IRIS

Integrated and Replicable Solutions for Co-Creation in Sustainable Cities

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D6.6 Launch of T.T. #4 activities on City Innovation Platform and information services (Nice)

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Authors

Surname	First Name	Beneficiary
Roux	Stéphane	NCA
Gindre	Céline	NCA
Chateau	Alain	NCA
Anfosso	Alain	CSTB
Quinard	Honorat	IMREDD
Piga	Damien	AtmoSud
Ahmed Ahamada	Sofia	AtmoSud

In case you want any additional information or you want to consult with the authors of this document, please send your inquiries to: irissmartcities@gmail.com.

Reviewers

Surname	First Name	Beneficiary
Tryferidis	Athanasios	CERTH
Kok	Matthijs	UTR
Barre	Pierre-Jean	UNS
Quinard	Honorat	UNS

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EXECUTIVE SUMMARY

Transition track	Ambition
#4 City Innovation Platform (CIP)	Through cross-cutting open ICT (1) enable the integration of the IRIS solutions, maximising cost-effectiveness of the integrated infrastructure, (2) provide the City Innovation Platform and (c) develop meaningful information services for households, municipality and other stakeholders, together allowing for new business models.

Updated ambition overview

Services linked to:	2017	2018	2019	2020	2021
Measure 1: Sensors data collection in air quality	specification	co-creation	demonstration	iteration	deployment
Measure 2: BIM/CIM data display	specification	co-creation	demonstration	iteration	deployment
Measure 3: Data control and monitoring for Smart e-mobility	specification	co-creation	implementation	demonstration	deployment
Measure 4: Data interoperability with energy cloud	specification	co-creation	demonstration	2 new services deployed	3 new services deployed

Key activities for the first 24 months

Included further detailing and defining the data services, developing a common process for the development of the services, making a clear division of roles in the process, discussing/establishing the cooperation/link with activities in WP 3 and WP4 and appointing a data challenger for each of the measures. Furthermore, anticipated activities in the development process for each of the data-services was outlined.

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List of Abbreviations and Acronyms

Abbreviation	Definition
BIM	Building Information Model
CIM	City Information Model
CIP	City Innovation Platform
DoA	Description of Action
EU	European Union
EV	Electrical Vehicle
EVCI	Electric Vehicle Charging Infrastructure
FC	Follower City
IOT	Internet of Things
IS	IRIS Solution
KPI	Key Performance Indicator
LH	Lighthouse
LHCSM	Lighthouse City Site Manager
MaaS	Mobility as a Service
PoR	Programme of Requirements
PV	Photovoltaic
RES	Renewable Energy Sources
SCADA	Supervisory Control and Data Acquisition
TT	Transition Track(s)
WP	Work Package

1 Introduction

1.1 Scope, objectives and expected impact

The Nice Côte d'Azur metropolis, located at the extreme South-West of France between the Mediterranean and the Alps, is strongly energy-dependent of the sole national French electric distribution network, without any connection with the transborder Italian national electric network. A major component of the resilience of a territory is its energy dependence and thus its capacity to become energy self-sufficient thanks to local production balancing consumption. A massive increase of a locally-based production of renewable energies and the broad deployment of energy-efficient buildings are instrumental to reach this target as long as coupled with the implementation of an optimal management of energy based on a smart control of local production, storage and consumption resources. This management of the flexibility is relying on a real-time monitoring and a dynamic control of the whole resources and is requiring the full access to all the resources related data, the usage data and the environmental data in order allowing an impact assessment and a predictive management. The City Innovation Platform (CIP) is playing the necessary role of aggregator of these data, of any types and any origins, to fuel the development of smart energy management systems. The CIP can then support the construction of the observatory of all activities run on the territory and the analysis on their environmental impact thanks to dashboards and structural modelling such as BIM and CIM.

Sustainable development is another component of the resilience of a territory characterized by air quality. The city of Nice is located on a narrow-urbanized strip of land along the sea with a high-density of inhabitants living nearby few high traffic roads. Thus, this population is highly exposed to air pollution including ozone which more than 80% is produced by road traffic. An alternative to individual transport is shared mobility, such as carsharing, which, when combined with the replacement of thermal vehicles by electrical vehicles (EV), is representing a travel solution which can drastically reduce the contribution of road traffic to air pollution. The CIP, thanks to the aggregation of data related to road traffic, to vehicles energy consumption and air quality, allows correlating travel modes and their consequent environment impact to infer and conduct new urban policies on sustainable mobility.

In that respect we decided to deploy two scenarios over Nice Meridia area demonstrating the collection of data, their provisioning on the CIP and their valorisation through innovative services.

The first scenario is of the ambient environment type and consists in the display of an alert on the CIM on the occurrence of a pollution peak. The user will be able to view all information related to the pollution peak, namely:

- Road traffic in real-time including vehicles average speed and roads congestion
- Air quality (GHG and fine particles) collected within the frame of Measure 3
- Weather data which could worsen air pollution

In addition to the real-time display of data, a simulator developed by ATMOSUD will propose various scenarios to model the impact of the integration of alternative means of transportation on the values of air pollution values based on real-time data.

In a first time period, the impact of electrical cars and of the tramway will be computed and subsequently enhanced to include the growing fleet of shared electric scoots, and possibly the future fleet of shared electric scoots. All vehicles data will be collected from the carsharing platform of the municipality as part of Measure #3.

A complementary exercise will be made with the impact of road traffic on noise thanks to noise data collected in real-time by the CIP from noise sensors distributed over the city. A simulator dedicated to noise will allow modelling and characterize the noise reduction which could be obtained with the introduction of soft modes of transport.

The second scenario is of the energetic type and will be deployed on the new building of IMREDD which is a positive energy building with an electric production based on PV and a small wind-turbine coupled to a battery storage. The BIM of Measure #2 will display various real-time information such as the energy production, the battery load, the energy consumption, the state of the EV charging stations including V2G (both charging point and EV) as part of Measure #4.

The information model of the IMREDD2 building (BIM) will be scaled up at Nice Meridia district level as part of the CIM with the integration of the BIM of the Palazzo Meridia second building.

Citizen engagement is included in the demonstrator thanks to the Smart City Innovation Centre (SCIC) located in the IMREDD2 building which show-room will display all dashboards and which open data portal will give access to the demonstrator data to the academic and industrial fields. Beyond citizen engagement is also addressed by the public awareness campaign on air quality and mobility aiming at adopting better behaviour that ATMOSUD will run as part of TT5 IS 5.1 activity.

As a conclusion, this document D6.6 is showing how data collected through the CIP within the frame of Measure #1, Measure #3 ad Measure #4 will be used and valued within the frame of Measure #2 in order to develop new services and to sensitize local stakeholders to two major local challenges: energy dependence and air pollution.

1.2 Contributions of partners

See overview of contributing partner per individual data service in the chapters that present each measure.

1.3 Relation to other activities

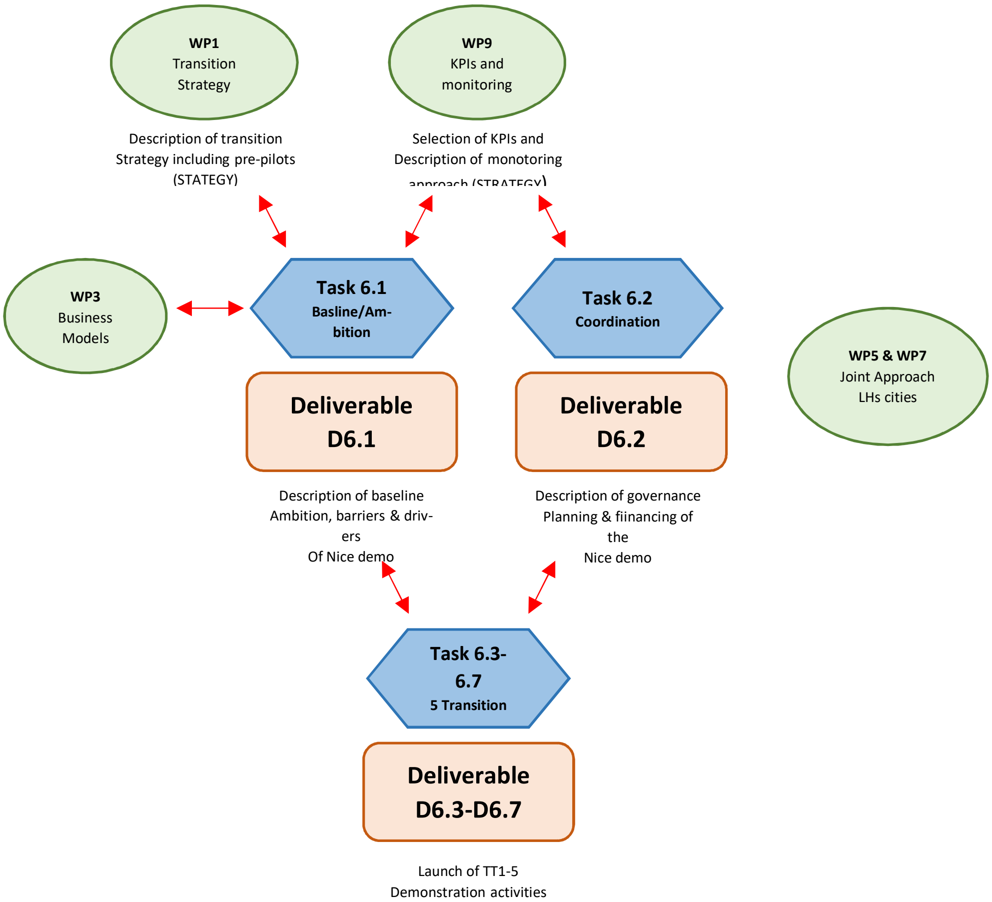

Figure 1 - Relation of Deliverable D6.6 to other activities in the IRIS project

1.4 Structure of this deliverable

This document contains the overall starting points for TT#4 activities, which include a description of the demonstration in a nutshell and the baseline for TT#4. From chapter 4, the four measurements within TT#4 are explained and the achieved results reported. Chapter 8 contains the ethical requirements we've to deal with, when rolling out the activities and monitoring. The last two chapters hold the output to the other Work Packages as well as a conclusion and next steps.

2 Demonstration in a nutshell

2.1 Ambitions for TT#4

Objective of this deliverable is to provide a detailed overview of the activities for Transition Track #4 within the NCA demonstration.

The ambition for Nice metropolis from Grant_Agreement-774199-IRIS-DEF are the following:

"NCA's ambition is to deploy a large number of city-owned street level environmental sensors of various types, to address all city applications (air quality, traffic, waste collection, water distribution, etc.). These ones, depending on the role they are envisaged to play for the delivery of data in the foreseen City Innovation Platform. In addition, the use of a future city-owned IOT network to collect sensors data is designed to take place during the project. The city ICT architecture is going to be expanded to include the framework for building a market place of city services. Such a market place is expected to ease the development of novel applications and services by 3rd parties for the benefit of the city and citizens."

The following measures will be applied:

Services linked to:	2017	2018	2019	2020	2021
Measure 1: Sensors data collection in air quality	specification	co-creation	demonstration	iteration	deployment
Measure 2: BIM/CIM data display	specification	co-creation	demonstration	iteration	deployment
Measure 3: Data control and monitoring for Smart e-mobility	specification	co-creation	demonstration	iteration	deployment
Measure 4: Data interoperability with energy cloud	specification	co-creation	demonstration	2 new services deployed	3 new services deployed

Table 1 - Ambitions TT#4 laid down in the Grant Agreement

2.2 Demonstration area

Nice (Eco Valley South): The demonstration area will be the same with the pilot area with the full integration of all sensors data in the CIP to develop in-house or enable the development by 3rd parties of production services supported by sustainable business models. Moreover, new categories of sensors will be deployed in the application fields of bidodiversity, for green watering forecast and control, inside buildings (apartments in Les Moulins district, offices in Grand Arénas and Nice Méridia districts) to correlate indoor air quality with outdoor air quality. A unified sensor network will be deployed in the demonstration area based on LoRa radio access technology for fixed objects and under certain conditions WiFi technology for mobile objects (eg. Sensors embarked in the tramway). Both the LoRa and WiFi city networks will be directly connected to the city optic fiber network via gateways distributed all over the demonstration area. Concurrently to the IOT network experimentations based on LoRa, the IT department of the city foresee to work by anticipation on the subsequent migration of the internet of things solutions from LoRa on 5G as soon as 5G equipment will be available for such trials. The target is to deploy local spots and proceeding further to full area coverage operating under the framework of LoRa and to test subsequently the migration to 5G (2018-2019).

Figure 2 - *Location of the demonstration district Nice Eco Valley South*

For the specific use case of Measure 3, the demonstration area will be enlarged to the city of Nice to encompass the charging stations of the private NCA EVCI distributed across the whole city. Moreover, it is assumed that the trips of the shared EV of the city fleet will extend beyond the perimeter of the city.

2.3 Deviations according to the Grant Agreement

Updated ambition overview

Services linked to:	2017	2018	2019	2020	2021
Measure 1: Sensors data collection in air quality	specification	co-creation	demonstration	iteration	deployment
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Table 2 - Ambitions overview

Deviations TT#4:

Measure 1: Sensors data collection in air quality is brand new measure without any deviations.

Measure 2: BIM/CIM dashboard, due to different HR and technical issues, the demonstrator has been postponed to month 33

Measure 3: Charging infrastructure data for optimal EV based free-floating car sharing. Due to the termination of the public carsharing service operating in free-floating mode and the demonstrator henceforth based on the city private carsharing fleet operating in loop mode, this measure is as of now addressing the smart charging paradigm. The description of this measure is limited to the sole data management for the control and monitoring of both the EVCI and the EV fleet carsharing the data with the full development of this use-case described in the deliverable D6.5.

Measure 4: Data interoperability with energy cloud This measure is not developed in this deliverable because this use-case is described in IS2.1 of the deliverable D6.4.

3 Baseline / Drives and Barriers for TT#4

3.1 Baseline

Nice already has an open and interoperable data and digital service. This platform integrates a central data warehouse that hosts in real time and in a standard format all the data from the different business fields (data from IOT devices or from other external data sources; a little part of these data is exposed in Open Data on the dedicated platform; the closed data can be accessed by any legacy systems or by any proprietary systems from suppliers or consumer through a common API based on REST/JSON or SOAP/XML. Since the beginning of 2018, this platform is fully compliant with the FIWARE Framework supported by the EU.

The new challenges for Nice is to transform the previous experiments and to scale up the current platform to deploy running digital and innovative services for citizens, operation staffs and to develop a new data economy with local, national and international companies.

3.2 Drivers and Barriers

Drivers:

- The measure implemented will improve the energy efficiency as well as reduce carbon footprint
- Open data trend pushing the CIP development
- The BIM concept is on the rise

Barriers:

- The current geopolitical context is a hindrance to the application of measure IS.4.1.
- RGPD
- Lack of standardization for data collections

4 Measure#1: Sensors data collection in air quality

4.1 Specification of the data service: current status

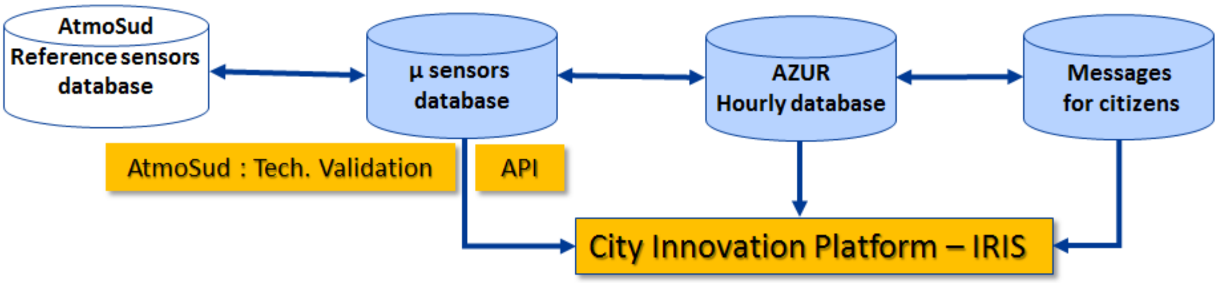

Figure 3 - Data service schema

AtmoSud's contribution to Task #4 consists of sharing data with the City innovation Platform (feed with air quality data and exploit existing traffic data). The data will afterward be used to create citizen engagement demonstrators.

This achievement relies on two actions:

- Improve the air quality measurements with micro sensors
- Upgrade the AZUR air quality mapping model with hourly forecast and real time information. This service will be fed by micro sensors' measurements and traffic data.

Current Status

AZUR is the forecast air quality platform developed by AtmoSud to provide information at very high resolution. This platform already provides daily forecasts for several pollutants: PM_{10}, $PM_{2.5}$, NO_2 and O_3. AtmoSud, with the contribution of its modelling and innovation team, has designed this platform with a great agility. IRIS project will allow to develop the hourly module and to provide a near "real-time" air quality information using AZUR methodology.

Currently, the only real-time input is observations from AtmoSud monitoring network. Over Nice city, this network regroups 4 stations: Nice Airport, Nice Arson, Nice Magnan and Nice NCA port. To provide high spatial and temporal resolution information, AZUR platform needs an update of the monitoring network with micro sensors over the demonstration area and to use real-time traffic data.

AtmoSud is currently working with the CIP administrators in order to push daily AZUR on the CIP before the end of March. This joint work helps to collect the CIP's traffic data as well.

Two requirements specifications are ready and about to be sent to providers: a first one for micro sensors and a second one for the server.

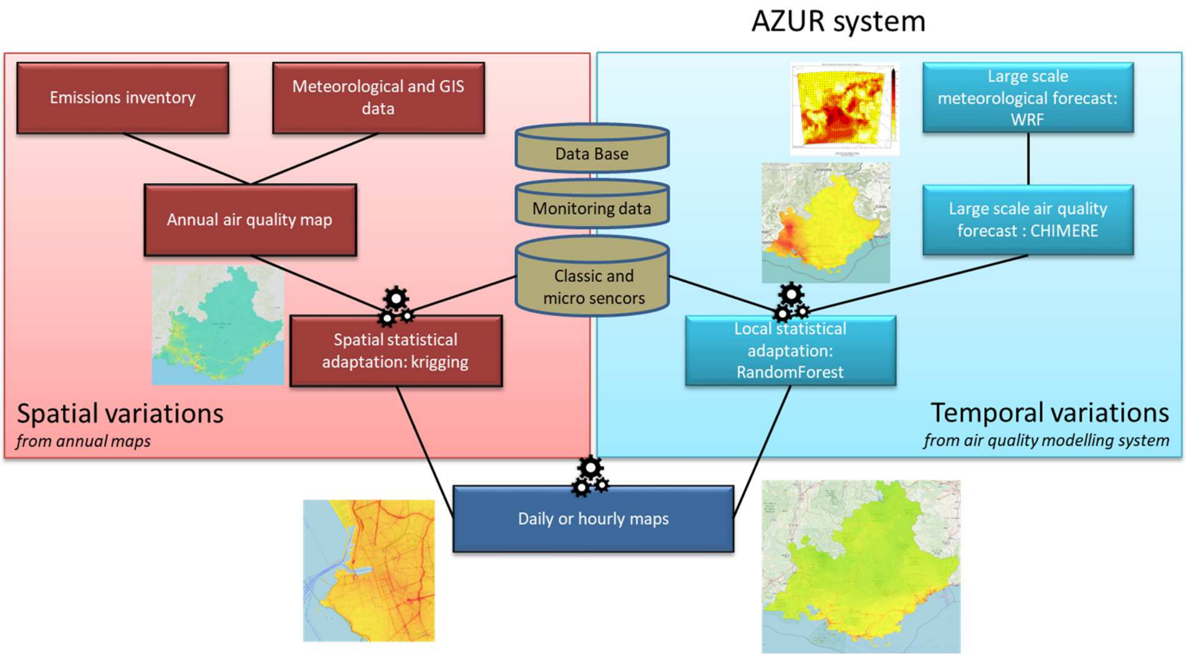

Figure 4 - *AZUR system concept*

4.1.1 Procurement of equipment and/or services

<u>Air quality data</u>

Air quality data will be collected from several sources:

- ***Micro sensors***

5 to 7 micro sensors will be installed in Nice Meridia and purchased shortly by AtmoSud after a call for tender. Data provided will improve AZUR compliance at high resolution.

- ***Air quality measurement network***

AtmoSud already owns a measurement network composed of numerous non-stop operating air quality stations. These continuous measurements will enable to check the proper functioning of micro sensors. They may be requested to contribute to citizen engagement as well.

- ***AZUR***

This hourly data model will be developed internally. Developments will be done with open source software. For its operation a server will be purchased.

<u>Traffic data</u>

Traffic data will upgrade AZUR accuracy output. The challenge for AtmoSud team will be to retrieve data over the road network, to calculate concentrations impact and to provide air quality information in less than one hour to reach near real time information in output.

Traffic data will be collected from several sources:

- ***City Innovation Platform***

The CIP contains several traffic data in a dedicated tab such as: vehicles counting (loop-based counting systems), WAZE data (occupancy rate, congestion index, speed limit etc.), a differentiation (light vehicles/ heavy goods vehicles).

- ***IMREDD***

This partner offered to improve the air quality data model with traffic and activity data. A list of required data is currently in progress and an inventory of propositions will be delivered by IMREDD shortly.

- ***NCA***

Other traffic data owned by NCA will help count the number of vehicles and qualify the vehicle fleet.

4.2 Societal, user and business aspects

4.2.1 Citizen engagement activities

Three citizen engagement activities linked with this measure are planned:

Urban awareness campaign

This reinsurance campaign targets a wide audience of citizens. Pedagogical messages and contents about the air quality and the mobility will be displayed on urban screens (public transports, and road signs). The aim is to promote public transports and soft mobility by converting a one off action, such as taking the tramway, into a regular habit.

Commuting to work

The aim of the initiative in the business area is to **help white-collars to change their commuting behavior, by choosing public transports or other alternatives to the individual car**. Nearby the chosen business district a plethoric offer is available, going from public transports (buses, train, and tramway), to a car-sharing device established by the district itself and city blue vehicles (bicycles and electric bicycles etc.). To achieve this goal several educational tools based on the collected data and services will be displayed on a pedagogic panel and on the intranet.

Mobility/Air quality student training project

This solution consists in **co-creating with students majoring in sustainability an action** to encourage behavioral change about air quality and mobility. For the students involved, the chosen approach is a pedagogical method particularly promoted in sustainable education called “Project-based learning”. They will gain skills and knowledges about air quality and mobility challenges by working on a pedagogical project based on these topics. The project will help them to **convert their convictions into commitment and become more qualified ambassadors for their peers and relatives**.

4.2.2 Environmental scenario

The environmental scenario, which will be visualized on the CIM model of the Méridia district, will allow real-time viewing of weather, noise and traffic data. All these data are already available on the CIP.
The results of the AZUR model, i.e. air quality forecasts at D, D+1 and D+2 are on the Nice Côte d'Azur urban platform too. It is therefore possible to retrieve all these maps via API access and display them on any media with an internet connection.
In a second step, as soon as the tool is available the new maps will be available at an hourly time step, with H+1 and H+2 forecasts, integrating real-time road traffic.

The aim of this scenario is when a pollution peak occurs, the user will be able to launch a scenario in order to visualize on the mock-up the effects on pollution:
- if fewer people use the tramway and therefore there are more vehicles on the roads
- if, on the contrary, we replaced some of the traffic with electric vehicles

Atmosud has the necessary tools to calculate pollution according to traffic. Once the scenario is launched, a calculation will be performed and the results injected into the AZUR model in order to be visualized on the model.
This use of the CIM makes it possible to enhance the value of the data collected by the CIP but also to make the link with actions to raise citizens' awareness.
Moreover, this new tool will be visible on IMREDD's SCIC dashboards (see Chapter 8) and can thus be presented to both students who are studying and industrialists. Thus, the visual will make this simulation more meaningful and will have a greater impact on people.

4.2.3 Governance

Stakeholder	Missions	
	Data	Citizen engagement
NCA	- Provide urban media - Provide access to the city platform - Share data to improve air quality models	- Validate and follow each step of the projects - Provide logistics support
AtmoSud	- Improve the local measurement network - Estimate in real time the air quality - Predict the air quality on an hourly basis - Analyze the air quality	- Create innovative citizen engagement demonstrators - Design awareness messages - Design awareness tools - Prepare and animate awareness sessions/trainings

IMREDD	- Provide innovative methods of data collection - Share urban data to improve air quality models	- Involve students as designers or users of a citizen engagement action
Common tasks	- Succeed in centralizing exploitable mobility and air quality data on the CIP	- Conduct surveys to identify the audience's needs/expectations - Conduct surveys to measure the impact on behavioral change - Design of the awareness messages, contents, infographics
Citizens		- Contribute to the implementation phase - Co-design pedagogical contents

Table 3 – Governance for Measure#1

4.3 Impact assessment

4.3.1 Expected impact

Measure#1 will enable to take advantage of collecting data in order to generate citizens' engagement. On the one hand benefits are expected for the air quality evaluation (upgrade AZUR accuracy output, additional local traffic and air quality data, integration of sensors data within a data model). On the other hand, this measure will support citizen engagement. The data collected will be converted into pedagogical tools to raise awareness, enhance behavioral change, improve the quality of urban life etc.

4.3.2 KPIs

Chosen KPI	Unit	Details
Number of connected urban objects	Number	The urban screens in public transports and on the road for awareness campaign and the pedagogical panel provided to the business district will count as urban objects connected with data.
Usage of open data	Likert scale (no unit)	Every data collected by AtmoSud are open and available freely on our base https://www.datasud.fr/ . The data collected for the IRIS project will follow this line required by the French government. Our data are the only references, certified by the Environment Ministry for the Provence-Alpes-Côte d'Azur region. Because of the nature of our work the demonstrations for #TT4 are all based on open data solutions. Currently the accuracy of daily AZUR is close to 100%. A 75% accuracy for hourly AZUR is expected.
Quality of open data	Likert scale (no unit)	
Open data based solutions	Likert scale (no unit)	

Share of RES in ICT power supply	Likert scale (no unit)	The requirements specification for the pedagogical panel and the micro sensors demands the providers to call on RES as much as possible.
Usage of open source software	Likert scale (no unit)	Every development for the AZUR device relies on open source softwares.

Table 4 – KPIs for Measure#1

4.3.3 Monitoring plan

AZUR platform is a part of the forecast air quality system supported by AtmoSud. Modelling team checks every day output of the system and its compliance with quality objectives. The hourly output from AZUR will be included in the operational system checklist.

4.4 Commissioning Plan

Phase	Activity	Parties involved	Responsibility	Relevant standard
1 Technical preparation	Collect relevant data to sharpen AZUR	NCA/AtmoSud NCA/AtmoSud/IMREDD AtmoSud	Connect daily AZUR to the CIP Collect traffic data to improve the data model Supply hourly modelled air quality data	
2. Citizen engagement preparation	Communication strategy for citizen engagement Evaluate citizen engagement possibilities with the collected data	NCA/AtmoSud NCA/AtmoSud NCA/AtmoSud	 Define pedagogic tools Define data display modes for the contents	
3 Recruitment	Recruit a staff to program hourly AZUR	AtmoSud		
4 Realization	Time management	AtmoSud	Retrieve data, calculate pollutants concentrations, redistribute the data on the	

	Set up hourly AZUR Integrate micro sensor data in AZUR Integrate traffic data in AZUR	AtmoSud AtmoSud AtmoSud	platform in less than one hour Develop Calculation Adapt calculation to micro sensor data Develop concentration calculation from traffic information with time production constraint	

Table 5 - Commissioning Plan for Measure#1

4.5 Implementation of the measure: planning and progress

4.5.1 Planning of activities

The next key stages of our planning are:

- March/April 2020: Availability of daily AZUR with Day+1 forecast
- March/April 2020: Communication plan design in partnership with NCA
- June 2020: Micro sensors installation in the district of Nice Méridia
- June 2020: Beginning of citizen engagement demonstrators
- 2021: Availability of hourly AZUR with hourly forecast
- 2021: Hourly AZUR includes micro sensors measurements in the air quality model

4.5.2 Planning of costs and (equipment) investments

The planning equipment costs is the following

EQUIPEMENT	Unit Price	Quantity	Price in euros
Server	26500	1	26500
Micro sensors	36000	6	6000
Pedagogical panel (for the business district)	15000	1	15000
Modulair (pedagogical tool for students/youth/business district)	7500	15	500
Total			**85000**

Table 6 – Costs of equipmet for Measure#1

4.6 Conclusions

Measure#1 “Sensors data collection in air quality” will enable to improve air quality data and support citizen engagement. Air data will be retrieved thanks to sensors and stations measurements; traffic data collected on the CIP and on other sources. The AZUR data model will integrate all these data to strengthen the accuracy of its future hourly output. These correlated data will be converted into innovative pedagogical tools co-designed with the Metropole NCA, relevant stakeholders and citizens.

5 Measure#2: BIM/CIM data display

The Nice Côte d'Azur Metropolis wants to demonstrate the capacity of the multi-scale BIM from the perspective of the City Information Platform (CIP) deployed in the IRIS project and the ability to integrate real-time "hot" data at the urban and scale Buildings.

5.1 Specification of the data service: current status

The demonstrator allows you to navigate the urban model that surrounds the new IMREDD building. This urban model covers the territory of NCA between the airport and Carros and allows to visualize the real-time data of the urban sensors as well as the IMREDD building and its energy production and storage equipment

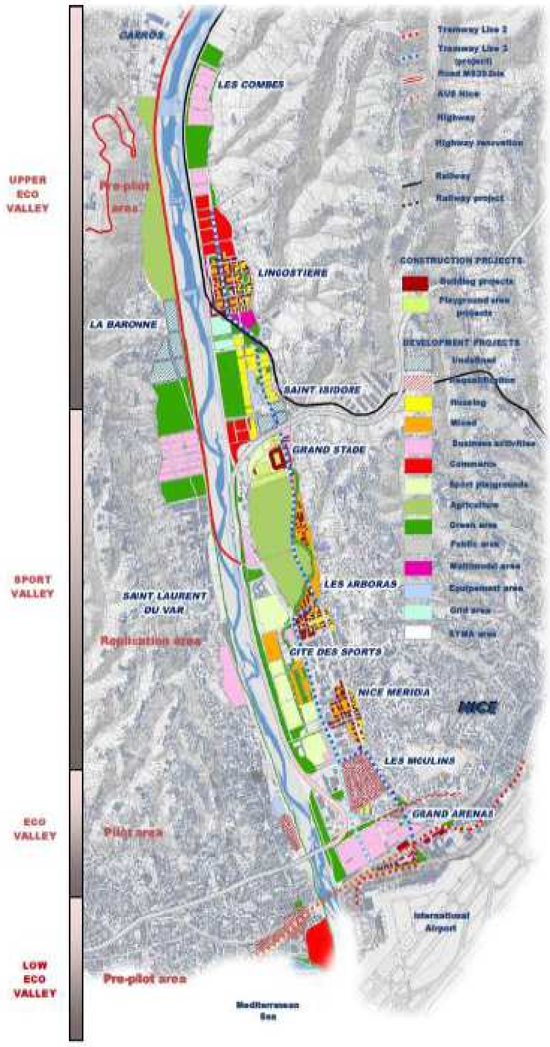

Figure 5 - The demonstration areas in Nice cot d'Azur

City Information Model demonstration

Different sensors will be displayed on the CIM (City Information Model).

The data made available:

- Water observation data: height and flow.
- Weather forecast data: rainfall, temperature, humidity, wind speed ...
- Weather observation data: rainfall, temperature, humidity, wind speed ...
- Air quality observation data: CO2, NO2, PM ...
- Data on noise level observation.

Building Information Model demonstration

Based on the IFC model of the new IMREDD building that describes the geometry of the building, its envelope, its spaces, the demonstrator will allow to visualize a number of geo-referenced equipment in the spaces.

The following equipment will be represented:

- Solar panels
- Lithium-ion battery (first-life)
- Electric vehicle charging stations
- The main energetic counter of the building

5.1.1 Technical specifications (hardware & software)

The aim is to match the urban model visuals and building models with the actual state of the information made available by the (environmental) equipment and sensors. This goal is achieved by implementing the following actions

1. The environmental sensors are placed on the urban model while the electrical equipment is placed in the building.
2. To enable the hypervisor to retrieve the hot data from environmental sensors referenced in GPS coordinates in the IPC, it is necessary to generate an extraction file of georeferenced devices (geojson) by geometrically representing the environmental sensor by a green cube.
3. The extraction will then be read by the CESIUM hypervisor. By selecting the georeferenced points, the dashboards will be displayed.
4. For IFC models of buildings, it is necessary to locate the equipment in the spaces in which they are located.
5. An Ifc entity is created based on the type of equipment: counter, battery, solar panel, charging station that is attached to an IfcSpace entity.
6. According the state of the device, the Ifc entity can be represented geometrically by a coloured cube (blue, red, yellow).
7. The IfcGUID ID should be used as a unique device identification key so that the hypervisor can retrieve the available data.

Figure 6 - Visualization of equipment and sensors and access to the dashboard

The visual below shows the main energy data from the future IMREDD building. The time scale can be changed by the user at the top right.

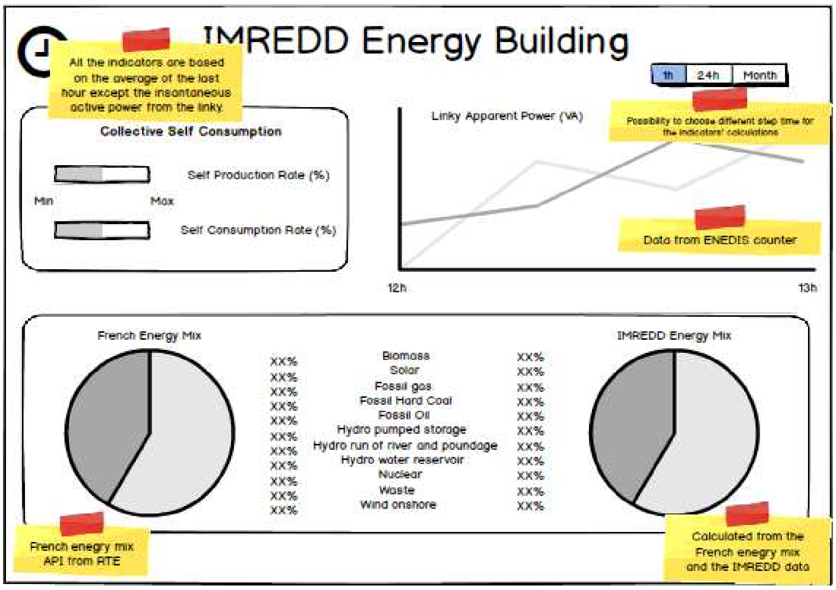

Figure 7 - Dashboard Energy Building

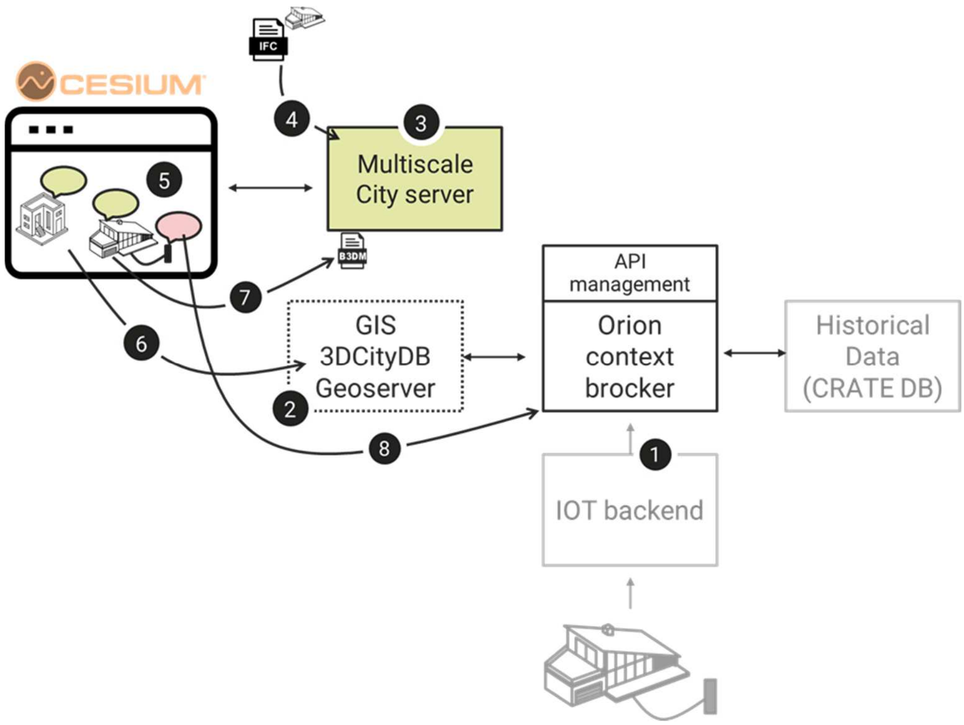

Figure 8 - Main architecture of the demonstrator

5.1.2 Procurement of equipment and/or services

As part of the IRIS project, NCA is developing an interactive dashboard allowing users to understand the Meridia district and the IMREDD building.

5.1.3 Citizen engagement activities

From the observation of the environmental sensors into the surrounding area, citizens could decide to change for example their behaviour to get around the city or they could modify their electrical consumption habits paying attention to the French electrical energy mix showed by the dashboard of the demonstrator.

5.1.4 Business model

For this demonstrator, the target user is the municipality for urban planning.

5.1.5 Governance

Municipality of Nice Cote D'Azur is operating the City Innovation Platform on which the data flows of the environment sensors, solar panels, Lithium-ion battery, Electric vehicle charging stations and energetic counter of the building are combined to create a dashboard to pilot the building. Nice Cote d'Azur is responsible to push data from the environmental sensors to the CIP.

IMREDD is the university owning the building used in the demonstrator. IMREDD is responsible to push periodically data from the building like solar panels, Lithium-ion battery, Electric vehicle charging stations and energetic counter of the building to the CIP.

CSTB is the organization responsible to develop the demonstrator that allows you to navigate the urban model that surrounds the new IMREDD building.

5.2 Impact assessment

5.2.1 *Expected impact*

The target group is divided into four categories:

- Users of the building (IMREDD team, students, professors…)
- Private compagnies (Maintainer of the building at the building scale, IDEX at the neighborhood scale)
- Public entity (administration, research laboratory, public company)
- Citizens (visitors)

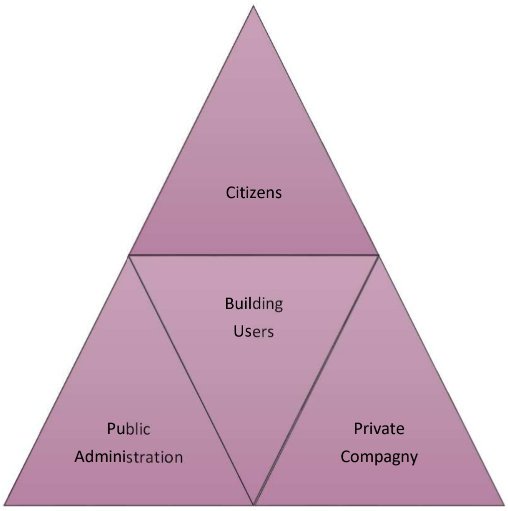

Figure 9 - Target group

The expected impact may be different according to the target group but the main goal is to improve the various stakeholders' global understanding of the urban future of Nice Meridia district in terms of development of physical accommodations and of main activities performed by this area.

5.2.2 *KPIs*

The KPI's can be monitored after installation.

KPI	Parameter(s)	Baseline	Target (as described in DoW or declared)
Quality of CIP	Number of sensors connected to the CIP	0.There is no sensor connected to the CIP	Number of sensors is more than 50.

Quality of datasets	Number of measurements added each day into the CIP	0.There is no measurements into the CIP	Number of measurements added each day into the CIP are more than 10 000.
Usage of the CIP	Number of consumers using datasets from the CIP	0.There is no consumers	Number of consumers using the CIP are more than 5.
Usage of the dashboard	Number of people visiting the BIM/CIM dashboard at the SCIC	0.The dashboard doesn't exist	Number of annual visits are more than 5.

5.2.3 Monitoring plan

The monitoring of the CIM pilot will be done in M40, 2021. In the table below, the monitoring plan for the CIM pilot KPIs is described

.KPI	When monitor	How	Who is responsible	How is baseline established
	Once, M40	Manual check	NCA	
	Once, M40	Manual check	NCA	
	Once, M40	Manual check	NCA	

Table 7 - Monitoring plan for CIM KPIs

5.3 Commissioning Plan

The purpose of commissioning is to verify and record that equipment and/or systems comply with the design specification and that construction is done accordingly. This process considers all the process steps from design till completion. *Table 8*, shows the high-level commissioning plan for the CIM pilot.

Phase	Activity	Parties involved	Responsibility	Relevant standard
1 Design	Identifying BIM requirements suitable for NCA	NCA, CSTB, IMREDD IMREDD	Provide input on BIM requirements Create draft BIM data requirements	
	Identification of use cases and creation of functional requirements	NCA NCA	Collect input from reference groups Assist in collecting input	

		CSTB, IMREDD NCA	Write functional requirements with use cases Assist in writing functional requirements	
2 Engineering	Identify need for development	NCA	Identify need for development from the City	
3 Contracting	Contracting technicians, programmers	NCA, CSTB, IMREDD	Make sure to have contract with relevant technicians, programmers	
4 Realization	Set up test CIP Set up CIM data Catalogue and CIM data retrieval tool Build BIM data collection tool Build Visualisation dashboard Deploy solution	NCA NCA, IMREDD CSTB IMREDD CSTB CSTB, NCA	Set up docker environment Configure relevant CIP/FIWARE components Configure Build BIM data collection tool Build Visualisation dashboard Create a deploy package. Deploy solution on City of Nice test CIP	
5 Testing	Unit testing	NCA, IMREDD, CSTB NCA, IMREDD, CSTB	Test that BIM data from projects can be uploaded and validated in BIM data Collection tool Test that successfully uploaded BIM data is shown and	

			can be accessed in CIM data catalogue/ CIM data collection tool	
		NCA, IMREDD, CSTB	Test that visualisation dashboard can show successfully uploaded BIM data	
	User evaluation	NCA, IMREDD, CSTB	Test the usability of BIM data collection tool Test the usability of CIM data retrieval tool/CIM data catalogue for planned projects	
		NCA, IMREDD, CSTB	Test the usability of CIM data retrieval tool/CIM data catalogue for app development	
	Test-CIP evaluation	NCA, IMREDD, CSTB	Evaluate the test CIP as a platform	
6 Completion	Approve the CIM pilot implementation	NCA, IMREDD, CSTB	Approve the CIM pilot implementation from City of Nice	

Table 8 - Commissioning Plan

5.4 Implementation of the measure: planning and progress

5.4.1 Planning of activities

In the Gantt chart below are the planned activities for the pilot to be completed before March 2020.

	2019												2020											
Missions	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Report D6.6 creation activities																								
Decide data retrieval tool																								
Set up necessary CIP components for CIM demo																								

Development BIM data collection tool
Configuration and development of CIM data catalogue
Development of CIM visualization tool
Development of CIM retrieval data tool
Deploy pilot
Pilot ready for demonstration
Describe evaluation and how to evaluate
Document technical solution

Figure 10 - Activities plan

5.4.2 Planning of costs and (equipment) investments

All cost related to implementation of measure #2, #3, #4 have been aggregated and included in the sub-contracting equipment costs of the WP4.

5.4.3 Risk management

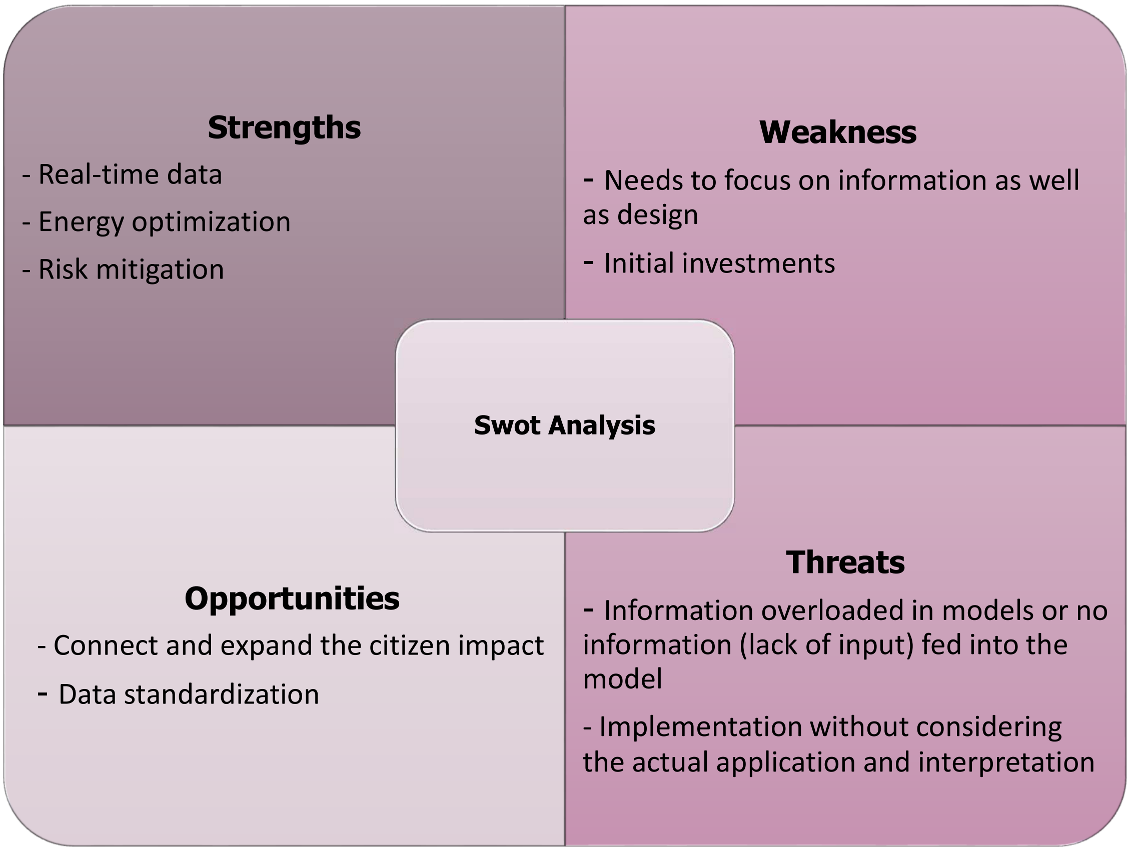

Figure 11 - Risk Management of Measure#2

5.4.4 Progress achieved up to M24

The numerical modelling of the IMREDD building is now achieved and the data collection is available on the CIP.

5.5 Conclusions

The next step will be to put the different bricks together (data collection, 3D model….) in order to finalize the demonstrator. A commissioning period is already planned between the partners.

6 Measure#3: Services for mobility

The Measure#3 is related to the TT#3 demonstration activity in Nice which is focusing on building and optimally coupling systems operating both EVCIs and electric carsharing fleets over a city, aiming at implementing a “Smart Charging” management and testing various related use cases.

Smart Charging requires to access real-time and historical data of various profiles to dynamically control and monitor both EVCI and EV management platforms aiming at a better forecasting of the turnover of the shared EVs and an optimal charging plan of EVs to provide both 1|a better service to EV end users by 2| flexibility services to reduce local grid imbalances on the public electricity grid.

The figure below illustrates the connections between the functional blocks at system level for the different supervision and management platforms involved in Smart Charging operation. The blue functions are supporting the forecast and optimization layers with additional data communication channels required to implement of Smart Charging. The functional elements in the left part of the figure are out of the scope of the Measure#3.

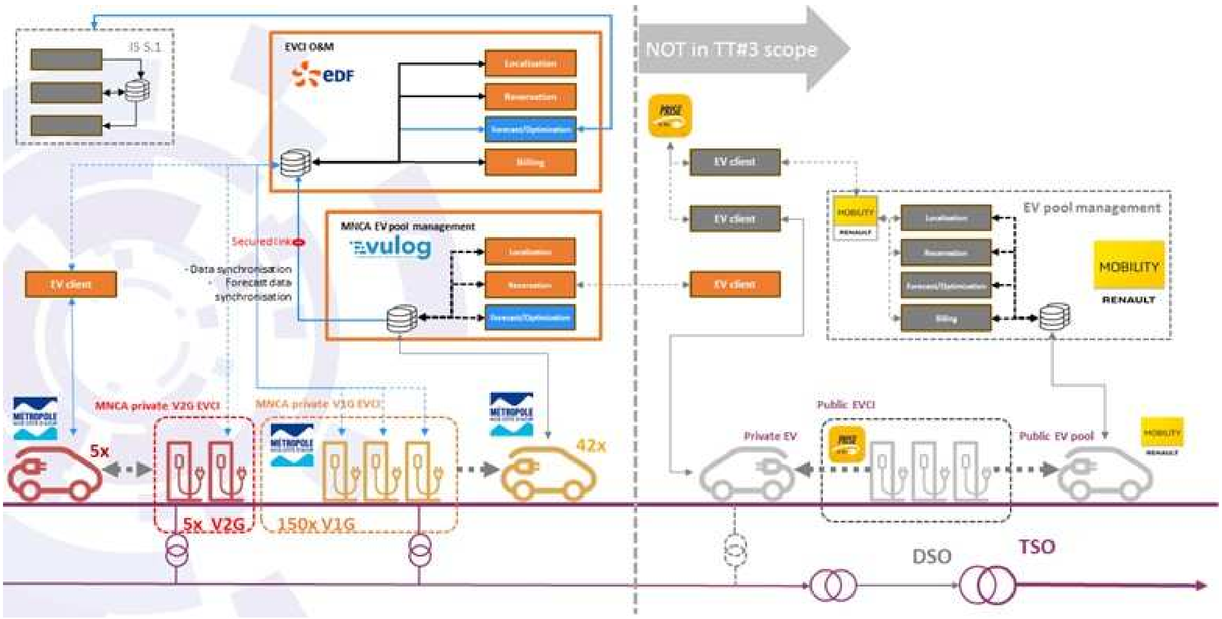

Figure 12 - General system functional connectivity between the different platforms involved in Smart Charging implementation as defined in TT#3 (Source: EDF)

6.1 Specification of the data service

6.1.1 EVCI supervision platform

The private EVCI network of NCA will be from now on controlled by a supervision platform provided by EDF partner. The system will be configured to communicate over fiber-optic and/or radio cellular connectivity with the subset of charging stations relevant to the demonstration, namely the stations located in the five (5) premises of the city assigned to park the 42x V1G-type and 5x V2G-type EVs of the shared e-fleet. All V1G charging stations are compliant with the standard OCPP protocol and new V2G charging stations are assumed to comply with ISO15118.

The EVCI supervision platform must interface with the Smart Charging management platform to support an optimal charging plan in accordance with the operating requirements of the carsharing of the e-fleet and the instructions from the energy aggregator platform to comply with flexibility energy services such as peak shaving and shifting and tertiary energy reserve. The Smart Charging management platform is assumed to be compliant with the standard OSCP protocol.

Data service	Data description	Data source	Data destination
V1G/V2G	Station location	SIG	EVCI Supervision
V1G/V2G	Station Type (V1G/V2G)	Charging Station	EVCI Supervision
V1G	Active Power	Charging Station	EVCI Supervision
V2G	Reactive Power	Charging Station	EVCI Supervision
V1G	Maximal power of charge	Charging Station	EVCI Supervision
V2G	Maximal power of discharge	Charging Station	EVCI Supervision
V1G/V2G	Charging point(s) availability	Charging Station	EVCI Supervision

Table 9 - List of data for each charging point of the EVCI.

6.1.2 Carsharing platform

The shared e-fleet of the city of Nice is managed by a car-sharing platform supplied by VULOG partner. The baseline functionality of this system is to communicate in real-time with each vehicle and to manage the booking and allocation process of vehicles with a database of registered users.

To support the demonstration of Smart Charging, the car-sharing platform is collecting information from the EVCI supervision platform, from the shared vehicles and, based on the scheduled or forecasted bookings of these vehicles, is computing and transferring to the smart charging platform the list of vehicles to be recharged, the mapping of the charging stations to whom they are plugged in, the amount of required energy, and the time and the maximum duration to charge these vehicles. The figure below is showing the data flows between the different components of the Smart Charging solution.

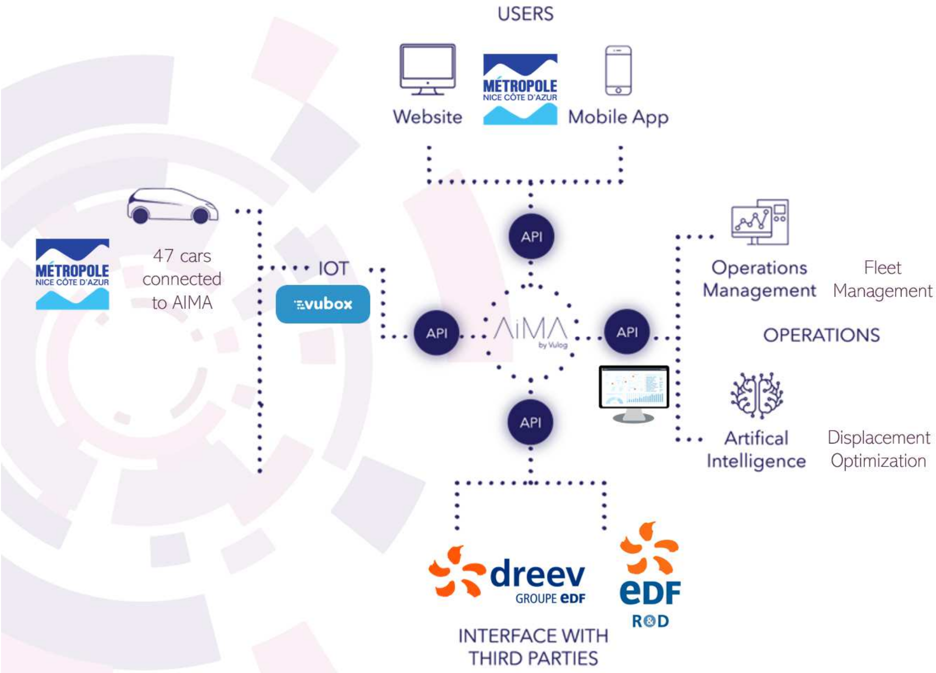

Figure 13 - Data flow diagram for the car-sharing platform "AIMA" (Source: VULOG)

Data service	Data description	Data source	Data destination
Carsharing	Vehicle location	Vehicle	Carsharing platform
Carsharing	State of Charge (SOC) of vehicle	Vehicle	Carsharing platform
Carsharing	Vehicle battery capacity	Carsharing platform	Smart Charging
Carsharing	Vehicle required battery energy	Carsharing platform	Smart Charging
Carsharing	Earliest time for battery charging	Carsharing platform	Smart Charging
Carsharing	Latest time for battery charging	Carsharing platform	Smart Charging

Table 10 - List of data for each vehicle of the share e-fleet.

6.1.3 Smart Charging platform

The Smart Charging management platform will directly communicate with the energy aggregator platform which will trade flexibility services on the energy market. All data exchanged will be therefore replicated on the CIP. It is expected that the management of the tertiary energy reserve based on V2G vehicles will be managed by a dedicated processing platform provided by DREEV LTP which will be tightly coupled to the Smart Charging management platform from EDF partner.

Service	Data type	Data source	Data destination
Flexibility	Bid acceptance	Aggregator	Smart Charging
Flexibility	Bid activation	Aggregator	Smart Charging
Flexibility	Power level	Aggregator	Smart Charging
Flexibility	Energy volume	Aggregator	Smart Charging
Flexibility	Activation timeslot	Aggregator	Smart Charging
Flexibility	N° of activations	Aggregator	Smart Charging
Smart Charging	Charging point ID	Smart Charging	EVCI supervision
Smart Charging V1G	Energy to charge	Smart Charging	EVCI supervision
Smart Charging V1G	Start time of charging	Smart Charging	EVCI supervision
Smart Charging V1G	Max duration of charging	Smart Charging	EVCI supervision
Smart Charging V2G	Energy to discharge	Smart Charging	EVCI supervision
Smart Charging V2G	Earliest time of discharging	Smart Charging	EVCI supervision
Smart Charging V2G	Latest time of discharging	Smart Charging	EVCI supervision

Table 11 - List of data for flexibility service activation.

6.1.4 Monitoring & evaluation platform

The monitoring and the evaluation of the TT#3 demonstration activities are based on the computation of the KPIs related to the deployment of the Smart Charging application and of the related services, such as specified in the document D6.5.

6.2 Impact Assessment

6.2.1 Expected Impacts

Expected impacts can be categorized in two groups: those providing flexibility services based on smart charging to reduce the local grid imbalances and, beyond, to contribute to the energy market; those providing an efficient car sharing service based on electric cars to foster the electric mobility market by reducing the barriers to EV adoption.

Impacts related to the development of local flexibility markets:

- IMPACT 1: Put in practice a bankable solution for a challenge identified by the city
- IMPACT 2: Increase the energy efficiency on district scale
- IMPACT 3: Increase significantly the share of renewable energies, their integration into the energy system, stimulate self-consumption, reduce curtailment to the minimum

- IMPACT 4: Increase local air quality.
- IMPACT 5: Reduce the technical and financial risks in order to give confidence to investors for investing in large scale replication.
- IMPACT 6: Make the local energy system more secure, more stable and cheaper for the citizens and public authorities.
- IMPACT 8: Reduce transport-based CO2 emissions, based on CO2 intensity of the European electricity grid of 443 CO2/kWh (coherent with TEST format - available on the Participant Portal)
- IMPACT 9: Create stronger links and active cooperation between cities in many Member States with a large coverage of cities with different size, geography, climatic zones and economical situations

Impacts related to the development of the electric mobility market:

- IMPACT 1: Provide a car sharing service, ensuring vehicles availability at peak demand periods and with the minimum battery load for the next scheduled or forecasted booking.
- IMPACT 2: Increase energy efficiency when charging a vehicle.
- IMPACT 3: Significantly increase the share of renewable energies, their integration into the energy system, stimulate self-consumption, reduce reductions to a minimum
- IMPACT 4: Increase local air quality, through an electric car integration
- IMPACT 5: Reduce technical and financial risks to give confidence to investors who want to invest in large-scale replication.
- IMPACT 6: Make the local energy system safer, more stable and cheaper for citizens and public authorities.
- IMPACT 8: Reduce transport-related CO2 emissions, based on CO2 intensity, by reducing the car fleet by increasing the number of users of VULOG
- IMPACT 9: Create stronger links and active cooperation between the cities of many Member States covering many cities of different sizes, geographical areas, climate zones and economic situations

6.2.2 KPIs

All KPIs related to the deployment of the Smart Charging application and of the related services are specified in the document D6.5 describing the TT#3 demonstration activities.

The following table describes the KPIs specific to the Measure#3 corresponding to the support by the CIP of the TT#3 demonstration activities.

KPI	Parameter	Baseline	Target
Quality of open Data	Number of datasets compliant with industry or governmental agencies standard data models [integer]	Existing industry standard data models for energy and Fiware foundation data (device, transportation).	100% of datasets in CIM compliant with existing standards if any. (Not part of DoW)
	Total number of datasets [integer]		

Usability of open data	Ratings of the easiness of use of datasets on the Likert scale [integer, Likert]	N/A – Smart Charging is a new application.	The ambition is a rating of 4 computed from the average ratings from users. (Not part of DoW)
Open data-based solutions	Number of datasets accessed from CIP producer/consumer APIs [integer]	N/A – Smart Charging is a new application.	70% of datasets accessed from the CIP. (Not part of DoW)
	Total number of datasets [integer]		

Table 12 - KPIs for CIP support of Measure#3

6.2.3 Monitoring Plan

The monitoring of the execution and completion of the activities related to the Measure#3 will rely on information distributed via the CIP from data delivered by the car-sharing platform and the Smart Charging management platform with additional post processing. Complementary information on energy aggregation at local level will be sourced from the DSO data center operated by ENEDIS partner. The resulting data will fuel the computation tasks of WP9 monitoring and evaluation activities. All details about the monitoring plan are described in the D6.5 deliverable of TT#3.

6.3 Commissioning plan

No commissioning plan can be disclosed so far. The identification of the exact scope and perimeter is still in progress as part of TT#3 activities and cannot be formalized yet among the involved parties. The delivery of an implementation plan is the next priority of activities related to TT#3.

6.4 Implementation of the measure

6.4.1 Planning of the activities

Work package	Task	Sub task	Entity concerned	Start	End	Milestones		Typology of data
Development of the car-sharing platform of the IRIS project and assimilation of dedicated cars	Assimilation of MNCA vehicles	Vehicle equipment by VUBOX, if necessary	VULOG MNCA	Mi	Mi +1	Mi+1	Successful vehicle integration	Location of vehicles Service usage time Battery charge for each vehicle Trip made in kilometers
		Connection with the AIMA platform		Mi	Mi +1			
	Assimilation of Nissan vehicles	Vehicle equipment by VUBOX, if necessary	VULOG EDF R&D	Mi	Mi +1			
		Connection with the AIMA platform		Mi	Mi +1			
	Creation of the car-sharing platform dedicated to the IRIS project	Data collection and qualification	VULOG	Mi +1	Mi +2	Mi+2	Gathering of information, mapping of habits (energy) and probability of booking.	
		Organization of input data		Mi +1	Mi +2			
		Simple implementation of algorithms		Mi +1	Mi +2			
		Adaptation of the car-sharing model		Mi +2	Mi +2	Mi+2	adaptation to address the sharing model of a private carpool instead of a public carsharing fleet	
Connections between carsharing and energy charging platforms	EDF R&D platform	Creation of the data lake	VULOG EDF R&D	Mi + 2	Mi+3	Mi+3	Exchange of information with the smart charging platform	Location of vehicles Optimal load Location of EVCI Statement of EVCI
		Contribution of VULOG data to the data lake		Mi+2	Mi+3			
		Contribution of EDF R&D data		Mi+2	Mi+3			
		Organization of data		Mi+2	Mi+3			
		Sends data to the AIMA platform		Mi+3	Mi+4			
		Sends data to the EDF R&D platform		Mi+3	Mi+4			
	DREEV platform	Creation of the data lake	VULOG DREEV	Mi+2	Mi+3			
		Contribution of VULOG data to the data lake		Mi+2	Mi+3			
		Contribution of DREEV data		Mi+2	Mi+3			
		Organization of data		Mi+2	Mi+3			
		Sends data to the AIMA platform		Mi+3	Mi+4			
		Sends data to the DREEV platform		Mi+3	Mi+4			
	Creation of algorithms related to load and displacement optimization	Data collection and qualification	VULOG	Mi +1	Mi+3	Mi+4	Set up ideal charging time with the necessary amount of "reloading".	
		Organization of input data		Mi+1	Mi+3			
		Simple implementation of algorithms		Mi+2	Mi+4			
Continuous integration into the car-sharing platform	Big Data architecture	Data collection and qualification	VULOG	Mi + 1	Mi+3	Mi+5	Study of the costs related to free floating with an optimization of energy load	Location of vehicles Service usage time Battery charge for each vehicle Trip made in kilometers Optimal load Location of EVCI Statement of EVCI
		Organization of input data		Mi + 2	Mi+2			
		Algorithm integration in carsharing plateform		Mi + 2	Mi+3			
		Tests		Mi +1	Mi+4			
		Development of displacement optimization algorithms		Mi+3	Mi+5			
		Prioritization management and conflict optimization		Mi+4	Mi+5			

Figure 14 - planning of Measure #3 activities

6.4.2 Costs

All cost related to implementation of measure #2, #3, #4 have been aggregated and included in the sub-contracting equipment's costs of the WP4.

6.4.3 Risks management

1. Limitations of experimentation activities due to contractual limitations
   a. The contractual implications of the activity implementations are yet not settled among the involved parties and leave the risk of bringing delays or limitations in the demonstration's scope. Impact of this on the metering activity is not clear yet.

2. System and/or protocol incompatibility can affect the feasibility and/or development costs related to the planned measures:
   a. The choice of the target EVCI to be included in the measure 1 demonstration activity has been restricted to the sole charging stations used for the shared EV fleet of NCA. Despite these charging stations are supporting the OCPP protocol, the technical feasibility of the dynamic control of these charging stations has still to be confirmed and the number of controllable stations might be reduced in case of incompatibility. The connection to internet of NCA private EVCI is planned but not yet completed: any data accessibility issue could be a risk for the demonstration realization.

3. Provision of flexibility services is relying on forecast performances which may not fulfilled the requirements for flexibility, or the level of flexibility could be too low for market integration
   a. The project is so far focusing only on fast charging technology to maximise the impact of the demonstration on flexibility.
   b. The pool of fast-charging stations of the private EVCI network is expected to provide significant flexibility volumes which would deserve to be integrated in an aggregator's flexibility portfolio. However, this technical assumption has still to be validated as part of the demonstration activities under the Measure#1 of TT#3.

6.4.4 Progress achieved up to M24

The main achievement during this period has been the rapid response to the change of the local market conditions with NCA retrieving the ownership of the city public EVCI (O&M contract signed between new owner NCA with IZIVIA) in January 2019 and the coordination of all IRIS partners involved to reassess and redefine the scope and objectives of IS 3.1 demonstrator (namely several departments of NCA, EDF, VULOG, and some other local stakeholders). The execution of the demonstration activity is leading to a deep modification of the contractual framework originally stated for these parties and the new contractual setup requires to well define the new roles and responsibilities of each stakeholder. The decision was to target for IS 3.1 demonstrator the private fleet of shared EV of NCA in replacement to the former public shared-EV fleet "Auto Bleue" and, consequently, to select the private EVCI of NCA in replacement of the city public EVCI "Prise de Nice".

6.5 Conclusion

The original objective of exploring how free-floating car-sharing is impacting air pollution, has been shifted towards the demonstration on how smart charging can be used to provide flexibility for the electric distribution grid based on a dynamic management of a shared EVs fleet to offer V1G and V2G energy services to the energy market while optimizing the turnover of vehicles and their availability to the end-users by an advanced forecasting and a dynamic management of EV battery charging.

The next implementation steps are the upgrade of the NCA self-operated car-sharing platform with the new generation interoperable carsharing platform “AIMA” from VULOG, the setup of a supervision platform provided by EDF to monitor and control the charging stations of the NCA private EVCI, the further interfacing of these platforms with the Smart Charging platform developed by EDF. The latter shall be then coupled to a V2G dedicated managed developed by DREEV in order to provide flexibility services to an energy aggregation platform operated by AGREGIO partner.

7 Measure#4: Services for grid flexibility

This IS will be implemented through IS 2.1 whose specifications are developed in deliverable 6.4. In the following section, we will describe how the data will be collected and then will be used by the CIP.

The local energy management system will be implemented on the two IS1.1 buildings: PALAZZO MERIDIA and IMREDD.

As a reminder, this system, which is connected to local VRES (variable renewable energy sources), decentralized battery storage and public/private EV charging infrastructure, aims to test different scenarios in order to provide flexibility services to the power grid.

8.1 Functional presentation

Figure 15 and *Figure 16* below represent, respectively, the architecture of PALAZZO MERIDIA and IMREDD.

The functional architecture is approximatively the same for both buildings.

All measured data are stored in a Building Management System and can be visualized through a Supervisory Control And Data Acquisition (SCADA) system. Then, thanks to a webservice, these data are locally collected, post treated and then stored in the City Innovation Platform.

The EMS part, designed by EDF, will optimize energy exchanges. The data will be, as for the BMS, visualized through a SCADA and shared with the CIP via a webservice.

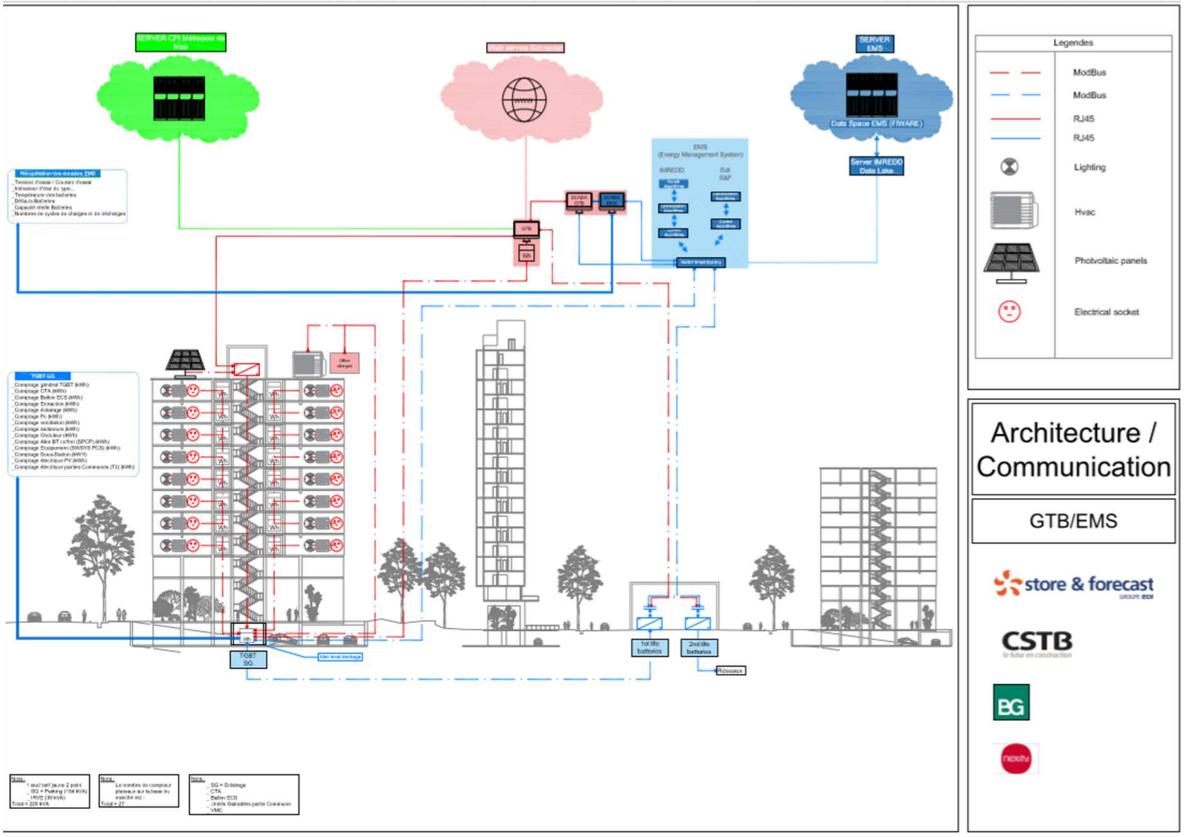

Figure 15 - Energy and data management system in the PALAZZO MERIDIA building (source BG21)

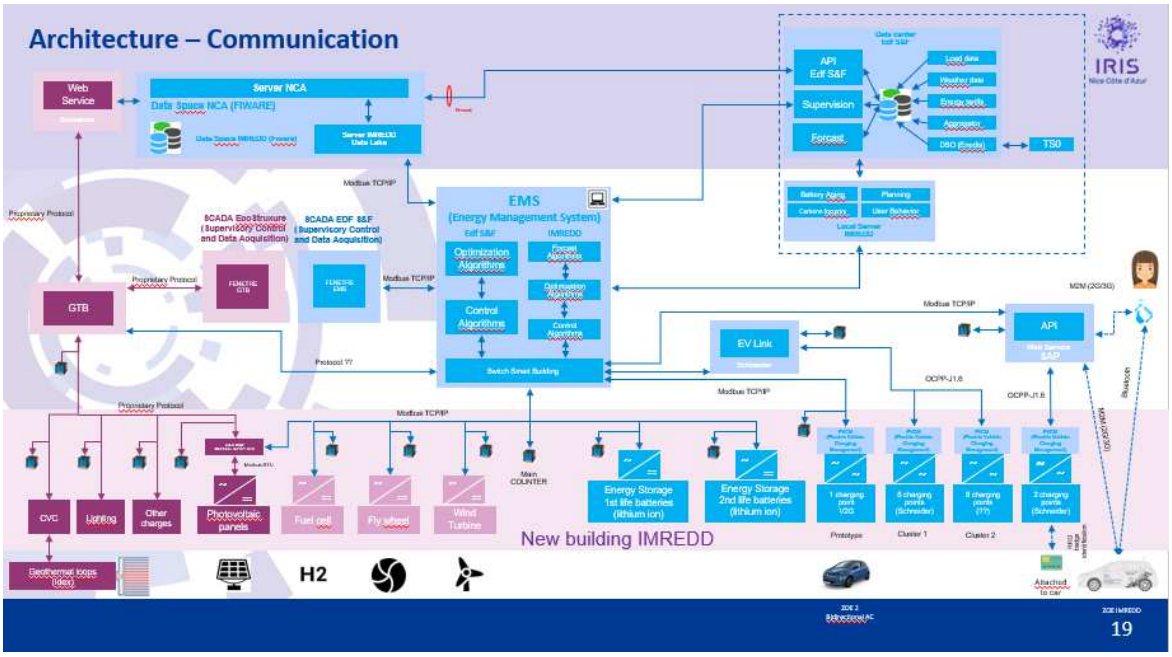

Figure 16 - Energy and data management system in the IMREDD building

In the IMREDD functional architecture diagram, we can see which data will be provided by the BMS (in purple) and which data will be provided by the EMS (in blue).

It should be noted that, all the data will not be uploaded to the CIP because this is very time-consuming and would not add value to the project.

Indeed, queries will be made on the two web services provided by the BMS and the EMS only for the data needed to calculate the KPIs. Then, the aggregation and data modelling (data model Fiware) will be done before pushing these data on the CIP.

The global KPIs defined in D6.3 are as follows

KPI	Unit	Definition	Target
Local renewable energy production	MWh/year	Produced energy from renewable production over a year	360
Degree of energy self-supply by RES	%	Ratio of locally produced energy from RES and the energy consumption over a year	80%
Storage capacity installed	kWh	Total electrical battery capacity installed in the project	300
Carbon dioxide emission reduction	tons CO_2/year	Total reduction of emissions of carbon dioxide per year after Measure 1 is implemented	24
Energy savings	MWh/year	Total reduction of the building energy consumption per year after Measure 1 is implemented	340
CO_2 reduction cost efficiency	€/ ton of CO_2 saved/year	Costs in euros per ton of CO_2 saved per year	Not fixed yet

Table 13 – KPIs for Measure#4

KPIs deal with services provided by the battery and energy production devices. For PALAZZO MERIDIA and IMREDD buildings, battery storage system is planned to increase the natural self-consumption of the building (common parts of the building for PALAZZO MERIDIA). Therefore, the monitoring plan is mainly based on the installation of electric power meters located in well-defined places.

In addition, the actual efficiency of the batteries (auxiliary consumption, non-ideal inverter and non-ideal discharge/charge behaviour) should be measured, but also the KPIs for the whole building should be evaluated.

Thus, the parameters to be monitored are listed in table.

KPI	Parameter(s)
Energy savings	PV production [MWh/year] Energy injected into the grid [MWh/year]
CO2 savings	PV production [MWh/year]
Peak load reduction	MAX elec peak [MW]
RES self-supply ratio	PV production [MWh/year] Elec consumption [MWh/year]

Ratio of valorised PV RES	PV production injected into the grid [MWh/year] PV production [MWh/year]
Useful storage capacity installed	Cumulative V1G BESS storage capacity activated [kWh] Cumulative 1st life BESS storage capacity [kWh] Level of charge of the electric battery relative to its capacity SoC
Battery degradation rate	Nominal 1st life BESS capacity [Ah] Final 1st life BESS capacity [Ah] Number of cycles of 1st life batteries [n]
Increased system flexibility	Number of activations per year Average Power flexibility [kW] Average Energy flexibility [kWh] Average activation duration

Table 14 - KPIs parameters for KPIs of Measure#4

Different scenarios will then be tested on these buildings. For example:
- use of the first life battery
- use of the second life battery
- use of the V2G technology

As a result, the KPIs will evolve during the course of the project in order to evaluate with precision these scenarios. As a result, the list of data traced back to the CIP could also vary.

This part of the project will therefore provide essential data for the CIP. However, the IMREDD building will use the stored data to feed the SCIC. This is what we will describe in a next paragraph.

7.2 Commissioning plan

Since all data comes from the EMS implemented in IS2.1, the commissioning plan is therefore logically linked to all the tasks of this solution for data collection and reporting.

Here below, the specific actions which have to be considered for the commissioning of the EMS:

1. 1 day
    a. Receipt of the cabinet for the hosting of the 2 industrial PC for the EMS and an additional one in case UNS/IMREDD have chosen to integrate a local SCADA.

   b. Additional commissioning of the two industrial PCs with the integrated needed software components
   c. On-site test communication infrastructure – direct internet connection (cable solution) if already commissioned, otherwise a 4G modem + cable will be integrated on site as intermediate solution
2. ½ day - with BESS supplier for pilot tests of EMS interfacing
3. ½ day - with supplier / operator BEMS to ensure local access and correct software interfacing for ensuring correct data exchange.
4. 1 day - test communication equipment – all assets (PV, metering station, etc.)
5. ½ day – reception and test for interfacing MMS/charging stations (1 cluster = 1 technology)

The technical communication interfaces will be delivered during the first semester 2020 and start the flexibility activation during the second semester 2020.

7.3 Progress update

The main achievement during this phase was the definition of the mode of acquisition and implementation of these data. Work carried out in collaboration with the actors of TT1 and TT2.

7.4 Energy scenario

All energy data concerning the IMREDD building will be visible in real time on the BIM, namely:
- renewable energy production: photovoltaic and wind power
- power consumption
- the different storage systems: 1st and 2nd life battery, flywheel
- recharging point for electric vehicles
- V2G

Thus, it will make possible to create a real educational tool for the academic, public and industrial world, through the dashboards present in the IMREDD SCIC. People will be able to have a better understanding of energy management within a building.

This device will initially be implemented at the building scale, on the BIM model, and could then be implemented at the scale of the district through the CIM model.

7.5 SCIC presentation

The "SMART CITY INNOVATION CENTER" is a project financed with the support of the European Union with the European regional development fund. The project also benefits from public co-financing from the Nice Côte D'azur metropolis, the Alpes-Maritimes department, the southern Provence-Alpes-Côte D'Azur region and the French state, notably within the framework of the "initiative of excellence" scheme of the "investments for the future" programme.

Figure 17 - SCIC

The Smart City Innovation Center is a unique collaborative technology platform in France, dedicated to innovation and economic development around the Smart City, a sustainable and connected city. The Showroom allows to materialize and visualize in real time all the data stored in the Data Center of the Metropolis and the piloting of the city which can result from it. Equipped with a dynamic data processing and display system, this 300 m² platform is installed at the Mediterranean Institute for Risk, Environment and Sustainable Development (IMREDD) in the heart of the Eco-Valley and displays a set of projects implementing innovative technologies and applications that enable the optimisation of the city's management and the improvement of services to the citizen. The IMREDD brings together the world of Research and Training represented by the University of Nice Sophia Antipolis and leading manufacturers in the field of innovation and the Smart City (Veolia, IBM, m2ocity, Orange, ERDF, EDF), with the support of the Nice Côte d'Azur Metropolis, with the aim of fostering synergies around projects dealing with 4 major issues for the Smart City: energy, the environment, risks and mobility. Thanks to the SCIC, all these players will be able to pool their data and know-how for the first time in a single place, thus multiplying the possibilities of experimenting with new uses and new services. Sensors distributed throughout metropolitan France will feed the platform by measuring various parameters such as air quality, rainfall volumes, road traffic fluidity, noise pollution, and the energy consumption of private individuals or companies volunteering to participate in the Nice Grid intelligent solar district demonstrator. The Smart City Innovation Center will make it possible to materialize and visualize in real time all of this collected data and the overall management of the city that may result from it. Open to all (students, start-up companies, researchers, the general public), the Smart City Innovation Center also aims to be a place for raising awareness and training, to build the intelligent city of tomorrow.

7.6 Conclusion

The CPI, thanks to which a lot of data is collected, will play a big role in this TT. It will make it possible to make available in the right format a mass of information, coming from other demonstrators, which we will be able to valorise through this measure and which we will be able to visualise on the model developed within the framework of measure 2.

This new tool, which will allow us to see in real time the impacts of the different energy scenarios on the elements of the building, will also play an educational role and will make it possible to raise the awareness of the various actors of the territory to energy (production of renewable energy, self-consumption, storage ...) which is a major stake of our territory.

8 Ethics requirements

8.1 GDPR compliance

Demonstrator	In a nutshell	
M#1: Sensors data collection in air quality	Data controller:	CIP, NCA, Atmosud
	Personal Data:	none
	High risk involved:	none
	DPIA:	none
	Informed Consent Procedure	none
M#2: BIM/CIM dashboard	Data controller:	CIP, NCA
	Personal Data:	Only aggregated data is used
	High risk involved:	none
	DPIA:	none
	Informed Consent Procedure	none
M#3: Charging infrastructure data for optimal EV based free-floating car sharing	Data controller:	IZIVIA, VULOG
	Personal Data:	none
	High risk involved:	none
	DPIA:	none
	Informed Consent Procedure	none
M#4: Data interoperability with energy cloud	Data controller:	EDF S&F, Agregio
	Personal Data:	Only aggregated data is used
	High risk involved:	none
	DPIA:	none
	Informed Consent Procedure	none

Table 15 - GDPR compliance

9 Output to other work packages

Output to Work Package 2

The barriers and drivers depicted in this deliverable could be used as immediate contribution to the investigation process in WP2, Task 1.

Output to Work Package 3

The point by point description of the demonstrators, just as their aspirations, drivers and hindrances developed here give a helpful contribution to the improvement of bankable plans of action in WP3.

Output to Work Package 4

The description of the actions in Transition Track #4 of the Nice ecosystem developed in this deliverable give a valuable contribution to the ongoing work in the execution of the City Information Platform in WP4.

Output to Work Packages 5 and 6

This deliverable includes the main point by point and reasonable description of the Lighthouse City exercises in Nice. The synergistic work started for the Deliverables 5/6/7 will be continued during the project. The deliverable will be fill in as a shared workplace to provide information and encourage the exchanges between the LHC's.

Output to Work Package 8

The description of the demonstrators, drivers and barriers developed in this deliverable give a significant contribution to the replication process and implementation plans for LHC's and FC's.

Output to Work Package 9

The description of the demonstrators, drivers and barriers developed in this deliverable give a contribution to the present document to build up a coher-ent monitoring plan. The arrangement of KPIs and target numbers will be planned based on the current and adjusted measurements depicted here.

Output to Work Package 10

The description of the demonstrators, drivers and barriers developed in this deliverable give premise and motivation for the dissemination occurring inside WP 10.

Output to Work Package 11

The point by point and refreshed description of the demonstrators, drivers and barriers created in this deliverable allow the Steering Committee of the IRIS project to evaluate the quality, control perspectives and deviations in the initiated tasks.

10 Conclusions and next steps

Key activities for the first 24 months

Until now, all the NCA ecosystem has worked together in order to imagine and prepare the different demonstrators of the IRIS project. Data services and data collection has been clearly identified. Furthermore, the job of each partner has been distributed and meetings were planned each month in order to verify the consistency of the different TTs.

Measure 1: Sensors data collection in air quality

This Measure#1 will enable to improve air quality data and support citizen engagement. Air data will be retrieved thanks to sensors and stations measurements; traffic data collected on the CIP and on other sources. The AZUR data model will integrate all these data to strengthen the accuracy of its future hourly output. These correlated data will be converted into innovative pedagogical tools co-designed with the Metropole NCA, relevant stakeholders and citizens

Measure 2: BIM/CIM dashboard

The digital modelling of the IMREDD building has been achieved and the building data collection is available on the CIP. The next step will be to put the different bricks together (data collection, 3D model….) in order to finalize the demonstrator. A commissioning period is already planned between the partners.

Measure 3: Data control and monitoring for Smart e-mobility

Due to the restructuring of the target EVCI and shared EV fleet to implement respectively IS 3.1 and IS 3.2 of TT#3 activities, the scope and the objectives of the TT#3 activities have been refined and shall get the agreement of all involved parties with the extension or amendments of existing related contracts and the possible need for additional agreements to be still concluded before starting to interface the different management platforms involved in the Measure#3. The NCA self-operated car-sharing platform will be upgraded in 1Q2020 with the new generation interoperable carsharing platform “AIMA” from VULOG. The monitoring of the NCA private EVCI supervision platform provided by EDF is scheduled from 4Q2020 with a concurrent activity to identify and select the data models used to interface this platform with the CIP. The interfacing of the Smart Charging platform with the CIP is planned from 2Q2021 for the support of V1G and V2G services.

Measure 4: Data interoperability with energy cloud

This management of the flexibility is relying on a real-time monitoring and a dynamic control of the whole resources and is requiring the full access to all the resources related data, the usage data and the environmental data in order allowing an impact assessment and a predictive management. The CIP is playing the necessary role of aggregator of these data, of any types and any origins, to fuel the development of smart energy management systems. The next step will be the data connection of the energy resources management platforms (Building EMS, EVCI supervisor) and the grid management platform (LEM) to the CIP in conformance with the standard data models related to the energy domain.

Key activities for the next months

The next 24 months will be mainly dedicated to the experimental part. There are still incoming adjustments about the demonstrators in TT4 leading to several deviations as explained in the previous section.