working age population with higher education	FI4	-	%	Proportion of working age population qualified at level 5 or 6 ISCED	Eurostat CEDUC[22]
GDP per inhabitant in PPS	FI5	-	M€/inh	GDP per capita at current market prices in Purchasing Power Standards (PPS). It is a common currency that eliminates the differences in price levels between countries	Eurostat[23]
Energy					
Share of electricity in final energy consumptions in households	EN1	-	%	Energy derived from electricity related to the final energy in households	Eurostat[24]
Share of gas in final energy consumptions in households	EN2	-	%	Energy derived from gas related to the final energy in households	Eurostat[25]
Share of Renewable Energies in final energy consumption in households	EN3	-	%	Energy derived from energy renewable sources related to the final energy in households	Eurostat[26]
Final energy consumption per inhabitant	EN4	-	MWh/inh	It covers consumption of private households, commerce, public administration, services, agriculture and fisheries	Eurostat[27]
GHG emissions per inhabitant	EN5	1000 tonnes of CO2 eq / Total National Population	Mton CO_2 eq/Million of inhabitant	GHG emissions from buildings (residential and public)	Eurostat[28]
Mobility					

[21] http://ec.europa.eu/eurostat/web/products-datasets/-/lfst_r_urgau

[22] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_leduc (Urban audit indicator : Proportion of working age population qualified at level 5 or 6 ISCED)

http://ec.europa.eu/eurostat/cache/RSI/#?vis=nuts3.economy&lang=en

[23] http://ec.europa.eu/eurostat/web/products-datasets/-/lfst_r_urgau

[24] http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210 and CoM Final energy consumption per capita (http://www.covenantofmayors.eu/search_en.html?q=+Final+energy+consumption+per+capita+&x=27&y=9) Search in every signatories Action Plan.

[25] http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210 and CoM Final energy consumption per capita (http://www.covenantofmayors.eu/search_en.html?q=+Final+energy+consumption+per+capita+&x=27&y=9) Search in every signatories Action Plan.

[26] http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210 and CoM Final energy consumption per capita (http://www.covenantofmayors.eu/search_en.html?q=+Final+energy+consumption+per+capita+&x=27&y=9) Search in every signatories Action Plan.

[27] http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdpc320&language=en

[28] http://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-37-01-647 and/or http://www.covenantofmayors.eu/. Search in every signatories Action Plan.

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Private car ratio	MO1	Total number of private cars x 1000 inhabitants/population	Number of cars / 1000 inhabitants	Total number of private cars (excluding automobiles, trucks and vans used for the delivery of goods and services by commercial enterprises), related to the total number of inhabitants	Eurostat CTRAN[29]
People killed in road accidents (per 10000 population)	MO2	People killed in road accidents x 10000 inhabitants/population	People killed in road accidents /1000 inhabitants	People killed in road accidents	Eurostat CTRAN [30]
Modal Split. Use of private motor vehicle	MO3	-	%	Percentage of trips using a private motor vehicle as type of transportation	Modal TEMS - The EPOMM Modal Split Tool[31] Eurostat CTRAN[32]
Modal Split. Walk	MO4	-	%	Percentage of trips walking as type of transportation	Modal TEMS - The EPOMM Modal Split Tool[33] Eurostat CTRAN[34]
Modal Split. Bike	MO5	-	%	Percentage of trips using a bike as type of transportation	Modal TEMS - The EPOMM Modal Split Tool[35] Eurostat CTRAN [36]
Modal Split. Passenger transport	MO6	-	%	Percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm)	Modal TEMS - The EPOMM Modal Split Tool[37] Eurostat CTRAN [38]
Percentage of Electrical Vehicle (EV)	MO7	Total number of all type EV Total number vehicles	%	Number of electric vehicles related to total number of vehicles	McKinsey Report[39]
GHG emissions per capita from transportation	MO8	Annual Tonnes of CO2 eq / Total City Population	Annual tonnes CO_2 eq / Hab.	According to the Global Protocol for Community Scale GHG Emissions (GPC)	Eurostat[40]
Infrastructures					
Smartphone penetration	IN1	Number of smartphones / Total mobile phones	%	Number of smartphones in relation to total mobile phones	The International Telecommunication

[29] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctran (Data 14 sheet)

[30] http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctran (Data 15 sheet) and http://ec.europa.eu/eurostat/web/products-datasets/-/tps00165

[31] http://www.epomm.eu/tems/cities.phtml

[32] Idib.

[33] http://www.epomm.eu/tems/cities.phtml

[34] Idib.

[35] http://www.epomm.eu/tems/cities.phtml

[36] Idib.

[37] http://www.epomm.eu/tems/cities.phtml

[38] Idib.

[39] http://www.mckinsey.com/~/media/McKinsey%20Offices/Netherlands/Latest%20thinking/PDFs/Electric-Vehicle-Report-EN_AS%20FINAL.ashx Exhibit 1.1

[40] http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rd300 (Country level only) and http://ec.europa.eu/eurostat/web/products-datasets/-/med_en1

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					Union. Wikipedia
Fixed wired internet subscriptions	IN2	Number of fixed wired internet subscriptions/ Total Country Population	%	Percentage of a country's population which have fixed wired internet subscription	The International Telecommunication Union. Wikipedia
Broadband internet subscriptions: Mobile-cellular	IN3	% of a country's population that are subscribers to a public mobile telephone service	%	Number of subscriptions to a public mobile telephone service. High-speed access to the public internet	The International Telecommunication Union. Wikipedia
Percentage of internet users	IN4	Number of people who has access to Internet at home. This indicator does not record use, or frequency of use, but only **access**	%	Number of people who has access to Internet at home. This indicator does not record use, or frequency of use, but only **access**	The International Telecommunication Union. Wikipedia

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Annex 4: Data collection and aggregation for mySMARTLife Cities Network

The following tables show the data obtained for the indicators related to the different fields described in the Table 8 and which have been used for the clusterization of the following cities:

- Lighthouse Cities: Hamburg, Nantes and Helsinki
- Follower Cities: Varna, Rijeka, Bydsgoszcz and Palencia
- mySMARTLife Cities Network: Murcia, Funchal, Torres Vedras, Alba Iulia, Cacak, Kragujevac, Medellín, Joensuu, Almería and Málaga.

At the end of this annex, a table where have been included the data sources used for the calculation of this indicators can be found.

Characterization of Cities by Management Features

Table 17: Aggregated data for the management layer for Physical Characterization

City		MG_PC1	MG_PC2	MG_PC3	MG_PC4
		Population density	Population	Area	Elevation
	HAMBURG	2,400.00	1,787,408	755	6
	NANTES	4,572.00	298,029	65.19	8
	HELSINKI	2,905.18	620,982	213.75	17
	VARNA	1,718	348,058	238	79
	RIJEKA	2,923	128,624	44	499
	BYDGOSZCZ	2,038	358,614	175.98	60

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	PALENCIA	835,57	79,137	94,71	749
	MURCIA	500,08	441,003	881.86	42
	FUNCHAL	1,469.36	111,892	76.15	0
	TORRES VEDRAS	196	79,465	405.89	41
	ALBA IULIA	613.28	63,536	103.60	203
	CACAK	1,463.69	73,331	50.10	242
	KRAGUJEVAC	559.10	179,417	320.90	173
	MEDELLÍN	6,492.12	2,479,990	382	1,465
	JOENSUU	64.41	75,557	1,173	117
	ALMERÍA	656.68	194,515	296.21	16
	MÁLAGA	1,428.77	569,009	398.25	8

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Table 18: Aggregated data for the management layer for People Characteristics

City	MG_P1	MG_P2	MG_P3	MG_P4	MG_P5	MG_P6	MG_P7	MG_P8	MG_P9
	Population dependency ratio	Annual population change	Foreigners as a proportion of population	Students in higher education	Youth unemployment rate	Number of public libraries per 10,000 inhabitants	Median Population age	Voter turnout in last municipal election	Percentage of the city's solid waste that is recycled
HAMBURG	47.10	0.93	13.09	96,286	7.00	37	43.35	63.40	47.83
NANTES	49.02	0.80	9.13	56,585	24.60	41	37.00	80.94	22.26
HELSINKI	38.78	1.42	8.52	219,080	20.10	46	38.00	58.80	28.12
VARNA	41.68	-1.07	1.01	30,692	21.60	4	41.10	46.50	19.03
RIJEKA	45.71	-2.93	0.96	16,027	31.50	20	42.70	36.70	16.32
BYDGOSZCZ	43.26	-1.35	0.12	39,513	17.70	35	39.10	54.94	26.39
PALENCIA	49.70	-0.68	3.73	5,567	44.40	6	47.50	66.68	16.84
MURCIA	46.68	-0.71	10.98	31,025	44.40	22	40.18	61.89	16.84
FUNCHAL	43.48	-0.77	3.15	3,266	28.20	1	37.00	52.60	16.24
TORRES VEDRAS	69.17	-2.50	9.49	17,665	28.20	1	41.00	52.60	16.24
ALBA IULIA	32.42	0.40	1.15	3,545	20.60	1,00	36.65	53.17	16.75

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	CACAK	46.79	-0.60	11.41	2,490	31.20	8	42.10	20.63	0.76
	KRAGUJEVAC	48.57	-0.11	11.41	6,094	31.20	8	42.10	20.63	0.76
	MEDELLÍN	40.18	1.01	0.28	226,912	18.20	1	28.90	48.27	2.10
	JOENSUU	45.99	1.88	0.00	19,499	20.10	12	42.10	58.80	28.12
	ALMERÍA	47.26	0.49	19.70	38,483	44.40	5	38.60	50.27	1.84
	MÁLAGA	48.43	0.18	15.2	105,031	44.40	25	40.40	51.91	16.84

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Table 19: Aggregated data for the management layer for Governance and Sustainable and Smart Strategies

City		MG_G1	MG_G2	MG_G3	MG_G4	MG_G5	MG_G6
		Local sustainability plans	Smart Cities strategies	Agenda 21	Covenant of Mayors	Mobility plan	ICT citizen oriented platforms
	HAMBURG	1	1	1	1	1	1
	NANTES	1	1	1	1	1	1
	HELSINKI	1	1	1	1	1	1
	VARNA	1	1	0	1	1	1
	RIJEKA	1	1	0	1	1	1
	BYDGOSZCZ	1	1	0	1	1	1
	PALENCIA	1	1	1	1	1	1
	MURCIA	1	1	1	1	1	1
	FUNCHAL	1	1	0	1	1	1
	TORRES VEDRAS	1	1	1	1	1	1
	ALBA IULIA	1	1	1	1	1	1
	CACAK	1	1	0	0	1	1

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	KRAGUJEVAC	1	1	0	0	0	1
	MEDELLÍN	1	1	1	0	1	1
	JOENSUU	1	1	0	1	0	1
	ALMERÍA	1	1	1	1	1	1
	MÁLAGA	1	1	1	1	1	1

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Characterization of Cities by their Finance Features

Table 20: Aggregated data for the finance layer

City		KPI_FI1	KPI_FI2	KPI_FI3	KPI_FI4	KPI_FI5
		GDP PPS per inhabitant	Average disposable income	City unemployment rate	Proportion of working age population with higher education	GDP per capita
	HAMBURG	123 €	24,331.00 €	7.40	31.70	42,701.44 €
	NANTES	105 €	17,200.00 €	8.80	41.20	30,904.63 €
	HELSINKI	119 €	18,300.00 €	7.40	47.00	40,804.82 €
	VARNA	48 €	5,200.00 €	7.60	39.70	12,500.00 €
	RIJEKA	59 €	4,876.39 €	16.10	28.90	10,697.00 €
	BYDGOSZCZ	69 €	5,000.00 €	10.70	27.60	9,100.00 €
	PALENCIA	92 €	17,754.00 €	15.80	34.70	23,019.00 €
	MURCIA	92 €	15,621.00 €	19.80	33.90	18,929.00 €
	FUNCHAL	77 €	12,100.00 €	15.00	20.80	21,100.00 €
	TORRES VEDRAS	77 €	15,300.00 €	11.90	42.80	28,100.00 €
	ALBA IULIA	59 €	4,181.00 €	5.90	14.50	6,600.00 €

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731297.

	CACAK	36 €	4,320.00 €	28.14	5.90	5,666.00 €
	KRAGUJEVAC	36 €	4,320.00 €	33.61	11.00	5,852.00 €
	MEDELLÍN	60 €	9,533.28 €	11.20	18.26	11,466.00 €
	JOENSUU	119 €	15,200.00 €	10.2	35.00	23,200.00 €
	ALMERÍA	92 €	13,160.00 €	21.97	35.70	16,855.00 €
	MÁLAGA	92 €	15,128.00 €	23.63	32.50	17,267.00 €

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731297.

Characterization of Cities by their Energy Features

Table 21: Aggregated data for the energy layer

City		KPI_EN1	KPI_EN2	KPI_EN3	KPI_EN4	KPI_EN5
		Share of electricity in final energy consumption in households	Share of gas in the final energy consumption in households	Share of Renewable Energies in final energy consumption in households	Final energy consumption per inhabitant (housholds)	GHG emissions per inhabitant (households)
	HAMBURG	20,8	37,1	11,2	7.60	2,250.94
	NANTES	34,8	27	17,4	6.56	1,815.32
	HELSINKI	36,7	0,5	24,4	10.39	1,008.97
	VARNA	41,7	2,4	33,1	3.56	1,225.22
	RIJEKA	22.1	18.5	48.4	6.66	1,240.68
	BYDGOSZCZ	12.9	16.8	13.7	5.77	1,308.76
	PALENCIA	40,5	20,3	18,5	3,72	1.361,02
	MURCIA	40,5	20,3	18,5	3,72	1.361,02
	FUNCHAL	40,6	10,4	32	2,85	788,75
	TORRES VEDRAS	40,6	10,4	32	2,85	788,75
	ALBA IULIA	14.1	30.4	40.1	4.40	795.91

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	CACAK	42.7	5.3	29.9	4.64	897.12
	KRAGUJEVAC	42.7	5.3	29.9	4.64	897.12
	MEDELLÍN	30.4	21.2	29.2	1.33	126.31
	JOENSUU	40,5	20,3	18,5	3,72	1.361,02
	ALMERÍA	40,5	20,3	18,5	3,72	1.361,02
	MÁLAGA	40,5	20,3	18,5	3,72	1.361,02

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Characterization of Cities by their Mobility Features

Table 22: Aggregated data for the mobility layer

City		KPI_MO1	KPI_MO2	KPI_MO3	KPI_MO4	KPI_MO5	KPI_MO6	KPI_MO7	KPI_MO8
		nº of registered cars per 1000 population	People killed in road accidents (per 10,000 population)	Modal Split. Private motor vehicle	Modal Split. Walk	Modal Split. Bike	Modal Split. Passenger transport	Percentage of EV	GHG per capita from transportation
	HAMBURG	346.10	0.22	42	28	12	18	0.73	1.79
	NANTES	530.90	0.30	52	27	5	16	1.5	1.85
	HELSINKI	403.40	0.10	23	32	11	34	1.2	2.19
	VARNA	554.90	0.57	48	29	0	23	0.1	1.09
	RIJEKA	365.90	0.40	37	25	1	37	0.2	1.40
	BYDGOSZCZ	473.10	0.17	40	13	4	43	0.1	1.07
	PALENCIA	449.50	0.13	28	45	4	23	0.3	1.98
	MURCIA	481.20	0.23	52	37	1	10	0.3	1.98
	FUNCHAL	548.00	0.94	53	12	1	34	0.9	1.80
	TORRES VEDRAS	548.00	0.33	47	16	2	35	0.9	1.80

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	ALBA IULIA	235.00	0.96	20	37	4	39	0.2	0.72
	CACAK	238.00	1.04	27	23	1	49	0.1	0.79
	KRAGUJEVAC	238.00	1.04	27	23	1	49	0.1	0.79
	MEDELLÍN	71.00	1.68	12,8	30,3	1	56	0.1	0.46
	JOENSUU	480.00	0.10	35	22	32	11	1.2	2.19
	ALMERÍA	440.70	0.26	60,5	30	1,5	7,9	0.3	1.98
	MÁLAGA	446.50	0.23	48	38	0,4	12,6	0.3	1.98

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Characterization of Cities by their Infrastructures Features

Table 23: Aggregated data for the infrastructures layer

City		KPI_INf1	KPI_INF2	KPI_INF3	KPI_INF4
		Smartphone penetration	Penetration ratio. Number of broadband internet subscriptions		Number of internet users (%)
			Fixed- broadband	Mobile	
	HAMBURG	68.8	34	41	87.59
	NANTES	65.3	37.8	52.2	84.69
	HELSINKI	45.5	30.4	106.5	92.65
	VARNA	45.5	30.4	106.5	92.65
	RIJEKA	33	17.6	40.3	56.66
	BYDGOSZCZ	59.3	20.3	52.3	69.8
	PALENCIA	63.4	16.6	49.3	68
	MURCIA	66.8	24.3	53.2	78.69
	FUNCHAL	66.8	24.3	53.2	78.69
	TORRES VEDRAS	65	22.3	32.5	68.63
	ALBA IULIA	65	22.3	32.5	68.63

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	CACAK	56	15.9	23.7	55.76
	KRAGUJEVAC	36	10.2	40.2	65.32
	MEDELLÍN	36	10.2	40.2	65.32
	JOENSUU	35.4	8.4	4.9	55.9
	ALMERÍA	66.8	24.3	53.2	78.69
	MÁLAGA	66.8	24.3	53.2	78.69

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Data Sources

In the following table the data sources where the information has been found are included,

Table 24: Data sources used in mySMARTLife for each indicator

MANAGEMENT. PHISICAL CHARACTERIZATION		
MG_PC1	**Population density**	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpopcb (Population by citizenship and country of birth - cities and greater cities)
MG_PC2	**Population**	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpopcb
MG_PC3	**Area**	Wikipedia/Google/local webs
MG_PC4	**Elevation**	Wikipedia/Google/local webs
MANAGEMENT. PEOPLE		
MG_P1	Population Dependency ratio	http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-data/database http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpop1 https://en.wikipedia.org/wiki/Joensuu https://www.citypopulation.de/php/serbia-moravica.php?cityid=13245 https://www.citypopulation.de/php/serbia-admin.php?adm2id=M19965 https://www.medellin.gov.co/irj/go/km/docs/pccdesign/SubportaldelCiudadano_2/PlandeDesarrollo_0_17/IndicadoresyEstadsticas/Shared%20Content/Documentos/ProyeccionPoblacion2016-2020/Perfil%20Demogr%C3%A1fico%202016%20-%202020%20Total%20Medellin.pdf
MG_P2	Annual population change	http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-data/database http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpop1 http://www.joensuu.fi/en/web/english/basic-facts;jsessionid=1A2AE51A0432525B2BE72633CD5A0345.node2 https://www.citypopulation.de/php/serbia-admin.php?adm2id=M12832 https://www.citypopulation.de/php/serbia-

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		admin.php?adm2id=M19965 http://www.dane.gov.co/files/investigaciones/poblacion/proyepobla06_20/Municipal_area_1985-2020.xls
MG_P3	Foreigners as a proportion of population	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_cpop1 https://ugeo.urbistat.com/AdminStat/en/hr/demografia/dati-sintesi/rijeka/20642058/4 http://www.datosmacro.com/demografia/migracion/inmigracion/rumania http://www.datosmacro.com/demografia/migracion/inmigracion/serbia http://www.datosmacro.com/paises/comparar/colombia/espana
MG_P4	Students in higher education	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ceduc http://ec.europa.eu/eurostat/web/products-datasets/-/educ_momo_dst http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__kou__vkour/010_vkour_tau_101.px/table/tableViewLayout1/?rxid=3fbc39a9-ba6e-43b1-ae0a-ce1fc5ee3c32 https://data.oecd.org/eduatt/population-with-tertiary-education.htm http://www.mineducacion.gov.co/sistemasdeinformacion/1735/articles-212352_antioquia.pdf
MG_P5	Youth unemployment rate	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_clma http://ec.europa.eu/eurostat/web/products-datasets/-/tipslm80 https://tradingeconomics.com/serbia/youth-unemployment-rate http://www.elcolombiano.com/negocios/economia/medellin-entre-las-6-ciudades-con-mayor-desempleo-juvenil-AX4066727
MG_P6	Number of public libraries	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctour https://www.oclc.org/en/global-library-statistics.html
MG_P7	Median population age	http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do http://www.indexmundi.com/croatia/median_age.html

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		https://goo.gl/PWGKs1 www.ine.es
MG_P8	Voter turnout in last municipal election	Local authorities website https://en.wikipedia.org/wiki/Elections_in_Hamburg http://www.nantes.fr/home/actualites/ville-de-nantes/administration/2017/les-infos-pratiques-pour-voter.html http://www.stat.fi/til/kvaa/2017/02/kvaa_2017_02_2017-04-11_tie_001_en.html http://sofiaglobe.com/2015/10/25/bulgarias-2015-elections-borissovs-gerb-headed-for-victory-in-most-major-cities-exit-polls-show/ https://en.wikipedia.org/wiki/Rijeka_local_elections,_2017 https://en.wikipedia.org/wiki/Elections_in_Poland http://resultados.elpais.com/elecciones/2015/municipales/15/ https://es.wikipedia.org/wiki/Elecciones_municipales_de_Portugal_de_2013 https://es.wikipedia.org/wiki/Elecciones_presidenciales_de_Rumania_de_2014 http://www.lainformacion.com/politica/elecciones-locales/candidato-que-apoya-serbia-gana-las-municipales-kosovares-en-mitrovica-norte_ZjAg5j0zCsn0cu5aL3LB33/ http://www.colombia.com/elecciones/2015/regionales/resultados/electorales.aspx?C=CO&D=1&M=1
MG_P9	Percentage of the city's solid waste that it is recycled	Local authorities website http://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics https://goo.gl/DXn6FA http://www.medellincomovamos.org/medell-n-es-la-ciudad-con-menor-generaci-n-de-residuos-por-cada-mil-habitantes-en-la-red-c-mo-vamos/
MANAGEMENT. GOVERNANCE AND SUSTAINABLE AND SMART STRATEGIES		

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MG_G1	Existence of local sustainability plans	http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans_en.html
MG_G2	Existence of Smart Cities strategies	https://eu-smartcities.eu/eu-projects
MG_G3	Existence of an Agenda 21	http://www.covenantofmayors.eu/
MG_G4	Signature of Covenant of Mayors	http://www.covenantofmayors.eu/
MG_G5	Mobility Plan	Local city website https://eu-smartcities.eu/sustainable-urban-mobility
MG_G6	ICT citizen oriented platforms	Local authorities website
FINANCE		
FI_1	GDP per inhabitant in PPS	http://ec.europa.eu/eurostat/web/products-datasets/-/lfst_r_urgau https://knoema.com/atlas/Germany/Hamburg/GDP-per-capita-PPS http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00114&plugin=1
FI_2	Average disposable income	http://ec.europa.eu/eurostat/en/web/products-statistical-working-papers/-/KS-RA-07-007 http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tgs00026&plugin=1 http://www.colliers.com/-/media/files/emea/germany/germany_research/hotel/cities/colliers%20international_mb_hot_hamburg_q1-q4%202015_en.pdf?la=en-gb http://www.regionalprofiles.bg/var/docs/Profiles-2016-EN/24-

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		Varna-District-ENG.pdf https://www.ceicdata.com/indicator/croatia/annual-household-income-per-capita https://knoema.com/atlas/Poland/Kujawsko-Pomorskie http://www.datosmacro.com/mercado-laboral/renta/espana/municipios/castilla-leon/palencia http://www.lavanguardia.com/20151118/30217300427/cual-es-el-salario-medio-en-cada-provincia-de-espana.html http://www.datosmacro.com/mercado-laboral/renta/espana/municipios/murcia/murcia http://www.lavanguardia.com/20151118/30217300427/cual-es-el-salario-medio-en-cada-provincia-de-espana.html https://www.romania-insider.com/purchasing-power-in-romania-a-third-of-european-average/ https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG
FI_3	City unemployment rate	http://ec.europa.eu/eurostat/web/products-datasets/-/lfst_r_urgau http://www.hamburg-economy.de/service-for-companies/2222552/economic-indicators/ https://knoema.com/atlas/Poland/Kujawsko-Pomorskie http://crm.siepa.gov.rs/municipalities-eng/municipality.php?place=cacak http://crm.siepa.gov.rs/municipalities-eng/unemployment.php?ID=80 https://www.dane.gov.co/index.php/estadisticas-por-tema/mercado-laboral/empleo-y-desempleo http://www.datosmacro.com/paro/espana/municipios/andalucia/almeria http://www.datosmacro.com/paro/espana/municipios/andalucia/malaga
FI_4	Proportion of working age	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_leduc

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	population with higher education	https://w3.grupobbva.com/TLFU/dat/cp_45_palencia.pdf http://www.cacak.org.rs/documents/Community_profile_242.pdf http://devinfo.stat.gov.rs/SerbiaProfileLauncher/files/profiles/en/1/DI_Profil_Kragujevac_EURSRB002001008001.pdf http://www.cid.unal.edu.co/files/publications/CID200304boproob_e.pdf
FI_5	GDP per inhabitant	http://ec.europa.eu/eurostat/en/web/products-press-releases/-/2-21062010-AP http://pubdocs.worldbank.org/en/366021438191576243/City-of-Rijeka-MFSA-summary-24-12-2013.pdf https://knoema.com/atlas/Poland/Kujawsko-Pomorskie http://www.datosmacro.com/ccaa/murcia http://knoema.es/atlas/Rumania/Alba http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=VN https://es.wikipedia.org/wiki/Anexo:Ciudades_por_PIB https://knoema.com/atlas/Bulgaria/Varna/GDP-per-capita-PPS http://www.investinserbia.biz/_file/cacak/Cacak_Community_profile.pdf
ENERGY		
EN_1	Share of electricity in final energy consumptions in households	http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210 https://www.minminas.gov.co/documents/10180/558752/Informe_Final_Consultoria_Plan_de_accion_Proure.pdf/e8cdf796-d7b1-4bb1-90b9-e756c7f48347
EN_2	Share of gas in final energy consumptions in households	http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210 https://www.minminas.gov.co/documents/10180/558752/Informe_Final_Consultoria_Plan_de_accion_Proure.pdf/e8cdf796-d7b1-4bb1-90b9-e756c7f48347
EN_3	Share of	http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rk210

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	Renewable Energies in final energy consumption in households	https://www.minminas.gov.co/documents/10180/558752/Informe_Final_Consultoria_Plan_de_accion_Proure.pdf/e8cdf796-d7b1-4bb1-90b9-e756c7f48347
EN_4	Final energy consumption per inhabitant	http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdpc320&language=en
EN_5	GHG emissions per inhabitant	http://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-37-01-647 http://documentacion.ideam.gov.co/openbiblio/bvirtual/021471/InventarioGEI/IDEAM2.pdf
MOBILITY		
MO_1	Private car ratio	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctran https://knoema.com/urb_ltran/transport-larger-urban-zone?indic-ur=1000010-number-of-registered-cars-per-1000-population
MO_2	People killed in road accidents (per 10000 population)	http://ec.europa.eu/eurostat/web/products-datasets/-/urb_ctran http://ec.europa.eu/eurostat/web/products-datasets/-/tps00165 https://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate https://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate https://knoema.com/urb_ltran/transport-larger-urban-zone?indic-ur=1000010-number-of-registered-cars-per-1000-population http://ec.europa.eu/eurostat/web/products-datasets/-/tsdtr420
MO_3	Modal Split. Use of private motor vehicle	http://www.epomm.eu/tems/cities.phtml https://ecomobility.org/alliance/alliance-cities/medellin-colombia/
MO_4	Modal Split. Walk	http://www.epomm.eu/tems/cities.phtml https://ecomobility.org/alliance/alliance-cities/medellin-colombia/
MO_5	Modal Split.	http://www.epomm.eu/tems/cities.phtml

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	Bike	http://www.ibikeoulu.com/presentations/timo_perala_top_10_wcc.pdf https://ecomobility.org/alliance/alliance-cities/medellin-colombia/
MO_6	Modal Split. Passenger transport	http://www.epomm.eu/tems/cities.phtml https://ecomobility.org/alliance/alliance-cities/medellin-colombia/
MO_7	Percentage of Electrical Vehicle (EV)	http://www.eafo.eu/europe
MO_8	GHG emissions per capita from transportation	http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rd300 http://ec.europa.eu/eurostat/web/products-datasets/-/med_en1 https://knoema.com/atlas/topics/Transportation/GHG-Emissions-from-transport/GHG-Emissions-from-roads
INFRAESTRUCTURES		
IN_1	Smartphone penetration	The International Telecommunication Union. Wikipedia
IN_2	Fixed wired internet subscriptions	The International Telecommunication Union. Wikipedia
IN_3	Broadband internet subscriptions: Mobile-cellular	The International Telecommunication Union. Wikipedia
IN_4	Percentage of internet users	The International Telecommunication Union. Wikipedia

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