smartCEM

Smart connected electro mobility

D4.1 Evaluation Framework

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Abbreviations

Abbreviation	Definition
ACQ ME	Acquired measures
AWA	Awareness Indicator
CL	Check list
DEP	Deployment Indicator
DoW	Description of Work
EM	Evaluation Matrix
ES	Evaluation scenario
ETC	Evaluation Test Case
ETR	Evaluation Test Run
HY	Hypothesis
ICT	Information and Communications Technologies
ITS	Intelligent Transport Systems
PI	Performance Indicator
PRO	Progress indicators
PS	Pilot Site
QMR	Quarterly Management Report
QT	Questionnaire
REQ ME	Required Measures
RQ	Research Question
SE	Sensor
UC	Use Case

Executive Summary

The main objectives of Task 4.1 *Evaluation framework,* is to design and develop the procedures for the evaluation and assessment of the (combination of) services to be tested in the four smartCEM pilot sites. It should be guaranteed that these procedures are applied in all the sites in a coherent and harmonized way, i.e. using a common methodology.

This document provides a detailed description of the evaluation methodology to be applied in the smartCEM Evaluation Work Package (WP4). Based on the FESTA methodology, the general approach adopted by smartCEM for the testing and evaluation is the V-model often used in the development and implementation of ICT systems. The core of deliverable *D4.1: Evaluation framework* - is the set of proposed templates and guidelines to be used by all the pilot sites when defining their evaluation criteria and experimental design for smartCEM. By doing this, a coordinated evaluation of the impact of smartCEM services in the real world - on the four sites - will be assured. A first list of evaluation categories - environment, traffic and mobility, user uptake, driver behaviour and safety – at project level, will cover technical and non-technical aspects.

Finally, it is worth mentioning that smartCEM project collaborates with other three CIP funded projects: ICT4EVEU [DOC 14], MOBI.Europe [DOC 15] and MOLECULES [DOC 16]. Discussions from the evaluation working groups derived to a set of CIP evaluation categories – *Environment, Transport & Mobility, User Uptake, and Economic* - and high-level electro mobility performance indicators which will be improved and refined during the course of the CIP projects.

1. Introduction

The smartCEM project is focused on the deployment of electro mobility ICT services that facilitate and enhance the user experience of electric vehicles. By doing so, it will address the relatively slow uptake of ICT systems in the public sector and the lack of interoperability of ICT solutions across Europe. Through the integration of ICT systems, smartCEM intends to increase awareness of electro mobility and to encourage the use of electric vehicles as part of everyday life.

Consequently, the smartCEM pilots aim to demonstrate the potential for EVs in urban and interurban contexts and to encourage the uptake of EVs through advanced and heterogeneous mobility services: *EV-navigation, EV-efficient driving, EV-trip management, EV-charging station management, EV-sharing management* (refer to smartCEM D2.1). In this perspective, pilots and trials are aimed at testing and understanding consumer patterns and behaviour, thus influencing this behaviour in order to manage a more effective service. Indeed, Intelligent Transport Systems (ITS) can play a major role in overcoming the barriers that have been identified for EV uptake [DOC 1].

The work to be performed in smartCEM takes into account the state of the art, concerning user uptake and user acceptance of electric vehicles by investigating what the deployment barriers of EV services are and how they could be overcome. Some of these difficulties have already been identified, such as the high purchasing price, the limited driving range, the time required to recharge, the inconvenience linked with the recharging spots (e.g. limited availability, low power and performance), lead to raise anxiety in users and a reduction in the uptake of EV to which can be added a general unfamiliarity and a lack of experience with the technology and the limited choice of models and brands.

This document provides guidance for the work to be performed in the smartCEM Evaluation Work Package (WP4). Task T4.1 *Evaluation Framework* has focused on the definition of a common evaluation framework and methodology for the evaluation criteria and experimental procedures to be deployed within each pilot site in the smartCEM project. The main objective of this methodology is to evaluate the impact of the smartCEM services on technical and non-technical categories, i.e. environment, traffic and mobility, user uptake and driver behaviour in a coherent and harmonized way.

The main body of deliverable D4.1 *Evaluation framework* is divided into five chapters as follows:

- Chapter 2: *Evaluation Methodology*, presents the evaluation objectives and categories, and introduces the evaluation methodology to be applied.
- Chapter 3: *Evaluation indicators generation*, defines the guidelines for the

generation of the smartCEM evaluation criteria; as well as the proposed templates to generate the criteria. In addition, several examples are given in order to show how it is done in practice.

- Chapter 4: *Experimental Design Generation*, provides guidelines and templates for the design of the experiments, which will be developed by each pilot site.
- Chapter 5: *Evaluation sites* framework, overview of each pilot site taking into account, the WP4 needs.
- Finally, chapter 6: *Legal and Organisational aspects*, describes the legal and organizational aspects that should be taken into account.

1.1. Related smartCEM documents

This section contains internal documents produced within the smartCEM project. All documents are available for download on the smartCEM project collaboration portal on ProjectPlace: http://www.projectplace.com/. All partners in the consortium have access to the portal, whose account management is owned by ERTICO.

Table 1. Related smartCEM documents

Finalised smartCEM deliverables		
Reference	**Document**	**Version and date**
smartCEM DoW	DOW smartCEM (297328) 2012-07-02.ppt	Version of 02/07/2012
smartCEM D2.1	20120803-smartCEM-D2.1-ReferenceArchitecture-v1.1.docx	Version 1.1, 03/08/2012
smartCEM D6.2	120531_CIP_D_common_high level_indicators_v1.pdf [smartCEM: Agreed set of indicators]	Version 0.12, 31/05/2012
Future smartCEM deliverables		
Reference	**Document**	**Version and date**
smartCEM D4.2	smartCEM-D4.2EvaluationCriteria-v1.0.doc	Version 3.0, 15/05/2013
smartCEM D4.3	smartCEM_D43_v10.doc	Version 1.0, 06/05/2013
Working documents		
N/A	smartCEM_EC Generation template_v0.6	Version 0.6, 14/09/2012

1.2. Terminology

Table 2. smartCEM terminology

Assessment	The process of collecting data by various methods such as experiments, questionnaires or simulations in order to evaluate the impact of a service or group of services.
Baseline	Also called reference case, represents an existing situation, against which the same situation, including a number of services, is compared as a method to assess (in terms of evaluation) the effects that these experimental services cause in a determined test environment, i.e. pilot sites.
Evaluation	The process of determining the effect of a smartCEM service in comparison to alternative services and/or to a baseline, in order to derive recommendations for decision makers, thanks to the analysis of obtained results during the experiments.
Hypothesis	The hypothesis is an answer to a research questions or deployment question that contains a specific and testable prediction about the relationship between two variables.
Impact	Changes or effects brought about by a service as a result of its implementation in an experimental or 'real-life' situation.
Impact assessment	Measurement or estimation of the impacts (effects) of a service or set of services, for the appraisal groups, e.g. EV potential end-user.
Indicator	Something that provides an indication about the status of system, project, etc., i.e. a "tool" used to measure or evaluate if smartCEM services and project itself have been developed properly, and the objectives of the smartCEM project have been achieved. Within smartCEM there are four types of indicators: awareness, deployment, progress and performance.
Service	Set of functionalities that are implemented and provided by components in an ICT System.

For more detailed information on these terminologies, refer to http://wiki.fot-net.eu/index.php?title=FOT_Glossary

2. Evaluation Methodology

The process adopted in the smartCEM Evaluation framework is based on a standard framework which is harmonised within the four pilot sites. It consists of a well-known and frequently used methodology for the development and realisation of ICT systems referred to as the V-model [DOC 3]. One of the most important benefits of using the V-model is that the validation activities are identified and specified from the start [DOC 4]. It also ensures a direct connection between the success criteria, the definition and execution of the tests, and the assessment of the impact. The same methodology can be used although the sites will have different functionality. The methodology will help to maximize the synergy between the sites in the evaluation phase.

The content of D4.1 derives from several research activities carried on in previous and on-going research projects, such as FESTA [DOC 5] and EuroFOT [DOC 13].

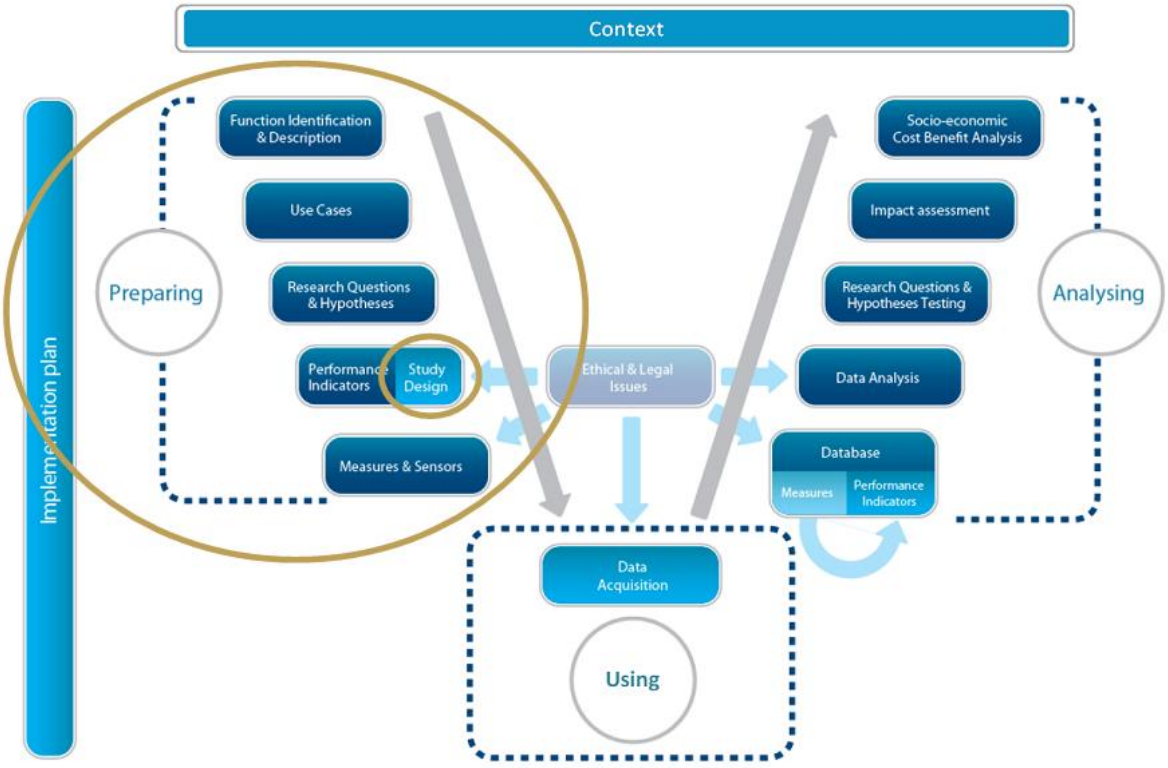


Fig. 1. FESTA-V model

A widespread point of view is that there is no optimal way to plan, run and analyse a pilot. Indeed, procedures have to be adapted from previous experience, such as FOT-projects, and literature to meet the needs of demonstration projects such as smartCEM and match the already available pilot site services, according to the

project objectives. As a starting point, it will be assumed that the process of establishing an evaluation framework can be described as a checklist of actions to be performed in order to outline a harmonised collaboration environment between project partners, as well as to define a common methodology and procedures to be followed at project, service and site level.

According to FESTA handbook [DOC 5], a possible list of actions to be performed in order to establish an evaluation framework is the following:

- Establish contact person within each pilot site to be contacted for evaluation purposes.
- Prepare evaluation guidelines.
- Prepare a template for the generation of evaluation criteria.
- Collaborate with WP2: Implementation for the definition of Use-cases.
- Turn Use-cases (from WP2: implementation) into validation scenarios (in WP4: Pilot Design and Evaluation)
- Prepare a master template for criteria generation at a site level, considering Gipuzkoa as a master.

2.1. Evaluation categories

The evaluation categories have been defined both at CIP and project level.

CIP level

The smartCEM project collaborates with other three CIP funded projects: ICT4EVEU [DOC 14], MOBI.Europe [DOC 15] and MOLECULES [DOC 16].

Deliverable 6.2: “Agreed set of indicators” (refer to smartCEM D6.2) is the result of an expert working group consisting of evaluation appointed representatives of each project discussing methods and high level indicators. The list of indicators is not intended to be the final set of indicators, but rather the best starting point based on current knowledge and experience. It is expected that the indicators will be improved and refined during the course of the project. It is intended to identify as many of the relevant areas possible, but will not be necessarily implemented at every site. Selected indicators relevant for the service at the site will be used to ensure the effective use of resources in the project.

The following list illustrates the evaluation categories that have been defined at CIP level:

- **Environment**: The goal of this category, in the context of the CIP pilots, is to

contribute to achieve the EU Climate Objective 20-20-20: 20% reduction in emissions, 20% renewable energies and 20% improvement in energy efficiency by 2020. The Environmental evaluation category will assess the carbon emissions from the electro-mobility sector taking into account the origin of the electric energy and the charging events.

- **Transport & Mobility**: In the high level context of the CIP demonstration activities (projects) the main objective of this category is twofold: (i.) to substitute conventional car sharing trips by electric vehicle trips supported by (ii.) the promotion and highlighting of environmental advantages and easiness-to-use of electro mobility for daily routines in urban and sub-urban contexts.
- **User Uptake**: User Uptake evaluation category is here defined as how drivers make use of the CIP pilot services, invest in them, trust and accept them.
- **Economic (business case)**: To enable the development of international business models it is necessary to ensure the financial flow between different operators. The system has to be designed based on technologies and management systems and they have to be evaluated. The most important evaluation is based on the usage.

smartCEM project level

Evaluation categories and high-level electro mobility performance indicators have been defined and selected specifically within smartCEM.

At the project level, four evaluation categories for the performance indicators have been defined:

- **Environment**: This category focuses on environmental impacts of the transportation system on other traffic participants. Example is carbon emissions. The carbon emission calculations will additionally take into account the origin of the electric energy and the charging events.
- **Transport & Mobility**: Transport mobility specifies road users' attitudes, opinions and choices concerning travel behaviour such as trip decisions, choice of mode of transport, choice of route or the amount of travelled kilometres, travel time, travel delays, vehicle speeds and traffic density.
- **User Uptake**: User uptake is defined as how drivers make use of the smartCEM services, invest in them, trust and accept them [DOC 10]. User uptake is hereby specifically related to aspects of the amount of knowledge and awareness about the intended impact of the implemented services and the compliance with the functions of the services [DOC 7]. Additionally,

usefulness and satisfaction with the services [DOC 6] are relevant influences on user uptake as well as trust in the impact and functionality of the services as well as the willingness-to-pay [DOC 8] or acceptable business models.

- **Driver Behaviour**: This category is related to changes in individual driving behaviour, such as acceleration and braking behaviour.

It is foreseen, throughout the project life, to establish additional evaluation categories for deployment, such as interoperability, economic, policy, social, strategic, commonality, etc. For more details on the evaluation categories and indicators, refer to deliverable D4.2.

2.2. *smartCEM Evaluation approach*

The validation approach for the smartCEM project is based on the FESTA methodology [DOC 5]. However, this methodology has been adapted for the smartCEM project, mainly, because of FESTA methodology is defined for Field Operational Test, and smartCEM is a demonstrator project, i.e. pilot type project. The smartCEM methodology is structured in three main phases (see Fig. 2), i.e. *definition*, *evaluation* and *deployment*.

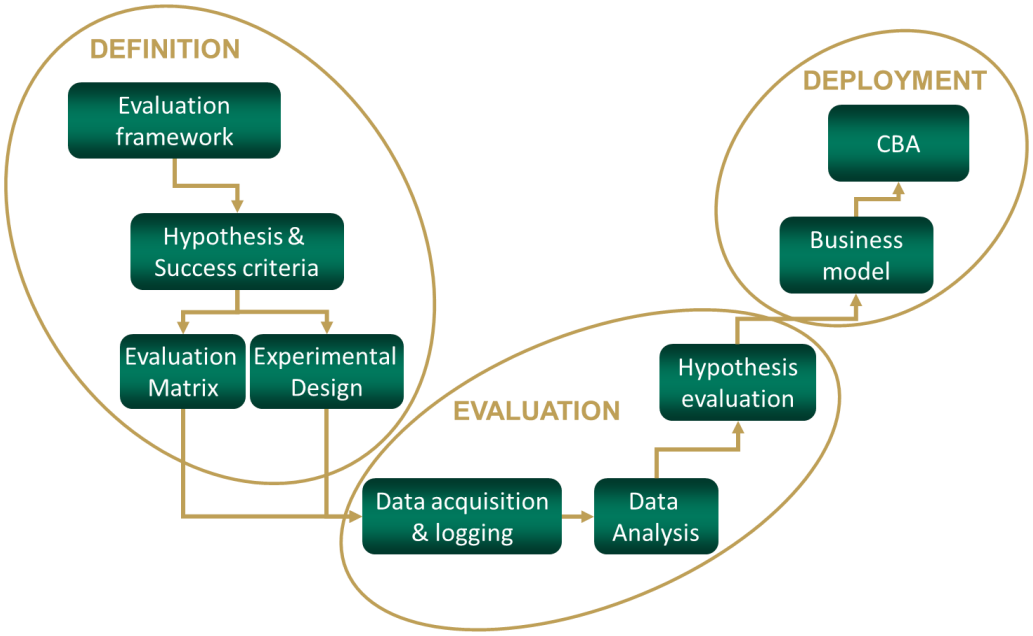


Fig. 2. smartCEM evaluation approach

- Definition phase is a process that establishes the evaluation criteria, evaluation scenarios and test cases, services to be validated and test sites where these services will be implemented and evaluated (together with vehicle demonstrators and infrastructure required for the tests). In smartCEM this includes *T4.1 Evaluation framework*, *Task 4.2 Evaluation criteria and*

performance indicators and *T4.3 Specification of the experimental design*.

The main outputs of this phase are:

- **Evaluation Matrix**: matrix containing the required information when defining the evaluation criteria. Each pilot site will be able to fill in this matrix by following the evaluation criteria generation process proposed in the definition phase. The evaluation matrix is also linked to the other output of this phase, the experimental design.
- **Experimental design**: table containing the definition of the set of evaluation scenarios, i.e. the process to be followed in order to evaluate the smartCEM services under different situations. The evaluation test cases, the test methods to be used, the situational variables and control factors, the data to be logged, the timeline for baseline and functional operation execution, among other information constituted in the experimental design.

- Evaluation phase includes the baseline and the functional operation of the services on the pilot sites, i.e. data acquisition, logging and analysis of the required measures, in order to calculate the indicators, and therefore be able to evaluate the hypotheses. WP4 tasks involved in this phase are *T4.4 Tool development* and *T4.5 Data analysis*. As well, this phase is linked to smartCEM WP3 tasks: *T3.3 Established Baseline* and *T3.4 Functional operation*.

  As a consequence, the main outputs of this phase are:

  - **Logged and analysed data of each pilot site**: the obtained indicators during baseline and functional operation for comparison.
  - **Hypothesis evaluation results**: the analysis carried out in order to evaluate if thresholds established by success criteria during the definition stage have been reached.

- Deployment phase. This phase provides evidences for the policy decision-makers and/or the stakeholders, on the advantages and disadvantages of smartCEM services by assessing their potential impacts. This phase is linked to WP6 tasks, mainly, with *T6.2 Business models*, *T6.3 Exploitation Plan* and *T6.4 Cost benefit analysis*. Nevertheless, it should be highlighted that all of the sites are different. As consequence, the approach of the framework and the methodology defined for the smartCEM project is done in a harmonised way; however, the pilot sites will have different business models and thus will inherently show different success and performance indicators.

Furthermore, legal and ethical aspects should be taken into consideration during the whole process.

Moreover, during the whole evaluation process, it should be taken into account that the representation of the smartCEM methodology in the form of a V does not mean that designing and performing is always a linear process.

Decisions made at a certain stage of the V-model influence the next steps and it is inevitable to sometimes go back and redo some steps. Especially, in the left-hand side of the V, iteration may be necessary. For example, one may find out that the measures and sensors available do not make it possible to investigate the hypotheses defined earlier, so adjustments to the hypotheses or indicators may be needed.

Additionally, the IMPACT ASSESSMENT stage of the V-model may influence the decisions to be made at the DEFINITION side. The question of the socio-economic impact may influence the definition of the use-cases, research questions or other elements of the DEFINITION side.

Regarding the resources available for data analysis (EVALUATION) may also lead to revision of DEFINITION side.

Consequently, the definition phase is not intended to generate the final set of hypothesis, indicators, and evaluation scenarios, but rather the best starting point based on current discussions, knowledge and experience, at the time execution in smartCEM. It is expected that the output of the definition phase, will be improved and refined during the course of the project, based on time and budget resources.

2.3. Evaluation process and smartCEM deliverables

Taking advantage of the V-model for evaluation explained in the previous section, the addressed deliverables are mapped to the evaluation stages in Fig. 3.and scoped:

- D4.1 Evaluation framework (the present document) describes the validation fundamentals, the methodology to be followed and an evaluation overview of the Pilot Sites
- D4.2 Evaluation criteria and performance, contains the validation matrix with definition of the smartCEM research questions, hypotheses and indicators for all the WP, including the performance indicators for the evaluation process.
- D4.3 smartCEM experimental design defines the sceenarios, more detailed tables for performance indicators and measures, and the more relevant issues regarding the data acquisition & logging, data analysis and HY evaluation (**evaluation stage)**

- D4.4 smartCEM assessment tools contains the description of specific tools developed as aids for the evaluation. Also updated measures table is included
- D4.5 Results of the evaluation. Applies what stated in the previous deliverables for the smartCEM data analysis and evaluation. Final results according to success criteria are included.

- WP6 deliverables address impact assessment stage, establishing deployment indicators (D6.2) looking for deployment barriers (D6.5), cost benefit analysis (D6.4), business model (D6.6) and exploitation (D6.7) and impact analysis and business model & deployment within **impact assessment stage** – are presented.

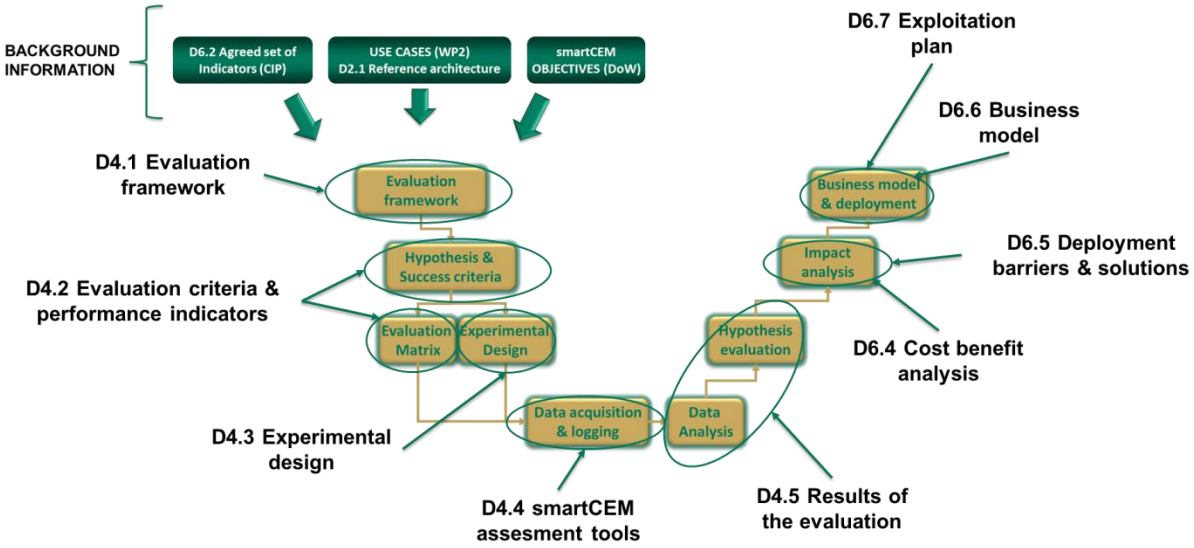


Fig. 3. Evaluation process and corresponding deliverables

Moreover, regarding the definition stage, it should be taken into account that the compiled information, thanks to the proposed templates within this document, will be updated during the smartCEM lifetime.

Some elements cannot be completely defined at the definition stage and only when the project outcomes are more mature, these pending elements can be detailed and updated.

3. Evaluation indicators generation

The results obtained when using the process explained within this chapter 3 will be part of the deliverable *D4.2: Evaluation criteria and indicators* (refer to smartCEM D4.2). Additionally, the information generated following this methodology during tasks T4.2 and T4.3, can be viewed as high level definition that will need to be specified further at a later stage in the project, when more information is available. Further on in the process, as it gets clearer what scenarios are foreseen, additional and more detailed information will be given for the evaluation categories. Then, the feasibility of testing new premises needs to be assessed, in terms of the needed data logging and data analysis efforts.

3.1. Evaluation indicators generation process

Along the following sections, all the information to generate the evaluation criteria is presented. These evaluation criteria will be established at project level, i.e. for the smartCEM project, and will be grouped under smartCEM evaluation categories (refer to section 2.1).

The top-down approach for determining the evaluation criteria has to match the bottom-up approach resulting from the analysis of smartCEM project resources, technologies and constraints. The following tasks are necessary in order to bring together the evaluation objectives:

- Research questions establishment. Relevant research or deployment objectives are the basis for Research Questions (RQ) formulation (refer to **Table 3**)
- Hypotheses and success criteria definition. RQ lead to hypotheses (refer to **Table 4**) and success criteria (refer to **Table 5**) formulation. Success criteria establish the thresholds for indicators.
- Indicator definition, which connect evaluation objectives with available sensors and measures or resources (refer to **Table 6**).

Within the smartCEM project, evaluation indicators are clustered into four groups (see also deliverable D4.2):

- Progress indicators (PRO): used to evaluate whether the implementation progress of the services follows the plan.
- Awareness indicators (AWA): used to evaluate the public awareness of the project itself or of the smartCEM services.
- Performance indicators (PI): used as evaluation criteria to determine

the performance or impact of smartCEM services.

- Deployment indicators (DEP): aimed to evaluate the viability, sustainability and scalability of the smartCEM services after the end of the project.

- Scenarios definition, which connects evaluation objectives, services, situations and vehicle/infrastructure demonstrators available at the pilot sites (refer to D4.2). Scenario definitions describe exactly how the services should be functioning at the site. What the user/driver can/could expect from the service.

Based on background information, smartCEM use cases and objectives (refer to deliverable D2.1), and also taking into account the group of indicators to be generated, the following schemas (view **Fig. 4**, **Fig. 5**, **Fig. 6**) give an overview on the description of the steps to follow when generating the evaluation criteria.

In case of **Progress indicators** (PRO) and **Awareness indicators** (AWA), these steps are: definition of the success criteria (threshold to establish if PRO and AWA indicators are successfully achieved) based on background information available at DoW (refer to smartCEM DoW) Progress indicators (PRO) are used to evaluate whether the implementation progress of the services follows the plan.

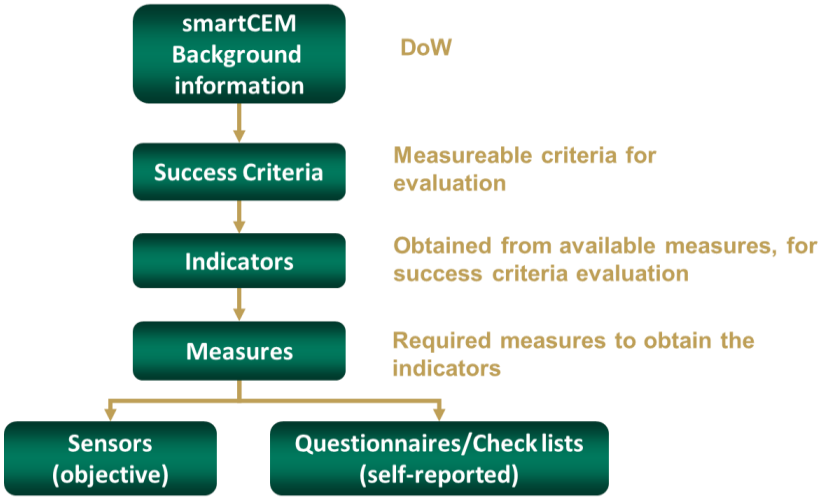


Fig. 4. smartCEM evaluation criteria generation approach for PRO and AWA indicators

In case of **Deployment indicators** (DEP) the steps to follow are: definition of DEP indicators' evaluation categories, taking into account the smartCEM deployment enablers and objectives, → if possible, establishment of the success criteria. Due to the nature of this type of indicators, sometimes will not be possible to establish the success criteria previously → definition of DEP indicators → definition of required measures to evaluate the DEP indicators and sources to obtain them.

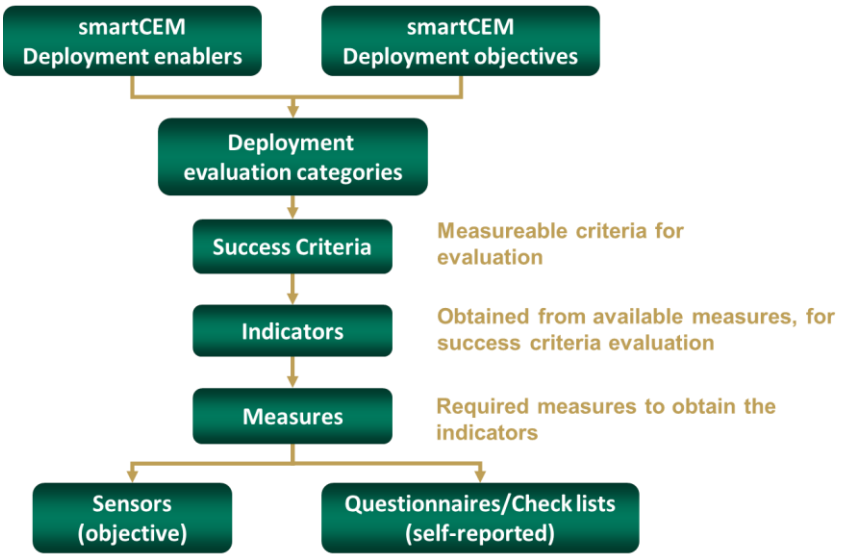


Fig. 5. smartCEM evaluation criteria generation approach for DEP indicators

Finally, in case of **Performance indicators** (PI) the evaluation criteria generation approach is based on FESTA methodology. The steps to follow are: definition of PI indicators evaluation categories, taking into account the smartCEM background information, → definition of Research Questions → establishment of the hypotheses and success criteria → definition of PI indicators → definition of required measures to evaluate these indicators and sources to obtain them.

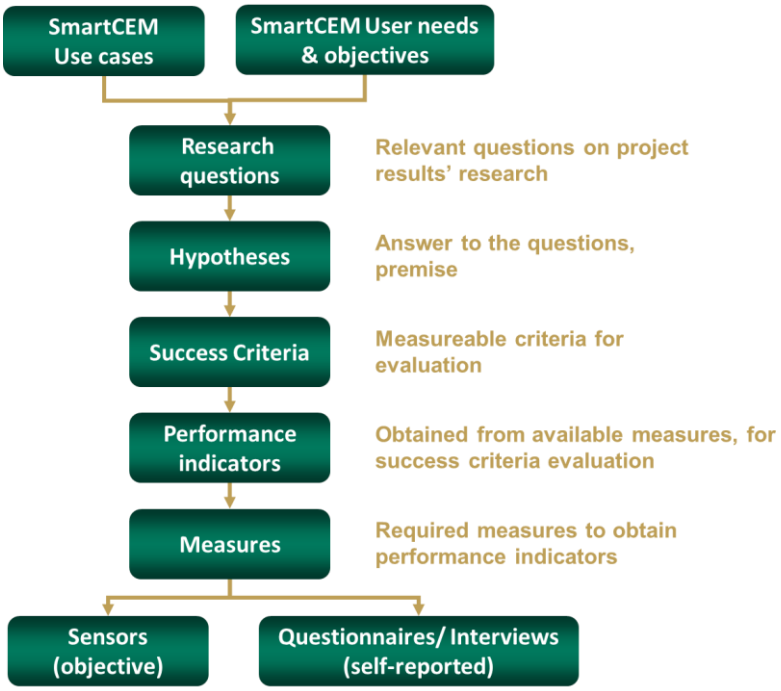


Fig. 6. smartCEM evaluation criteria generation approach for PI indicators

The following sections present the definitions and best practices to generate the evaluation indicators, in order to finish the definition phase. As well, when required, the templates to produce this information are given, in order to generate the needed information of pilots in a harmonized way.

Research questions

Table 3. Research question (RQ) generation

Definition	A research question is a statement of what the researcher wants to discover or prove.

Best practices	• Should be not too broad or not too narrow.
	• A guiding syntax could be: Will <service(s) or system> that gives <feature> lead to <effect> on <something or somebody>?, where:
	  • <service(s) or system>: any object of validation in the project.
	  • <feature>: specific characteristic of application/system
	  • <effect>: In this kind of projects they are normally formulated as positive effects and related to main objective categories (environment, mobility, etc.).
	  • <something or somebody>: the target of the benefit

Example	Category User uptake: Do the smartCEM services contribute to increase the users' willingness to pay for EV services? Category Environment: Does the EV-CarSharing service, together with EV-CP management, EV-navigation and EV-trip planning services reduce energy consumption?

Hypothesis

Table 4. Hypothesis (HY) generation

Definition	The hypothesis (HY) is formulated as an answer to a RQ and contains a specific and testable prediction (which can be confirmed or rejected) about the relationship between two variables.
Best practices	• A well thought out and focused RQ leads directly to a (number of) HY. • For approving the hypothesis a related performance indicator is needed. Thus, it is recommended to define the performance indicator(s) directly when defining the hypotheses.

	• The identified indicators should be feasible to obtain (in terms of what to measure, at reasonable costs, etc...). • The hypothesis is tested with a success criterion (SC), through which the evaluation of the hypotheses is examined. Preferably, the success criterion is expressed in a quantitative way (e.g. a certain percentage change) Note that sometimes the enunciation of the hypothesis could be very close to the RQ
Example	Category User uptake: SmartCEM services will increase users' willingness to pay for EV services Category Environment: The EV-CarSharing service together with EV-CP management, EV-navigation and EV-trip planning services will contribute to reduce the CO_2 emissions, derived from the energy generation

Success criteria

Success criteria generation is a top-down process that moves from high level inputs such as services and project research/deployment challenges, to specific criteria and indicators that will make evaluation feasible. Success criteria can be very specific, e.g. an absolute value or percentage or more broad such as an orientation for an expected outcome. Specifications will either be a comparison to the baseline or to a value, obtained from previous projects/data, experience or expert judgement. It is foreseen that there will be cases in which success criteria cannot be determined due to a lack of reasonable information and data.

All indicators need the corresponding success criteria. However, in case of deployment indicators, in general, these thresholds cannot be established beforehand and they should be defined nearer to the end of the project. These criteria establish the thresholds to determine if the hypotheses and objectives have been achieved.

Table 5. Success criteria generation

Definition	The success criteria (SC) establish quantitative or qualitative thresholds for indicators, normally expressed as rates, percentages or indexes according to which hypotheses or thresholds can be evaluated as true or false.
Best practices	Within smartCEM project the defined success criteria can be of very different natures. In general terms, there are two possible scopes of comparison: • **Comparison to baseline**: a comparison is made of an indicator in a situation in which the smartCEM services are operational versus a situation where no smartCEM services

	operate, i.e. the existing situation. • **Comparison to value**: the indicator has to reach a certain value, which is reasonably defined in previous work. However, in case of PRO indicators, the success criteria will be a figure or percentage that should be achieved in a certain month during lifetime of the project. As well, some of success criteria related to DEP indicators will have been established during the definition stage, and they should be defined or updated through probe-error tests.
Example	**Success criteria for PRO indicator examples:** • Number of vehicles in GIP pilot site: Year 1 →19, Year 2 →24 (+5), Year 3 → 30 (+6). At the end of project 30 in total • Number of CP in NEW pilot site: Year 1: 200, Year 2 → 700 (+500), Year 3 → 1000 (+300). At the end of the project 1000 in total **Success criteria for AWA indicators examples:** • Number of project contacts: more than 500 at the end of the project. • Number of scientific publications: more than 8 at the end of the project. **Success criteria for PI examples:** • Category User uptake: User's willingness to pay for EV service will increase by 15% after using smartCEM services • Category Environment: The CO_2 emission reduction due to energy generation is estimated to be > 10% **Success criteria for DEP indicators examples:** • Category interoperability: number of synchronized payment-schemes at least 3 • Category economic: user willingness-to-pay for urban mobility without individual car > €6 (compared to public-transport/taxi)

Indicators

This section presents the classification for the proposed indicators which could be used to measure the progress towards the achievement of the project's objectives at different stages throughout smartCEM's lifetime, i.e. implementation, operation, evaluation, dissemination and smartCEM deployment.

Indicators are clustered into the following groups: *progress indicators* (PRO), *performance indicators* (PI), *awareness indicators* (AWA) and *deployment indicators* (DEP).

Table 6. Indicators generation

Definition	**Progress indicators** (PRO): used to evaluate whether the implemented services are implemented. These indicators are related to *implementation* (WP2: completion of the integration and adaptation of all components necessary for the relevant pilot sites) and *operation* (WP3: undertaking of trials and collection of measurements in the pilot sites). A set of proposed PRO indicators are listed in the DoW and are updated every QMR by the pilot site leaders.
	Performance indicators (PI): parameters which are derived from quantitative or qualitative measurements. They can be defined as a percentage, index, rate or absolute value. PIs are used as evaluation criteria to determine the performance or impact of the candidate system(s) or service(s) and for comparisons. This kind of indicators allows measuring how well smartCEM services are doing they are expected to do. Related to the operational phase in WP3 and to evaluate the implemented services in WP4 based on research questions.
	Deployment indicators (DEP): aimed to evaluate the viability, sustainability and scalability of the smartCEM services after the end of the project and the European Community funding.
	Awareness indicators (AWA): used to evaluate the public awareness of the project and are therefore linked to WP5 dissemination activities. A set of proposed AWA indicators are listed in DoW and are updated every QMR by the pilot site leaders.
Best practices	During the process of developing hypotheses and the success criteria, it is important to choose appropriate indicators that will answer the hypotheses and are achievable within budget or any other limitations of the project. The calculation of performance and deployment indicators has to consider external influences, such as situational variables, e.g. weather conditions or traffic flow; or, control factors, parameters that have to be controlled during the test of the hypothesis to ensure that these factors do not disturb the comparability, e.g. the same public transport bus line. Next, the required measures for measuring each indicator shall be listed.
Example	<u>PRO indicator examples:</u> • Number of vehicles in GIP pilot site, and the **measure** and **source** are total number of vehicles per year and self-created check list, respectively. • Number of CP in NEW pilot site, and the **measure** and

	source are total number of CP per year and self-created check list, respectively. **AWA indicators examples:** • Number of project contacts, i.e. number of subscribers to newsletter and the **measure** and **source** are total number of subscribers and mean scores of self-created questionnaire, respectively. • Scientific impact, i.e. number of publications and the **measure** and **source** are total of scientific publications and self-created check list, respectively. **PI indicators examples:** • Category User uptake: Willingness to pay (in %) and the **measure** and **source** are Willingness Questionnaire and self-created questionnaire, respectively. • Category Environment: Energy consumption per trip, and the **measures** and **sources** are Consumed energy, Duration, Date and time and the Energy mix; and different sensors, respectively. **DEP indicators examples:** • Category Interoperability: Number of payment-schemes and the **measure** and **source** are Pilot-site report on implementation and the report itself, respectively. • Category Economic: Average expected profit - CO_2 emissions, and **measure** and **source** are benefit estimation and a derived measure, respectively.

Measures and sensors

In order to obtain the resulting value of a certain indicator, a number of measures are required to derive the PI value. There is a need to make a distinction at this point between: measure and sensor.

- A measure can be logged directly from a sensor, read from a simulation or derived from other measures
- Sensors indicate how measures will be collected. They can be independent elements or part of system hardware or also, an internal procedure within simulation software, for instance in smartCEM, measures obtained as a result of the CO_2 estimation simulation tool.

Furthermore, in order to derive an indicator from a measure, a measure can be:

- A required measure (REQ ME): measures required to obtain directly the pre-defined indicators

- An acquired measure (ACQ ME): means the available measures that will allow to calculate the REQ ME, and finally, the indicator

Measures can have different categories and the integrity of the measurement during the operational process should always be guaranteed. For the first aspect on measure categories, the FESTA handbook [DOC 5] makes the following categorization:

- **Direct (raw) measures**: a direct measure is logged directly by a sensor, without any processing before saving the data to the log file. Linear transformations like the conversion from m/s to km/h are not considered to be processing. During the definition of the type of measurement, it must be taken into account that depending on the nature of the acquisition, a measurement may be direct or not. For example, longitudinal acceleration is a direct measure if logged directly from an accelerometer, but not if derived from collected speed and time.

- **Derived (pre-processed) measurements**: a pre-processed measurement is not directly logged by a sensor, but a variable that has been filtered or one which is a combination of two or more direct or derived measurements.

- **Events**: events can be seen as peculiarities based on direct and/or derived measurements. They can be short in time, like emergency breaking, or extended over a longer period of time, such as an overtaking manoeuvre. One or several preconditions must be fulfilled for an event to be classified as such, that is, one or more 'trigger' criteria must be exceeded.

- **Self-reported measurements**: this kind of measurement is obtained from questionnaires, interviews, rating scales or check lists. The measurements related to self-reported indicators could be the answer to each single question or the checks on the rating scale, while the 'sensors' would be the questionnaires or rating scale themselves.

  Note: In case of smartCEM project, at the time of writing the report when an indicator needs to be evaluated using self-reported measures, these could be questionnaires, in case of deployment or performance indicators, and check lists in the case of progress and awareness indicators.

- **Situational variables**: give information on current external surrounding and external influences during the testing period that may affect the results. Situational variables are an aid to understand results and can be logged like direct measures or computed like derived measurements. They can also be self-reported measurements or events. In any case, all relevant situational variables have to be measurable continuously. Example: weather or road friction factor.

- **Control factors**: determine the parameters that have to be controlled during the test of the hypothesis to ensure that these factors do not disturb the comparability, e.g. same public transport bus line.

In order to guarantee integrity of the measurement during the operational process, the following concepts (Source FESTA Handbook, [DOC 5]) must be taken into consideration:

- **Completeness**: Disregarding significant (but perhaps unexpected) indicators can very easily occur when the limited resources are concentrated on measuring only the indicators regarded as most important or easiest to measure. Therefore, totality of the measures should be assured and choices made regarding this should be reported.
- **Repeatability and reproducibility**: The measurement process should guarantee that variability of the measurements obtained by one person or process, while measuring the same item repeatedly (repeatability) and the variability of the measurement system caused by differences in operator behaviour (reproducibility) will be within an admissible range. It means that the ability of a test or experiment to be accurately reproduced, or replicated, must be ensured.
- **Disturbance of evaluation**: Special countermeasures have to be taken, in order to avoid the effect of potential disturbances introduced during the evaluation phase.

3.2. Evaluation Criteria generation templates

This section brings together the proposed templates to be used when generating the evaluation criteria, i.e. when filling in the evaluation matrix. Each pilot site will need to fill in this matrix which includes a set of tables.

The main tables are: Success criteria, Indicators and Measures and Sources table.

Table 7. smartCEM success criteria generation template definition

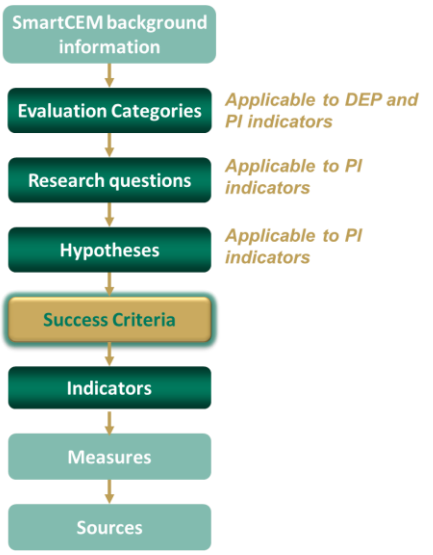
SUCCESS CRITERIA	
This table contents the list of success criteria, together with: research questions and hypotheses (in case of PI), and all referred indicators, classified under the indicator groups, i.e. progress indicators (PRO), awareness indicators (AWA), deployment indicators (DEP) and performance indicators (PI) (refer to Annex 1).	

Table 8. smartCEM indicators generation template definition

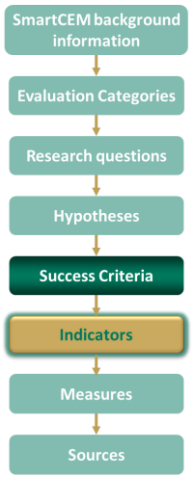
INDICATORS	
The content of this table is the list of indicators for the different groups, addressing a certain hypothesis (if necessary) and required measures to obtain each indicator. (refer to Annex 2)	

Table 9. smartCEM measures and sources generation template definition

MEASURES AND SOURCES	
The content of this table is the definition of all required measures, addressing a certain measure category (direct, derived, self-reported) and referred source of this measure: sensors, acquired measures, questionnaires or check lists. (refer to Annex 3)	

Furthermore, it should be taken into account that the compiled information, thanks to these templates, will be updated during the smartCEM lifetime, and some parts cannot be completed until the end of the definition stage.

3.3. Evaluation Criteria generation example

Within this section, an example of how to use and how to generate the Evaluation criteria for smartCEM project is given. The example consists of four pictures extracted from the Evaluation Matrix proposed templates. First one is the Success Criteria generation template (view **Fig. 7**), where all indicators are defined. The second one is the indicators template (view **Fig. 8**), where measures are described, the third one is the table where measures and their referred sources are given (view **Fig. 9**). Finally, the last one is the EM summary (view **Fig. 10**) where previous information can be reviewed at a glance.

There are two examples of indicators for each group, i.e. two progress indicators (PRO), two awareness indicators (AWA), two performance indicators (PI) and, finally, two deployment indicators (DEP).

Performance indicator Evaluation Category	Deployment indicators Evaluation Category	Research Question / Deployment Question	Hypothesis	Success Criteria	Indicator group	Indicator ID	Indicator Name
1) Environment 2) Transport and mobility 3) User uptake 4) Driver behaviour					*Progress indicator Performance indicator Deployment indicator Awareness indicator*	*PRO_SITE_# PI_SITE_# DEP_SITE_# AWA_SITE_# <SITE NAMES: New Castle - NEW Gipuzkoa - GIP Barcelona - BCN Turin - TUR>*	
N/A	N/A	N/A	N/A	N/A	Progress	PRO_GIP_01	Number of EV Carsharing vehicles/per year
N/A	N/A	N/A	N/A	N/A	Progress	PRO_GIP_02	Number of CP/per year
Environment	N/A	Do the EV-CarSharing service, together with EV-CP management, EV-navigation and EV-trip planning services reduce the energy consumption?	The EV- CarSharing service togheter with EV-CP management, EV-navigation and EV-trip planning services will contribute to reduce the energy consumption	The energy consumption reduction is estimated to be > 10%	Performance	PI_GIP_01	Energy consumption per trip
User uptake	N/A	Do the smartCEM services contribute to increase the users' willingness to pay for EV services?	SmartCEM services will increase users' willingness to pay for EV services	An increment of 15% after using smartcEM services	Performance	PI_GIP_37	Ex-ante Willingness to pay (in %) Expost Willingness to pay (in %)
N/A	Interoperability	N/A	N/A	comparison to value; number of synchronized payment-schemes at least 3	Deployment	DEP_GIP_01	Number of payment-schemes
N/A	Economic	N/A	N/A	comparison to value; benefits in € are at least XXX	Deployment	DEP_GIP_02	Average expected profit - CO2 emissions
N/A		N/A	N/A	N/A	Awareness	AWA_GIP_01	Published results on websites
N/A		N/A	N/A	N/A	Awareness	AWA_GIP_02	Scientific impact

Fig. 7. smartCEM Success Criteria generation example

Indicator group	Indicator ID	Indicator Name	Description	Unit	Subjective/ Objective	Qualitative/ Quantitative	Comments	Required measures		Equation	Rationale
								REQ ME_ID	REQ ME Name		
Progress indicator Performance indicator Deployment indicator Awareness indicator	*PRO_SITE_# PI_SITE_# DEP_SITE_# AWA_SITE_# <SITE NAMES: New Castle - NEW Gipuzkoa - GIP Barcelona - BCN Turin - TUR>*		*Illustrative description of the indicator*				*Comments on the indicator*	*Unique ID identifying the required measure*	*Basic name of the required measure*	*Equation used to calculate indicator*	*If required, literature reference*
Progress	PRO_GIP_01	Number of EV Carsharing vehicles per year	Number of EV vehicles	Unitless	Objective	Quantitative		REQ ME_01	Number of EV availables	N/A	N/A
Progress	PRO_GIP_02	Number of CP per year	Number of NEW CP	Unitless	Objective	Quantitative		REQ ME_02	Number of NEW CP		
Performance	PI_GIP_01	Energy consumption per trip	amount of KW consumed per trip	kW per trip	Objective	Quantitative		REQ ME_03 REQ ME_04 REQ ME_05 REQ ME_06	Consumed energy Duration Date and time Energy mix		
Performance	PI_GIP_37	Ex-ante Willingness to pay (in %) Expost Willingness to pay (in %)	Willigness to pay certain amout of money for using service/ EV-car-sharing / EV-Bus	%	Subjective	Qualitative		REQ_ME_07	QT-Willingness Questionnaire	Self reported (questionnaire item)	
Deployment	DEP_GIP_01	Number of payment-schemes	Number of payment-schemes	Unitless	Subjective	Qualitative		REQ ME_08	Pilot-site report on implementation		
Deployment	DEP_GIP_02	Average expected profit - CO2 emissions	The benefit calculated in € based on the performance indicators of fuel savings, CO2 emission reduction and time savings.	%	Objective	Quantitative		REQ ME_09	Benefit estimation	Derived from benefits due to e.g. fuel saving, CO2 emission reduction, time saving	
Awareness	AWA_GIP_01	Published results on websites	Number of published results on different websites (for GIP: annually in municipality websites)	Unitless	Objective	Quantitative		REQ ME_10	Number of website publications		
Awareness	AWA_GIP_02	Scientific impact	Total number of publications until the end of the smartCEM project	Unitless	Objective	Quantitative		REQ ME_11	Number of publications		

Fig. 8. smartCEM Indicators generation example

Measure_ID	Measure name	Description	Unit	Measure Category	Pilot Site				Measure Source								Reviewers	Comments
	The name of the measure.	*Description of this measure.*	*Standard unit that applies to the measure. Use preferably SI units.*	*Direct, Derived, Event, Self reported, Situational variable, Control Factor*	*NEWCASTLE*	*GIPUZKOA*	*BARCELONA*	*TURIN*	*Sensor_ID*	*SE name*	*ACQ ME_ID*	*ACQ ME name*	*Questionnaire_ID*	*QT name*	*Check list ID*	*CL name*	*Name andd ompany*	*Additional comments to the measure.*
REQ ME_01	Number of EV availables	Increased number of EV per year	Unitless	Self reported		x									CL_01	GIP site PRO CL		
REQ ME_02	Number of NEW CP	Increased number of CP per year	Unitless	Self reported		x									CL_01	GIP site PRO CL		
REQ ME_03	Consumed energy	Required energy to reload the batteries	kW	Direct		x			SE_01									
REQ ME_04	Duration	Time of charging	h	Direct		x			SE_02									
REQ ME_05	Date and time	Date and time	Unitless	Direct		x			SE_03									
REQ ME_06	Energy mix	For each country	Unitless	Direct		x			SE_04									
REQ ME_07	QT-Willingness Questionnaire	Willigness to pay certain amout of money for using service/ EV-car-sharing / EV-Bus	%	Self reported		x							QT_01	GIP site QT1				
REQ ME_08	Pilot-site report on implementation	Each pilot-site who has committed to implement the payment scheme reports after implementing it	Absolute Value	Self reported		x												
REQ ME_09	Benefit estimation	Total accumulated profit for a specified period (e.g. 0,5 years) derived from e.g. fuel savings, CO2 emission reductions, time savings translated into monetary benefits	€	Derived		x												
REQ ME_10	Number of website publications	Total number of website publications per year	Unitless	Self reported		x									CL_02	GIP site AWA CL		
REQ ME_11	Number of scientific publications	total number of scientific publications	Unitless	Self reported		x									CL_02	GIP site AWA CL		

Fig. 9. smartCEM Measures and sources generation example

Category	RQ	HY	SC	Indicator group	Indicator ID	Indictor Name	Measure_ID	Measure Name	Pilot Site			REQ ME Source		Reviewers	Comments
									NEW CASTLE	GIPUZKOA	BARCELONA TURIN	Source ID	Source name		
N/A	N/A	N/A	N/A	Progress	PRO_GIP_01	Number of EV Carsharing vehicles/per year	REQ ME_01	Number of EV availables		x		CL_01	GIP site PRO CL		
N/A	N/A	N/A	N/A	Progress	PRO_GIP_02	Number of CP/per year	REQ ME_02	Number of NEW CP		x		CL_01	GIP site PRO CL		
Environment	Do the EV-CarSharing service, together with EV-CP management, EV-navigation and EV-trip planning services reduce the energy consumption?	The EV- CarSharing service togheter with EV-CP management, EV-navigation and EV-trip planning services will contribute to reduce the energy consumption	The energy consumption reduction is estimated to be > 10%	Performance	PI_GIP_01	Energy consumption per trip	REQ ME_03	Consumed energy		x					
							REQ ME_04	Duration		x					
							REQ ME_05	Date and time		x					
							REQ ME_06	Energy mix		x					
User uptake	Do the smartCEM services contribute to increase the users' willingness to pay for EV services?	SmartCEM services will increase users' willingness to pay for EV services	An increment of 15% after using smartcEM services	Performance	PI_GIP_37	Ex-ante Willingness to pay (in %) Expost Willingness to pay (in %)	REQ ME_07	QT-Willingness Questionnaire		x					
Interoperability	N/A	N/A	comparison to value; number of synchronized payment-schemes at least 3	Deployment	DEP_GIP_01	Number of payment-schemes	REQ ME_08	Pilot-site report on implementation		x					
Economic	N/A	N/A	comparison to value; benefits in € are at least XXX	Deployment	DEP_GIP_02	Average expected profit - CO2 emissions	REQ ME_09	Benefit estimation		x					
N/A	N/A	N/A	N/A	Awareness	AWA_GIP_01	Published results on websites	REQ ME_10	Number of website publications		x					
N/A	N/A	N/A	N/A	Awareness	AWA_GIP_02	Scientific impact	REQ ME_11	Number of scientific publications		x					

Fig. 10. smartCEM Evaluation Matrix Summary example

4. Experimental Design Generation

The following sections provide guidance on the overall experimental design, in order to ensure experimental rigour and scientific quality.

The definition phase in such a project as smartCEM, a demonstration project, begins with the selection of the suitable indicators according to previous tasks defining RQ/DQ, HY and SC, and also considering the resources available. The experimental design is the further specification of the data assessment procedures and is the connecting point between the definition and evaluation phase. It is therefore also closely linked to the Evaluation Matrix, which contains the evaluation criteria (Fig. 11).

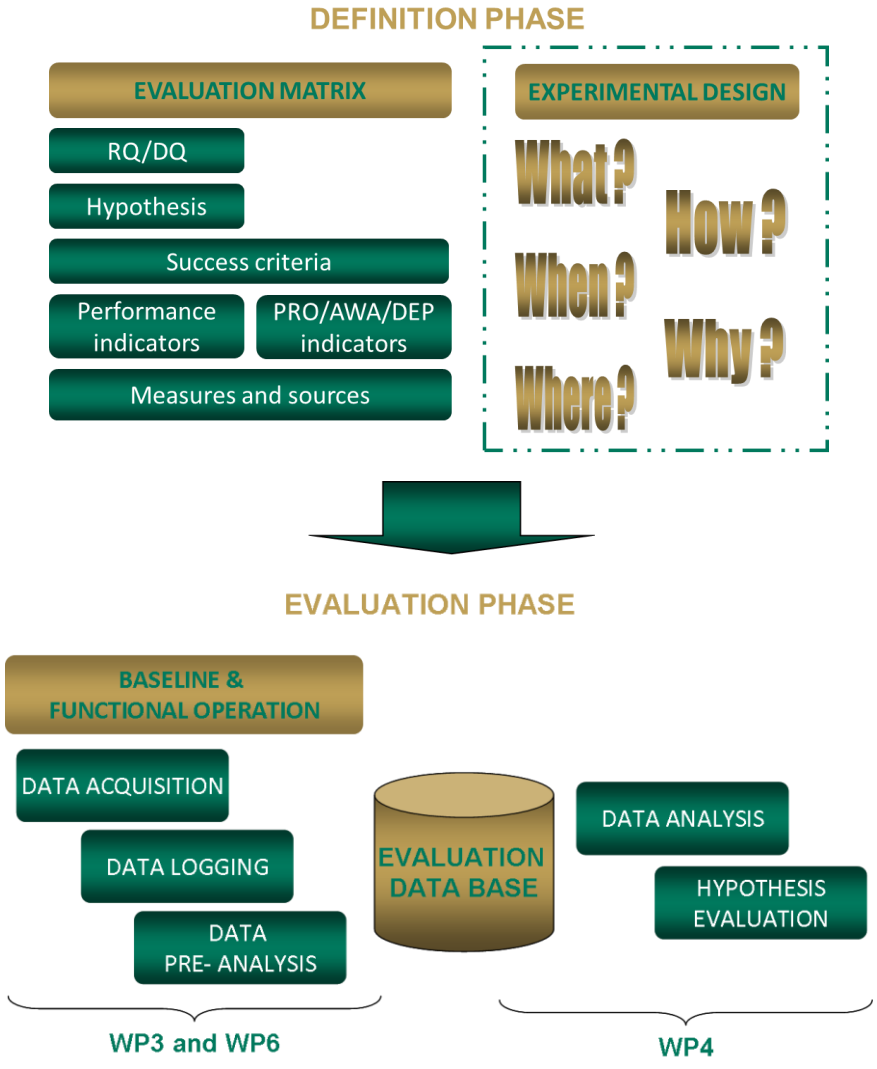


Fig. 11. smartCEM Experimental design, link between Evaluation Matrix and Evaluation phase

During the experimental design definition, the evaluation data base should be defined, i.e. when the available data to be logged is well-defined, the data type and format within the evaluation database should be established.

In order to carry out the evaluation stage correctly, it is important to plan the timing of measurement of indicators for the functional operation of the services and baseline. The details of how this is intended to be performed in each pilot site where included in the experimental design definition.

It should also be taken into account that the reliability of the statistical conclusions is closely related to the number of samples. The more samples are provided by the sites, the more reliable results from statistical analysis will be obtained. In some cases budget, technical or organizational constraints will define the number of samples that can practically be recorded. Nevertheless, the pilot sites aim to provide the maximum number of samples per parameter within this study.

After acquiring the data and recording them in the database, all the information will be uploaded to the evaluation FTP server. All the details for uploading this information by the pilot sites will be provided in the deliverable *D4.3: smartCEM experimental design*, output of task *T4.3: Specification of the experimental design*.

4.1. Experimental design fundamentals

When designing the experiments in order to validate the formulated hypothesis, it should be taken into account that the smartCEM is a pilot demonstration project. It is then necessary to define the suitable test methods and validation environments in order to cover the project needs. Test methods have to be selected according to the validation objectives and also available resources.

The more relevant test methods for smartCEM project are listed below:

- **Field trials:** The field trial definition implies the testing of applications under real conditions, in order to identify and evaluate the technical and/or non-technical benefits of these services prior to marketing. Within the smartCEM project, the field trials will be performed in pilot sites which include public roads that represent typical driving environments, such as an interurban (Gipuzkoa site) and urban road network (Barcelona, San Sebastian, Reggio Emilia and Newcastle pilots). The activities carried out in the field trial will be observation (how the systems and/or drivers react), interviews (does the system work sufficiently well in the real driving context) or measurements (is the signal strength sufficient to broadcast the messages).
- **Subjective assessment methods (interviews/questionnaires):** Drivers, other road users and end-users should be carefully considered within smartCEM

evaluation, as working with human beings is different from working with technical systems and ethical issues have to be considered.

The use of interviews/questionnaires is suitable for collecting systematic information on personal opinions, knowledge and behaviour. For ensuring the validity of acquired data, a wide range of standardised tools is available. The use of these pre-defined questions, answers or scales simplifies the analysis of results, as well as facilitating their comparability.

Depending upon the research questions, there is often a need to select a particular group of participants and ensure that this group is in some way representative of those drivers who will ultimately interact with the system.

Pilot site leaders are recommended to define (and report) a list of criteria for selecting the participants for their tests.

During the selection of test participants, the types of variables that should be taken into account include:

- **Demographics variables**, such as age, gender, social economic variables, and permanent or temporary driver impairments.
- **Driving experience**, in general but also experience with various systems, accident history, mileage per year and the usual time of driving and roads used.
- **Personality and attitudes**, such as driving style, i.e. sporty-driver or completely eco-driver, or their attitudes towards road safety issues.

Regarding the sample size, it should be carefully selected, due to the fact that the smartCEM project should be able to assess the functionality of the smartCEM services, i.e. ITS systems, and their impact on the driver behaviour, traffic and mobility and environment.

Consequently, when the chosen sample size is too small, it is difficult to statistically prove effects of the services that are actually there. However, there are two major disadvantages on just using a very large sample sizes, i.e. every driver/participant needs a car equipped with the smartCEM services and with a data logging system, which is expensive; and small effects which are statistically significant might be found, but they might not be relevant (source FESTA handbook [DOC 5]). As a consequence, in order to ensure that the chosen sample size is representative for the behaviour of a group of drivers and that it is possible to statistically prove effects that are there, statistical power analysis is needed to calculate the desirable sample size. Power analysis can either be done before (a priori or prospective power analysis) or after (post hoc or retrospective power analysis) data are collected. The statistical power analysis can be done a priori or post-hoc.

A priori power analysis is conducted prior to the research study, and is typically used in estimating sufficient sample sizes to achieve adequate power. Post-hoc power analysis is conducted after a study has been completed, and uses the obtained sample size and effect size to determine what the power was in the study, assuming the effect size in the sample is equal to the effect size in the population. Whereas the utility of prospective power analysis in experimental design is universally accepted, the usefulness of retrospective techniques is controversial. However, falling for the temptation to use the statistical analysis of the collected data to estimate the power will result in uninformative and misleading values.

4.2. Experimental Design generation process

After the definition of the evaluation indicators, success criteria, etc., the evaluation methodology has to be designed in detail which leads to the experimental design for the evaluation scenarios and test cases. Within this chapter, the experimental design generation process is presented together with the required templates, in order to produce experimental designs of all sites in a harmonized way. The result of following this process, i.e. definition of the experiments, will be included in the deliverable *D4.3: smartCEM experimental design*, output of task *T4.3: Specification of the experimental design*.

The *evaluation scenarios* at smartCEM, generally speaking, are site dependant, since they are based on the specific use cases of each site. Each scenario will group different use cases, representing pre-trip, on-trip and post-trip situations. The evaluation scenarios deal with EV (cars, and motorcycles) and hybrid buses sharing smartCEM services, i.e. EV-navigation, EV-efficient driving, EV-trip management, EV-charging station management, EV-sharing management (refer to smartCEM D2.1). With this arrangement, individual or several services can be evaluated over a specified period of time. The impact area is given at this scenario level.

Within the same evaluation scenario, different *evaluation test cases* can be produced. This means that a test case is a particular implementation of a scenario which differentiates from other test cases by the variation of one or more specific parameters, for instance, a combination of services or urban and interurban environments to be evaluated. The minimum number of times the evaluation test case should be produced to ensure statistical analysis robustness will set the *test runs*, which need to include baseline and functional operation. In the terminology of the smartCEM project, the baseline represents the existing situation and the functional operation is the situation when the smartCEM services will be running.

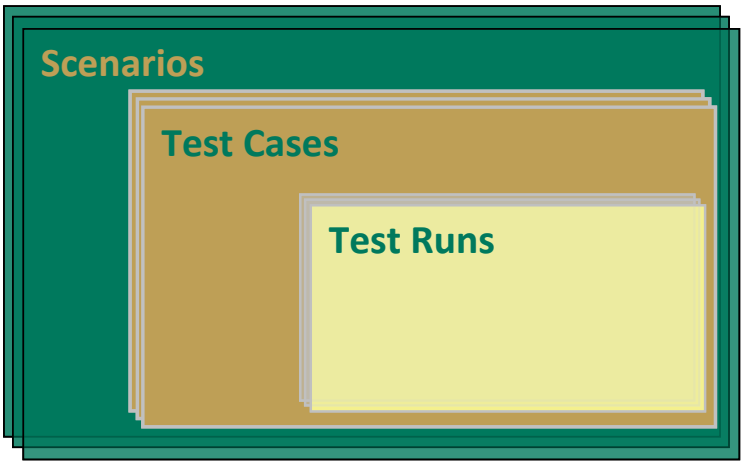


Fig. 12 smartCEM validation scenario breakdown

4.2.1. Experimental Design generation templates

This section presents the proposed templates to be used when defining the evaluation scenarios (view **Table 10**) and test cases (view **Table 11**). These templates could be adapted along the smartCEM project lifetime, at defined review points, such as the beginning of the base line or at the end of the base line recordings. The main objective of these templates is to ensure a common approach for the definition of the tests within all Pilot Sites involved in the smartCEM project.

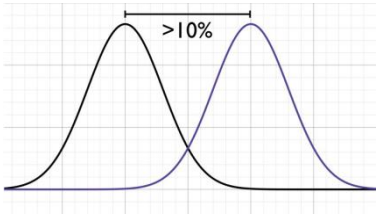
Table 10 smartCEM evaluation scenario template

Evaluation Scenario ID	*A unique ID for each scenario.* *Format: **ES_SITE_number*** *ES: Evaluation scenario;* *SITE: Newcastle → NEW, Barcelona → BCN, Gipuzkoa → GIP or Reggio Emilia → REG* *Number: correlative numbers, starting with 01.*
Name	
Description	*A brief description of the scenario*
Picture	*An scenario schema /picture*
Objective	
Evaluation Pilot site	*BCN, NEW, GIP, TUR*
Evaluation Category(s) of performance indicators	*<Environmental, Transport and mobility, User uptake, Driver Behaviour>*
Use case(s) covered	*Using the same nomenclature than deliverable D2.1*
Service(s) evaluated	*< EV-navigation, EV-efficient driving, EV-trip management, EV-*

	charging station management, EV-sharing management>

Table 11 smartCEM evaluation test case template

Evaluation Test Case ID	*A unique identification for each ETC.* *Format: **ETC_SITE_number*** *ETCS: Evaluation Test Case;* *SITE: NEW, BCN, GIP or REG* *Number: correlative numbers, starting with 01.*	
Name		
Description		
Belongs to ES	*Evaluation scenario ID and name*	
Responsible (Name and company)		
Participants partners		
Test Case evaluation criteria	*Sets of indicators and success criteria for the test case*	
Test Case Baseline	*Reference case, i.e. the existing situation.*	
Test procedure	*Description on how to perform the test, in order to log data or collect opinions provided by users (self-reported data) in a suitable way*	
Test setup	**Resources**	*Test resources - equipment, infrastructure and human resources - needed to perform the test, including services, components and core technologies (software) used and hardware description*
	Test method (s)	
	Test participant(s)	
	Test routes	
	Control factors	
	Situational variables	*are there, but influence the outcome*
	Measurements	*data to be logged (during baseline and functional operation)*
	Data to be sent in the log	*Specifying for baseline and functional operation.* *e.g. Baseline: the smartCEM services will be **switched***

	file	***off**, and the current services will be running. Other measures that could be influenced the results, i.e. situational variables should be measured during the tests, such as weather conditions.*
		*Functional operation: the smartCEM services will be **switched on**. In this case the same situational variables should be logged.*
	Assessment (inc. Picture or schema)	*e.g. using all samples, the mean value and the standard deviation of the parameter under evaluation is going to be calculated, both for baseline and functional operation. The resulting curves are going to be compared and the difference between both mean values should be greater than 10% in order to be able to say that the success criteria has been achieved.*  *Blue for baseline, Black for functional operation*
Test runs	*Minimum require number of times the test case needs to be repeated, in order to ensure statistical analysis robustness*	
Timing	**Date start baseline and duration**	*e.g. 01/11/2012, one week (twice each month)*
	Date start functional operation and duration	*e.g. 08/11/2012, one week, immediately after baseline's week (twice each month)*
	Information available at FTP	*e.g. once a month, results of two periods of baseline, together with two periods of functional operation.*
Comments		

5. Evaluation sites framework

This chapter contains two main sections. Section 5.1. is a short overview of the evaluation environment and a brief explanation of smartCEM pilot sites, taking into account WP4 perspective. Each pilot is described by a table containing the following information:

- Site description: a brief survey of what will be tested in the site, supported by a scheme that outlines the pilot structure (DoW)
- Main contacts: the list of each pilot partners, with their roles and responsibilities in the scope of the pilot
- Services to be implemented: the list of the smartCEM services that will be implemented at the site (refer to D2.1)
- Use cases: the list of all the use cases that will be tested at the site (refer to D2.1).

Most of these contents are available in a more detailed version in other project documents, as the aim of this paragraph is to gain a synoptic view of what will be evaluated in WP4.

Finally, section 5.2. is an overview of the framework of the evaluation indicators, in order to facilitate the obtaining of overall conclusions at the end of the project, independently of the nature of smartCEM pilot sites, which have complete different approaches.

5.1. Evaluation environment

The four pilot sites involved in smartCEM have their own features and characterization as can be seen in Table 12.

Table 12 Pilot sites overview

	Barcelona Pilot Site	Gipuzkoa Pilot site	Newcastle Pilot Site	Reggio Emilia Pilot Site
Environment	Urban (3,5 mill. inh.)	Urban (150.000 inh.), interurban	Urban, interurban, semi-rural	Urban (170.000 inh.)

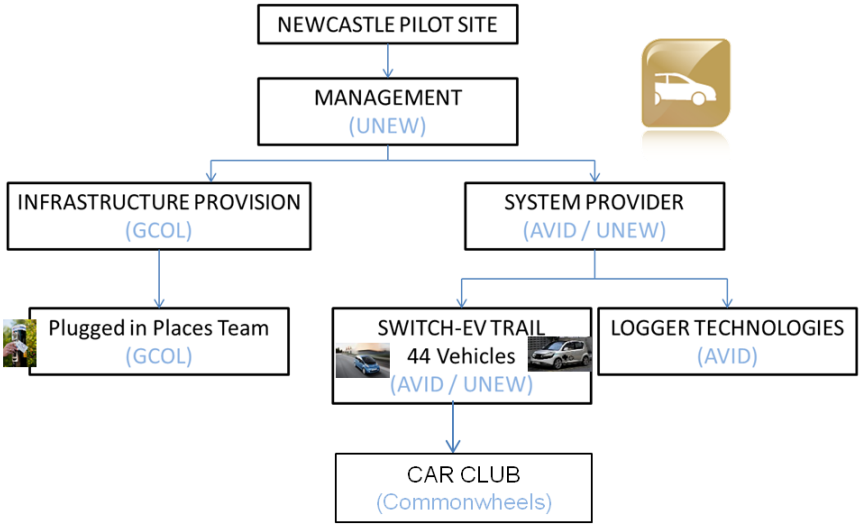
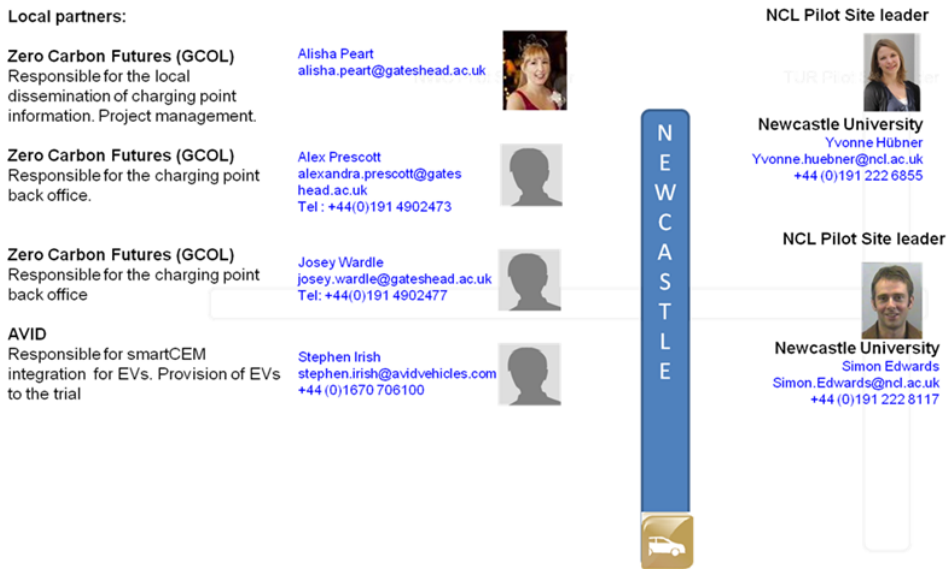
	Barcelona Pilot Site	Gipuzkoa Pilot site	Newcastle Pilot Site	Reggio Emilia Pilot Site
Services	EV navigation, EV trip management, EV efficient driving, EV sharing management, EV charging station management.	EV navigation , EV trip management, EV efficient driving, EV sharing management	EV navigation, EV trip management, EV efficient driving, EV charging station management.	EV navigation and range estimation, EV efficient driving, EV sharing management
Transport type	Passengers (individual)	Passengers (individual and public)	Passengers (individual)	Commercial and passengers (individual)
Vehicles	45 EV scooter-sharing fleet	Hybrid bus, EV car-sharing	Electric cars	10 vehicles (minivans and cars)
Infrastructure	Connected charging B.O., EV operator B.O., 234 charging points, in-vehicles Dataloggers, mobile devices for EV users	2 bus lines, bus operator B.O., EV car sharing back office, charging stations, on-board devices, mobile devices	600 to 1300 charging posts	14 charging stations and Power supply system

Furthermore, due to the differences between smartCEM pilot sites, their own set of scenarios (for each pilot site) should be defined for the implementation of the smartCEM services that requires determined lay-outs of vehicles, in-vehicle equipment and infrastructure and back-office equipment. As well, in some cases it is possible that several or even all the services work together in a single scenario set up, whereas in others each scenario is composed of a single service.

The design of each scenario should be addressed the different hypotheses (HY) and corresponding success criteria, though some could only address a single HY. In addition, the scenarios should summarize the testing, timing and evaluation parameters.

5.1.1. Newcastle Site

Table 13. Newcastle PS framework within WP4

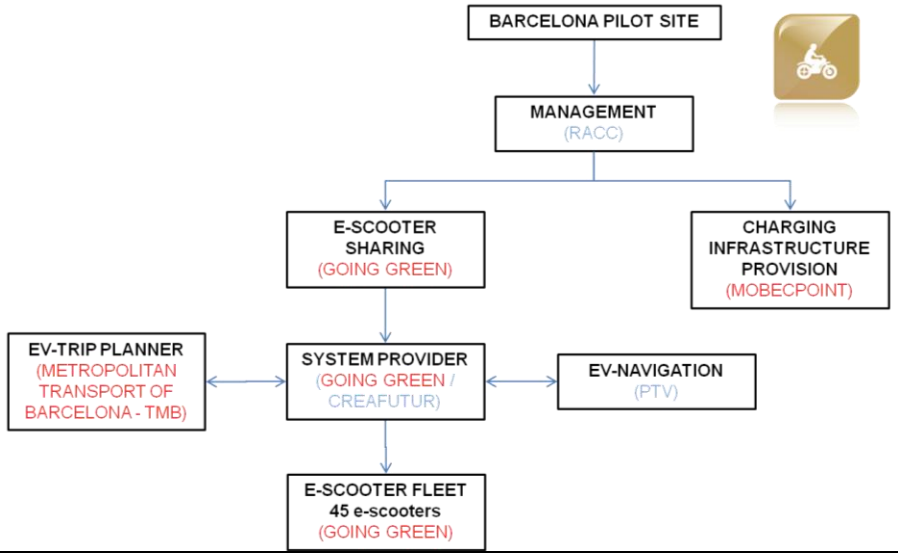
Newcastle Pilot Site	
Site description	The Newcastle pilot site in smartCEM will be based on the existing knowledge on electric vehicles. More specifically, the activities will involve compact urban electric cars, and will implement the eco-driving driver interface of smartCEM into these vehicles. This will allow the services provided in smartCEM to be tested and evaluated on a sizable fleet of electric vehicles which are at an advanced level of technological maturity. 
Main contacts	
Services to be implemented	• EV-navigation • EV-efficient driving • EV-trip management • EV-charging station management

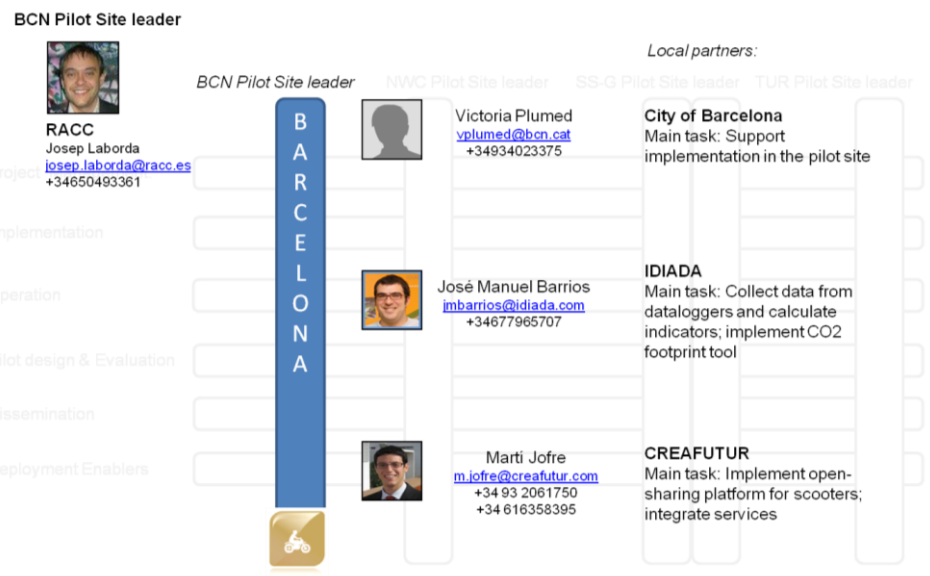
Use Cases	• NEW_UC_01	APP access
	• NEW_UC_02	CP Access by RFID
	• NEW_UC_03	CP Access by IVR
	• NEW_UC_04	CP Access by SMS
	• NEW_UC_05	Charging initiation
	• NEW_UC_06	Charging conclusion
	• NEW_UC_07	CP search
	• NEW_UC_08	CP state-change notification
	• NEW_UC_09	CP status polling
	• NEW_UC_10	CP status visualisation
	• NEW_UC_11	Efficient driving
	• NEW_UC_12	Intention of charging
	• NEW_UC_13	User validation
	• NEW_UC_14	Integration with EV-Navigation

5.1.2. Barcelona Site

Table 14. Barcelona PS framework within WP4

Barcelona Pilot Site	
Site description	The Barcelona pilot site in the smartCEM project will be based on electric motorcycles and scooters. More specifically, an advanced open sharing service for electric scooters will be implemented involving the introduction of a unique innovative solution based on concepts such as "mobility on-demand", intelligent infrastructures, dynamic pricing or incentive schemes for users.

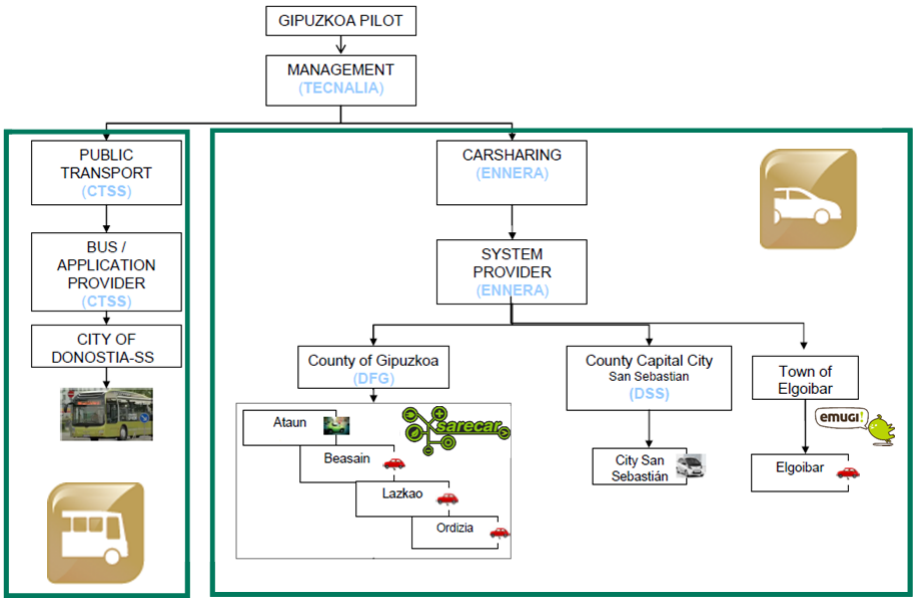
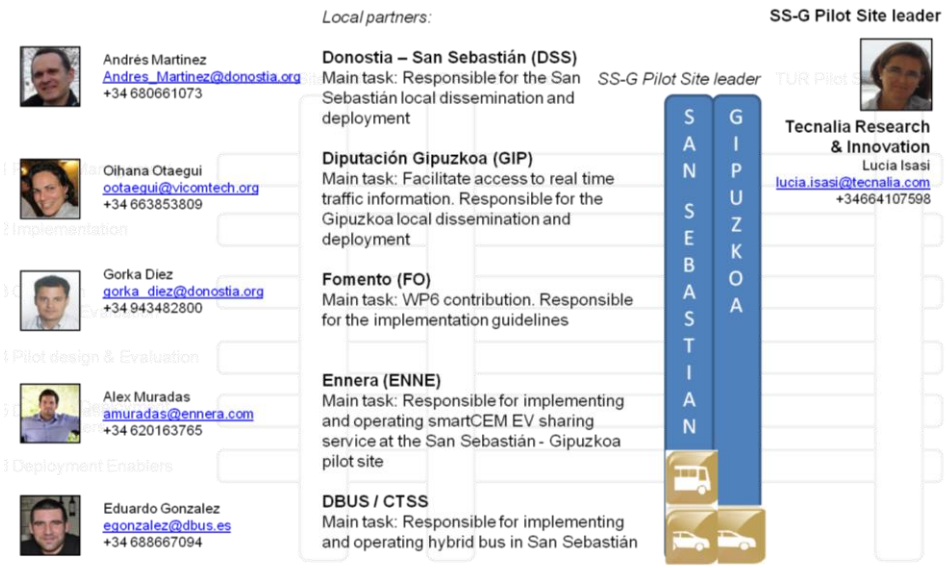


Main contacts	
Services to be implemented	• EV-navigation • EV-efficient driving • EV-charging station management • EV-sharing management
Use Cases	• BCN_UC_01 User registration • BCN_UC_02 User account management • BCN_UC_03 Frequent trip (automatic booking) • BCN_UC_04 Immediate Spot Trip Booking • BCN_UC_05 Planned Spot Trip Booking • BCN_UC_06 Time-based booking • BCN_UC_07 e-scooter check-in • BCN_UC_08 Incentives management (dynamic pricing) for efficient fleet management • BCN_UC_09 Cancellation / Modification of frequent trip(s) • BCN_UC_10 Cancellation / modification of spot trips • BCN_UC_11 e-scooter riding • BCN_UC_12 e-scooter check-out

5.1.3. Gipuzkoa – San Sebastian Site

Table 15. Gipuzkoa PS framework within WP4

Gipuzkoa Site	
Site description	Gipuzkoa pilot site will implement two transport modalities: • Hybrid public transport: At least, two bus routes will be used in San Sebastian with a hybrid bus in order to contribute to electro-

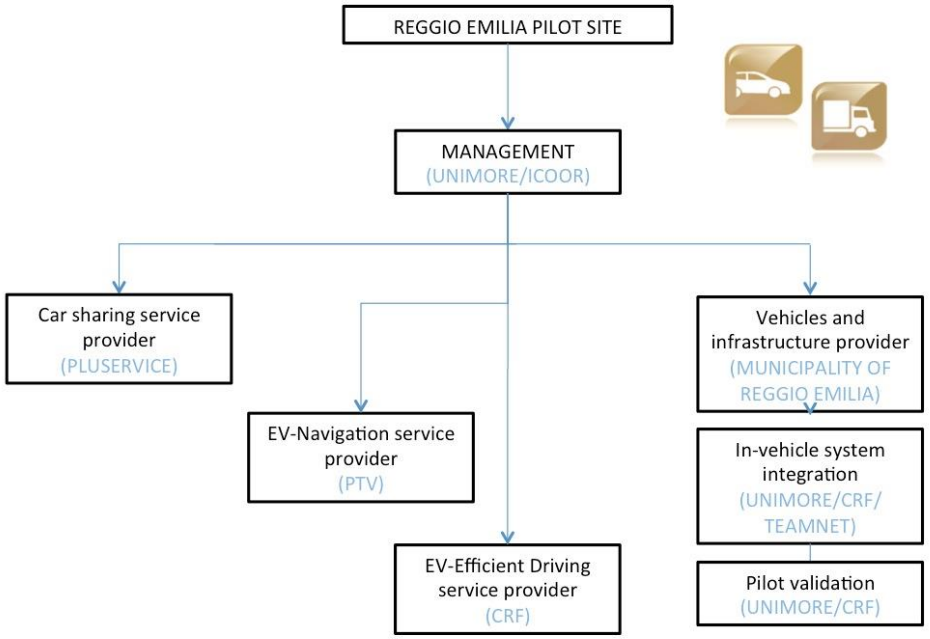
	mobility in urban areas. These lines are chosen due to their topography and topology. • EV Carsharing: running on urban and interurban scenarios. There will be FEV car-sharing vehicles driving during the operation phase. 
Main contacts	
Services to be implemented	Hybrid Public Transport: • EV – Efficient driving • EV – Trip Management EV Carsharing: • EV – Sharing Management • EV – Trip Management • EV – Navigation

	• EV – Charging station management
Use Cases	Hybrid Public Transport: • GIP_UC_04 Bus route pre-learning • GIP_UC_05 Bus driver working shift start • GIP_UC_12 Hybrid bus driving • GIP_UC_15 Bus working shift data analysis EV Carsharing: • GIP_UC_01 eCarsharing registration • GIP_UC_02 eCarsharing booking • GIP_UC_03 Multimodal transport booking • GIP_UC_06 Start eCarsharing • GIP_UC_07 eCarsharing driving • GIP_UC_08 Multimodal travelling • GIP_UC_09 Finish eCarsharing • GIP_UC_10 Booking modification • GIP_UC_11 Accessing CP • GIP_UC_13 CP data analysis • GIP_UC_14 ecarsharing data analysis

5.1.4. Reggio Emilia Site

Table 16. Reggio Emilia PS framework within WP4

Reggio Emilia Pilot Site	
Site description	For the Reggio Emilia Pilot site, a scenario has been identified from an experimental point of view, in which an EV car sharing system is available for the employees of a local administration. Users will be able to access user-side services, as EV-Navigation and EV-Efficient Driving. The EVs are provided by the local administration (i.e. Municipality of Reggio Emilia).

<table>
<tr><td></td><td> 
</td></tr>
<tr><td>Main contacts</td><td>REG Pilot site leader
 
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Mauro Dell'Amico
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ICOOR - UNIMORE:
Main task: Responsible for the city support to Pilot site framework development Supporter on the analysis of pilot site data, execution and validation plan.

CRF:
Main task: supporter on test site deployment and system integration. EV-Efficient Driving provider

PLUSERVICE:
Main task: supporter on service harmonization and integration with other smartCEM pilots. EV-Sharing service provider

REGGIO EMILIA</td></tr>
<tr><td>Services to be implemented</td><td>• EV navigation and range estimation
• EV efficient driving
• EV sharing management
• EV charging station management (TBC)</td></tr>
<tr><td>Use Cases</td><td>• REG_UC_01 EV-sharing registration
• REG_UC_02 EV-sharing standard booking</td></tr>
</table>

	• REG_UC_03	EV-sharing last minute booking
	• REG_UC_04	EV-pick-up
	• REG_UC_05	EV trip start
	• REG_UC_06	EV-sharing driving
	• REG_UC_07	EV trip ending
	• REG_UC_08	Real time advice on efficient driving
	• REG_UC_09	Advice on efficient driving through web interface

5.2. *Evaluation indicators framework*

From the evaluation point of view, three levels should be considered:

- Pilot Site level (site-specific indicators): assessment will be performed and conclusions extracted in the ambit of the characteristics of each pilot site. At this level, scenarios are defined for each Pilot Site. Some examples of site-specific indicators are: in case of Barcelona, *Percentage of complied trips* (due to incentives), i.e. percentage of trips in which the user accepted a modification in his initial trip preferences for a cheaper fare; or, in case of Gipuzkoa, *CO_2 emissions for hybrid bus* or *Average willingness-to-pay* score for a transport card combining carsharing with public transport, etc. For further information refer to D4.2.

- smartCEM level (common indicators): an overall approach for common assessment objectives that can be found in the four pilot sites is performed at project level (refer to D4.2). For instance, smartCEM level indicators are *Average user acceptance score* - under User uptake category - or *Average energy consumption*, within Environment category.

- CIP level: within this level a set of common CIP indicators for high level Electro-Mobility impact assessment is designed and reported (refer to D6.2)

Thanks to these different levels of indicators, it should be easier to obtain overall conclusions, independently of the specific characteristics of each pilot site.

However, due to this different composition of pilot sites, i.e. different environments, vehicles, etc., it should be remarked the need of establish the required measures to obtain each indicator and, of course, the specifications of mentioned measures, it means, frequencies, accuracies, etc. This aspects will be defined during task *T4.3: Specification of the experimental design* and will be included in the deliverable *D4.3: smartCEM experimental design* (refer to D4.3).

6. Legal and Organisational aspects

Performing trails and test with users give rise to a number of legal and organizational issues that need to be tackled from the very early stage of experimental design.

Given that a comprehensive recollection of the issues linked with smartCEM is not easy to be defined, smartCEM partners are asked to consider national laws and regulations that vary from country to country.

From the FESTA handbook, a list of topics to be covered are listed and they constitute a first draft of issues that need to be taken into consideration within smartCEM and according to the services implemented in each pilot site.

Participant recruitment

During the recruitment phase of participants, it is compulsory to ensure that participants have a legal entitlement to drive the vehicles and are eligible for insurance.

Participant agreement

An agreement between the participant and the organization responsible of performing the tests should be formalised, thus specifying in advance the purpose of the field test, the risks they may incur, the costs that are covered and not covered, whom to contact in case of breakdown, etc.

It is not necessarily the case that the relationship with the participants will be set in the form of a legal contract; alternatively it may take the form of a letter of agreement.

The agreement or contract may need to cover the potential liabilities and which party is responsible. One liability to consider is what happens in the event that a participant commits a traffic offence and/or incurs a traffic penalty (speeding ticket, parking ticket, etc.). The issue of who is allowed to drive, e.g. other household members, and under what circumstances also needs to be considered.

Data protection and data ownership

Prior consent needs to be collected from participants in order to allow the partners to handle vehicle data (e.g. vehicle speed, position).

Data servers must be protected from intrusion and personal ID information should be kept completely separate from the database.

Risk assessment

A prior risk assessment has to be carried out at a pilot site level, giving proper consideration to safety, health, legal and organizational risks.

7. Conclusions

Within this document, D4.1 Evaluation Framework, guidelines to proceed with the definition of evaluation process have been presented. The main purpose of those guidelines is to facilitate the generation of the required information to complete evaluation process successfully, and to avoid difficulties during the data analysis and to elude lack of data, in order to perform the smartCEM hypotheses evaluation.

As has been remarked, this framework is the first step to define the required information, and this task is strongly related to other WP4 tasks and also with other work packages, mainly with WP2: Implementation, WP3: Operation and WP6: Deployment enablers.

To avoid unnecessary overlaps between deliverables content, scope for each of them has been defined (mainly for WP4 deliverables). This scope will be the basis of a later more detailed agreement by deliverables responsibles.

In order to conclude the guidelines for the definition stage, it should be taken into account the following recommendations:

- The development of the pilot sites should be closely monitored. With this purpose, the proposed mechanism and measurements for monitoring the status of the pilots is based on the progress indicators. These indicators have been created for each pilot site. These indicators should be reviewed and updated periodically each quarterly. This task will be done by Pilot Sites leaders together with the project managers.
- Data collection for each pilot site must be harmonized. In order to facilitate this harmonization, a local data base structure will be defined within WP2 for each pilot site. However, this structure will be as equal as possible between sites, since it helps to create a smartCEM global evaluation data base.
- Also, data collection for smartCEM project must be harmonized. For that, within WP3: Operation, the global evaluation data base will be created, hosted by University of New Castle, where acquired data during the operational stage will be aligned not only with the aims and objectives of the implementation, but also with requirements of Evaluation. For example, in order to ensure that the work is being made towards a common goal, tasks T4.2 and T4.3 will address common approaches for the four pilot sites.

8. References

DOC 1 *"ITS for electric vehicles - an electromobility roadmap"*, Y. Hübner, P.T. Blythe, G.A. Hill, M. Neaimeh, C. Higgins. Newcastle University, Transport Opertations Research Group, Civil Engineering and Geosciences, Cassie Building, Claremont Road, Newcastle upon Tyne, Tyne and Wear, NE1 7RU

DOC 2 ISO 9001- Section 7.3.1 *Design and Development Planning*, Section 7.3.5 *Design and Development Verification*, Section 7.3.6 *Design and Development*, Section 4.2.4 *Control of Records*. (2009).

DOC 3 Systems Engineering - System life cycle processes, ISO/IEC 15288. (2009).

DOC 4 Driessen, B., Hogema, J., Wilmink, I., Ploeg, J., Papp, Z., & Feenstra, P. (2007). *The SUMMITS Tool Suite: supporting the development and evaluation of cooperative vehicle- infrastructure systems in a Multi-Aspect Assessment approach* (TNO memo 073401-N17). Delft: TNO Verkeer en Vervoer.

DOC 5 FESTA: http://www.fot-net.eu/download/festa_handbook_rev4.pdf

DOC 6 Van der Laan, J. D., Heino, A. & de Waard, D. (1997). A simple procedure for the assessment of acceptance of advanced transport telematics. *Transportation Research Part C, Vol. 5 (1), pp. 1-10.*

DOC 7 Tarry et al., 2008 Tarry, S.; Kulmala, R.; Schuster, G; Nemec, M.; Taale, H.; Struder, L.; Riley, P. (2008). Handbook on Evaluation Best Practice. Version 3, EU, Evaluation Expert Group. Brussels. Available at: http://partnet.vtt.fi/evaserve/evaserve_tool/aineisto/EEG_Handbook_Best_Practice_draft_v2.1.pdf [11.04.12]

DOC 8 Kulmala, R., Luoma, J., Lähesmaa, J., Pajunen-Muhonen, H., Pesonen, H., Ristola, T., Rämä, P. (2002). Guidelines for the evaluation of ITS projects. Helsinki, FITS Publications, Available at: http://www.lpcb.org/lpcb/index.php?option=com_docman&task=doc_details&gid=11043&Itemid=32 [11.04.12]

DOC 9 FESTA, D2.3 – Experimental Procedure

DOC 10 TeleFOT, D4.7.1 – Take-Up of Functions - Data Analysis Plan

DOC 11 CONVERGE Project TR 1101, Deliverable D2.3.1

DOC 12 SAFESPOT Project, Deliverable D5.6.1

DOC 13 EuroFOT: http://www.eurofot-ip.eu/

DOC 14 ICT4EVEU: http://www.ict4eveu.eu/

DOC 15 MOBI.Europe: http://www.mobieurope.eu/

DOC 16 Molecules: http://www.molecules-project.eu/

Annexes

Annex 1: smartCEM Success Criteria generation template header

Perormance Indicators Evaluation Category	Deployment Indicators Evaluation Category	Research Question	Hypothesis	Success Criteria	Indicator group	Indicator ID	Indicator Name
1) Environment *2) Transport and mobility* *3) User uptake* *4) Driver behaviour*					*Progress indicator* *Performance indicator* *Deployment indicator* *Awareness indicator*	*PRO_SITE_#* *PI_SITE_#* *DEP_SITE_#* *AWA_SITE_#* *<SITE NAMES:* *New Castle - NEW* *Gipuzkoa - GIP* *Barcelona - BCN* *Turin - TUR>*	

The smartCEM SC generation template is divided into the following columns:

- Performance indicators evaluation category: area where the performance indicator has more impact: Environment, Transport and mobility, User uptake or Driver behaviour. *Only applicable for performance indicators definition*.
- Deployment indicators evaluation category: area where the performance indicator has more impact: economic, interoperability, social, etc. *Only applicable for deployment indicators definition*.
- Research Question. *Only applicable for performance indicators definition*.
- Hypothesis, related to each RQ. *Only applicable for performance indicators definition*.
- Success criteria: the SC threshold.
- Indicator group: Progress (PRO), Performance (PI), Deployment (DEP) or Awareness (AWA).
- Indicator ID: an unique ID per indicator. The proposed structure used to name the indicators could be **<TYPE of indicator>_<SITE>_<number>.**
    - Type of indicator: PRO, PI, DEP or AWA.
    - Site: Newcastle → NEW,

      Barcelona → BCN,

      Gipuzkoa → GIP

      Reggio Emilia → REG
    - Number: correlative numbers starting with 01.

  EXAMPLE: PRO_GIP_01, first progress indicator defined for Gipuzkoa site.
- Indicator name.

Annex 2: smartCEM Indicators generation template header

Indicator group	Indicator ID	Indicator Name	Description	Unit	Subjective/ Objective	Qualitative/ Quantitative	Comments	Required measures		Equation	Rationale
								REQ ME_ID	REQ ME Name		
Progress indicator Performance indicator Deployment indicator Awareness indicator	*PRO_SITE_# PI_SITE_# DEP_SITE_# AWA_SITE_# <SITE NAMES: New Castle - NEW Gipuzkoa - GIP Barcelona - BCN Turin - TUR>*		*Illustrative description of the indicator*				*Comments on the indicator*	*Unique ID identifying the required measure*	*Basic name of the required measure*	*Equation used to calculate indicator.*	*If required, literature reference*

The smartCEM indicators generation template is divided into the following columns:

- Indicator **group**, Indicator **ID**, Indicator **name,** copied from the SC sheet are the link between SC and indicators sheets.
- Description: Illustrative description of the indicator.
- Unit: standard unit that applies to the indicator. Use preferably SI units.
- Subjective/objective: depends on the nature of the indicator. Subjective refers to self-reported data. Example: fuel consumption is an objective indicator, acquired through CAN-bus, for instance. However, usefulness is a subjective indicator, and is obtained in order to test participants' opinions.
- Qualitative/quantitative: depends on the nature of the indicator.
- Comments.
- Required measures: divided into two columns: REQ ME ID and REQ ME names (In order to know how to complete these columns view REQ ME generation template).
- Equation: indicator equation, if required.
- Rationale.

Annex 3:smartCEM Measures and sources generation template header

Measure_ID	Measure name	Description	Unit	Measure Category	Pilot Site				Measure Source								Reviewers	Comments
					NEW CASTLE	GIPUZKOA	BARCELONA	TURIN	Sensor_ID	SE name	ACQ ME_ID	ACQ ME name	Questionnaire_ID	QT name	Check list ID	CL name		
	The name of the measure.	*Description of this measure.*	*Standard unit that applies to the measure. Use preferably SI units.*	*Direct, Derived, Event, Self reported, Situational variable, Control Factor*													*Name andd ompany*	*Additional comments to the measure.*

The smartCEM REQ ME generation template is divided into the following columns:

- Measure ID: an unique ID per measure. The proposed structure used to name the measure could be **REQ ME_<number>**. Where REQ ME means required measure, in order to distinguish with acquired measures, and number is a correlative number starting with 01.
- Measure name: Required Measure name.
- Description: description of this measure.
- Unit: standard unit that applies to the measure. Use preferably SI units.
- Measure category: direct, derived, event, self-reported, situational variable or control factor.
- Pilot site: an "x" should be included in all pilot sites that will be used this measure.
- Measure source: this column should be completed taking into account the nature of the measure:
    - If measure will be acquired directly with a **sensor** (HW or SW), sensor(s) ID(s) and name(s) should be included. Objective type of data.
    - If REQ ME is the result of a transformation function or equation of an **acquired measure(s)** [ACQ ME(s)], ACQ ME(S) ID(s) and name(s) should be included. Objective type of data.
    - If measure source is a **questionnaire**, for instance to obtain a subjective PI, QT ID(s) and name(s) should be included. Self-reported (subjective) type of data.
    - If measure source is a **check list**, needed to "measure" PRO indicators, CL ID(s) and name(s) should be included. Self-reported (subjective) type of data.
- Reviewers: name and company of main reviewer.
- Comments.

Annex 4: smartCEM Evaluation Matrix Summary

Category	RQ/DQ	HY	SC	Indicator group	Indicator ID	Indictor Name	Measure_ID	Measure Name	Pilot Site				REQ ME Source		Reviewers	Comments
									NEW CASTLE	GIPUZKOA	BARCELONA	TURIN	Source ID	Source name		

The aim of the smartCEM EM summary template sheet is to have all the information at a glance, listed in the following columns:

- Category: Environment, Transport and mobility, User uptake, Driver behaviour or Safety.
- RQ/DQ, when required, i.e. in case of PRO and AWA indicators this column is empty.
- HY: hypothesis to be addressed.
- SC name: success criteria threshold.
- Indicator group: Progress (PRO), Performance (PI), Deployment (DEP) or Awareness (AWA).
- Indicator ID.
- Indicator name.
- Measure ID: Required measure ID.
- Measure name: required measure name.
- Pilot site: an “x” should be included in all pilot sites that will be used this measure.
- Measure Source: Required measure source. It should be included ID and name of SE, ACQ ME, QT or CL, in each case.
- Reviewers: name and company of main reviewer.
- Comments.