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D6.1 – Initial Pilot Definition

SCENE Project

Grant Agreement No. 831138

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Disclaimer

The SCENE consortium consists of the following partners.

No.	Name	Short Name	Country
1	VISIONWARE - SISTEMAS DE INFORMAÇÃO, SA	VISIONWARE	PT
2	JCP-CONNECT SAS	JCP-C	FR
3	ALMAVIVA - THE ITALIAN INNOVATION COMPANY SPA	ALMAVIVA	IT
4	COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	CEA	FR
5	AZIENDA METROPOLITANA TRASPORTI CATANIA SPA	CAT	IT

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[1]**Types.R:** Document, report (excluding the periodic and final reports); **DEM:** Demonstrator, pilot, prototype, plan designs; **DEC:** Websites, patents filing, press & media actions, videos, etc.; **OTHER:** Software, technical diagram, etc.
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Acronyms and Abbreviations

Acronym/Abbreviation	Description
IGW	Intelligent Gateway
SP	Service platform
KPI	Key performance Indicator
QoS	Quality of Service

CONTENTS

1 EXECUTIVE SUMMARY

This report is part of WP6 – System integration and validation. In this Work Package, the hardware, software and security components developed under WP3, WP4 and WP5 are integrated into a functioning product, which is put to the test using real-life scenarios.

The report D6.1 – Initial Pilot Definition documents the planning of the tests to be performed in the first phase of pilots, which will occur in months M13 and M14 of the project, in Italy, France and Portugal.

The pilots will test the platform and assess its performance according to the KPIs defined initially under D2.1, and updated in this document, in chapter 3.

2 PILOT ASSESSMENT METHODOLOGY

The pilots planned for France, Italy and Portugal will demonstrate the SCENE platform in different settings; the monitoring of critical infrastructures in Italy, the monitoring of air pollution in France and the detection of traffic infractions in Portugal.

The goal of these tests is to demonstrate the functionality of the platform and to calculate the Key Performance Indicators (KPIs) as they were defined in WP2 and updated in this deliverable.

The final KPI table has 13 indicators that allow us to monitor the achievement of the project's objectives. Where possible, the values of indicators will be determined with objective technical measurements. For KPIs which cannot be measured technically, a questionnaire will be used to determine their values in each of the pilots.

The questionnaire will be distributed by all participants on the pilots and invited observers and will be responded on a voluntary basis. The questionnaire has two sections, one to be answered by end users of the SCENE platform (for example, the commuters in the buses that will use the content delivery platform or the users of the data received from the sensors –police, critical infrastructure operators, pollution monitoring organizations) and another to be used by smart city operators (municipalities, private smart city operators).

The updated KPIs are documented in next section, and the proposed questionnaire in section 4.

3 UPDATED KPIS

This section updates on the KPIs defined at the beginning of the project, so they can be relevant for testing during the pilots.

The KPIs defined within this report supersede the initial KPIs defined in section 6 of deliverable D2.1.

The new updated KPI list is as follows:

KPI	Description	Target	Measurement method
KPI.1 - Network QoS	Simulation will be done for two networks (4G and WiFi). It is based on the assumption that user will use 4G just in case WiFI network is not available. The content will be prefetched at stopping point before a user or group of users (in case of bus) reached next stopped point	25% gain on video network traffic	It is measured using the define simulation scenario
KPI.2 - IGW data latency	This KPI is intended to measure the time lost in the IGW processing of data. Value is determined by measuring the time gap among the time the data is received by the IGW and the time it is transmitted to the SP. Assuming that IGW always has connectivity.	N/A now, (only in 2nd Phase of project)	Technical measurement.
KPI.3 - SP Data Latency	This KPI is intended to measure the efficiency in Service Platform elaboration by detecting the gap between the time the gateway publishes data to the central server and the time the data is available, after filtering, transformation and enrichment, into the data layer available for inquiring and analytics functions	<= 10 sec for “near-real-time" data <= 5 min for analytics batches	Technical measurement.
KPI.4 - IoT SP Process Throughput	This KPI is intended to measure the throughput in processing the IGW incoming messages. From this KPI it is possible to define the number of measurements that can be processed by the platform without significant decrease of performance.	<=6000 measurements per min	Technical measurement.

KPI	Description	Target	Measurement method
KPI.5 - Listened data ratio	KPI to measure the ratio among the IoT data received by the sensors and the data that has been collected by the sensor in a defined timeframe (day, week etc...)	>= 80 %	Technical measurement. NOTE: Sensor ratio will depend on the existing data to be sent to the gateway, and the "time window" a sensor will have to communicate to the gateway.
KPI.6 - Packets' drops (loss rate)	This metric directly reflects the congestion level of the network. It can be measured at the different nodes (i.e. at the transmission buffer level).	< 20 %	Technical measurement.
KPI.7 - False Positive Rate	This metric reflects the number of raised alerts which are not attacks. The objective of the security service will be to have this ratio as small as possible to avoid false alarm inspection and therefore time delay.	< 5 %	Technical measurement.
KPI.8 - Accuracy	This metric reflects the ratio of correctly identified results. It can be calculated through Accuracy=(TP+TN)/(TP+TN+FP+FN) with TP: True Positive, TN: True Negative, FP: False Positive, FN: False Negative.	>= 90 %	Technical measurement.
KPI.9 - Time to detect	This metric represents the delay between the start of an attack and its detection. SCENE security service will try to provide a delay as small as possible.	N/A (only 2nd phase)	Technical measurement.
KPI.10 - Positive feedback from prospective clients	This metric represents the market attractiveness of the SCENE platform.	>= 90 %	Questionnaire to be answered by prospects after each pilot.
KPI.11 - Successful integration	All components work together without problems.	>= 90 %	Technical questionnaire
KPI.12 - Functional end-user applications	Deployment of fully functional end-user applications.	>= 90 %	Questionnaire to be answered by prospects after each pilot.

KPI	Description	Target	Measurement method
KPI.13 - Management framework approved by end users	Evaluation of the management framework	>= 90 %	Questionnaire to be answered by prospects after each pilot.
KPI.14 - Gateway - Service Platform transmission quality	This KPI gives a measure of the quality of the data transmission from the Gateways to the Service Platform. It is calculated as the ratio between the measurements correctly sent by the Gateways and the measurements that effectively are received and processed by the Service Platform in a specific time interval.	>= 90 %	Technical measurement.

Table 1 - Updated KPIs

These KPIs are related to the project's objectives as demonstrated in the following table:

Objective	Success criteria	KPIs
Objective 1 - Design and implementation of a integrated IoT platform for smart city applications	Delivering SCENE ready for market, technical test results sheets should meet the system specs as per the design characteristics.	KPI.10
Objective 1.a: Verify the compatibility of both mobile content delivery and IoT based services in SCENE architecture	Pass the interoperability test within system components	KPI.11
Objective 1.b. Define and implement the underlying system infrastructure architecture and communication protocols	Selected communication protocols should be fully supported and pass the verification test.	KPI.2, KPI.3, KPI.4, KPI.5, KPI.14
Objective 1.c: Define/implement the application layer structure/interfaces	Delivery of defined applications with fully functional options	KPI.12
Objective 1.d : Security framework for both content delivery and IoT	SCENE succeeds security validation tests designed along with the initial threat analysis	KPI.7, KPI.8, KPI.9
Objective 1.e: Define/implement the management framework	Pass the verification test for monitoring/management (both modules and integrated system.	KPI.13
Objective 2: System integration and Deploy a "Living Lab" pilot to validate user acceptance and the business model	Successful completion of the field trials, leading to pre-sale agreements.	KPI.10

Table 2 - Relationship between KPIs and Project Objectives

4 QUESTIONNAIRE TO BE USED FOR PILOT ASSESSMENT

4.1 SCENE platform evaluation questionnaire - Final Users

This section of the questionnaire is meant for content delivery users of the pilots.

4.1.1 Content Delivery

4.1.1.1 Quality of Experience (QoE)

What is your experience with the SCENE's content delivery system?

a) Excellent
b) Good
c) Fair
d) Poor
e) Bad

4.1.1.2 Content

In your opinion, what kind of content could be more useful to provide (multiple replies allowed)?

a) Local news
b) Public transport information
c) City information
d) Entertainment
e) Other (please specify .....)

4.1.2 Sensitivity Aspects

4.1.2.1 Privacy Impact

In your opinion, what is the privacy impact of the IoT sensor network shown during the pilot, to the people on the bus using the content delivery system?

a) It constituted an invasion of privacy;
b) It did not constitute an invasion of privacy.

In your opinion, what is the privacy impact of the IoT sensor network shown during the pilot, to people present at the space being monitored by the sensor network?

a) It constituted an invasion of privacy;
b) It did not constitute an invasion of privacy.

4.2 SCENE platform evaluation questionnaire - Smart City Operators

This section of the questionnaire is meant for users of the SCENE system (municipalities, smart city operators, traffic control authorities, etc.).

4.2.1 Technical Aspects

4.2.1.1 Quality of Integration

Based on your observations, do you consider the various parts of the SCENE system to work smoothly together?

a) Yes
b) No

During your whole interaction with the system, did the system malfunction?

a) No, not at all
b) Yes, a few times
c) Yes, several times
d) Excessive number of system malfunctions

Data from your sensors are accessible through SCENE

a) easily
b) with no difficulties
c) With some difficulties please specify: _____
d) With great difficulties please specify: _____
e) Cannot be accessed

4.2.1.2 Security

Which is your perception of the security features provided by SCENE platform?

a) Excellent
b) Good
c) Fair
d) Poor please specify: _____
e) Bad please specify: _____

4.2.2 Usability

4.2.2.1 Ease of Use

From your experience with the SCENE system during the pilot, do you feel it to be:

a) Easy to use for a skilled operator
b) Not easy to use for a skilled operator

Regarding accessing SCENE system by using the web Dashboard, the overall user experience was:

a) Excellent, menus are well designed, available functionalities are easy to use
b) Good, menus and functionalities are usable with no difficulties
c) Fair, no particular difficulties encountered during usage
d) Poor, some difficulties encountered during use

Please specify: _____

e) Bad, web site crashed, and no usage was possible

Please specify: _____

4.2.3 Strategic Positioning

4.2.3.1 Comparison with other IoT sensor networks

Considering your previous experiences with other smart city IoT sensor networks, how would you qualify SCENE's performance in terms of deployment of the IoT sensor network?

a) Much better
b) Better
c) Equal
d) Worse
e) Much worse

Do you believe the SCENE framework as shown during the pilot to be applicable to your city?

a) Yes, absolutely
b) Yes, with some changes
c) Not without significant changes
d) Absolutely not

4.2.4 Sensitivity Aspects

4.2.4.1 Privacy Impact

In your opinion, what is the privacy impact of the IoT sensor network shown during the pilot, to the people on the bus using the content delivery system?

a) It constituted an invasion of privacy;
b) It did not constitute an invasion of privacy.

In your opinion, what is the privacy impact of the IoT sensor network shown during the pilot, to people present at the space being monitored by the sensor network?

a) It constituted an invasion of privacy;
b) It did not constitute an invasion of privacy.

5 ITALY USE CASE – CRITICAL INFRASTRUCTURES

A.	END USER
AZIENDA METROPOLITANA TRASPORTI CATANIA SPA	
SCENE Partners involved	
AlmavivA	Pilot coordinator, service platform
JCP-C	IGW, content delivery
VisionWare	Security validation
CEA	Security validation

B.	Use Case Title
Monitoring Critical Infrastructures and Buildings	

C.	USE CASE DESCRIPTION
Accurate description of the Use Case. It should be as detailed as possible in order to include all the main aspects of the scenario and the monitoring activity needed. *Please describe different Use Case scenarios with different difficulty, if applicable.*	
Description	
The proposed ITALY Use Case is focused on the need to have an "intelligent" monitoring system of some specific parameters of urban infrastructures, both structural and functional, (e.g. useful to evaluate the effects of an earthquake on the usability of the infrastructure or to gather specific parameters on the state of the art of ancient and artistic buildings/monuments due to traffic vibrations, earthquake, etc.). Referring to the structural characteristics and taking into account the static nature of the road main body and of the other infrastructure parts, sensors should be essentially composed by accelerometers, or IMU units, that measure displacements vibrations and rotation for both buildings and infrastructures. A set of sensors will be deployed throughout the interested area of infrastructure to be monitored. They will collect data and store them in order to send to the IGW when it will be in range. One option to be further evaluated is to have one of the sensor nodes that act as other sensors data collector, dedicated to the transmission to the IGW. This possibility would enable usage of simpler sensors. The data received by the IGW will be transmitted to the Central Service Platform, the core of SCENE Platform. There, the data will be securely stored and will be available to be used by the authorized customers. Analytics are produced to assess platform performance and functions will be available through the main web dashboard.	

D.	TRIGGER EVENTS
Detailed description of the Events of Interest in terms of objects (i.e. cars, people, bridges) and their behaviors/variables that must be detected/measured. It is fundamental to describe what triggers an event or what permanent variable is tracked by the sensor. Add information if there are threshold values above/below which the particular event is verified (i.e. if a car is stropped more than 5 minutes then it is considered 'double parking' and ', this is an event of interest and then it must be detected). *Please specify the scenario Id for every Event defined (one, more or ALL) if multiple scenarios are described above*	
The events to be monitored in Italy pilot tests are collected in the unique scenario of "Infrastructure Monitoring". These events are movements and vibrations occurring in an infrastructure, in our case a building in the historic center of Catania. These events can be determined by traffic, earthquakes or unexpected structural issues. They are monitored along the 3D space, in the X, Y and Z axis. Some thresholds can be defined in order to automatically detect if the monitored events are within specific value ranges. If not, we require an alert to be generated and sent to specific email recipients.	

E.	AREAS DEFINITION
General description of the areas to be monitored in terms of extension, if urban or rural, if outdoors or indoors, expected conditions, etc.	
The areas to be monitored are parts of an old building located in the historic center of Catania, near the bus terminus. Further tests may be held in another building away from the bus terminal.	

F.	CRITICAL ELEMENTS
Accurate description of the risk factors involved in the Use Case definition. For example, if a sensor is to be deployed in a coast area, salt and sand may be risk factors for the integrity of the sensor itself.	
When tests are conducted outside the infrastructures to be monitored, the sensors must be waterproof. In addition, having the sensors outdoor, poses risks for the sensors that could be vandalized. For outdoor sensors where there is no available power line, solar power banks are used to power some units. Such power banks can recharge if correctly exposed to sunlight. The risk is not to expose them in the right way, or if there is bad weather (or during night time) sunlight may not be sufficient to generate enough power to recharge them. But as mitigation measure for Pilot tests, we can affirm that the internal sensors batteries and the used power banks have sufficient power to execute all the designed tests.	

G.	EXPECTED RESULTS
Comprehensive explanation of the expected results (i.e. regarding cars and people, possible results are vehicles identification, number of people involved, evidence recording and storage for legal use). *Please specify the scenario Id for every expected result (one, more or ALL) if multiple scenarios are described above*	
From the pilot tests the expected result is to receive a constant stream of data from the sensors, timed on sensors-IGW interaction.	

H.	ALERT
In case of event detection, a notification is sent. Specify in which way you prefer it (email, text, etc.) and if you want any other real time data (i.e. picture, short video, etc.)	
If and when threshold values are set, we expect to receive notification emails in case of sensors data outside validity range.	

I.	POTENTIAL MARKET
Indication about any other possible market in which the present Use Case could be applied	
Other potential market that can use the architecture of Italy Pilots are: Structure Health Monitoring, statistic modeling regarding vibrations and movements in infrastructures, prediction systems.	

J.	OTHER
Please specify any possible additional information useful for the Use Case definition namely how the privacy of uninvolved parties is protected)	
Italy pilot tests don't generate any sensitive data, hence there is no impact on privacy.	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
1	Network QoS	Simulation will be done for two networks (4G and WiFi). It assumes that user will use 4G just in case Wi-Fi network is not available. The content will be prefetched at stopping point before a user or group of users (in case of bus) reached next stopped point.	25% gain on video network traffic	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
2	IGW data latency	This KPI is intended to measure the time lost in the IGW processing of data. Value is determined by measuring the time gap among the time the data is received by the IGW Gateway and the time it is transmitted to the SP. Assuming that IGW always has connectivity.	Only in 2nd phase of pilots.	
3	SP Data Latency	This KPI is intended to measure the efficiency in Service Platform elaboration by detecting the gap between the time the gateway publishes data to the central server and the time the data is available, after filtering, transformation and enrichment, into the data layer available for inquiring and analytics functions.	<= 10 sec for "near-real-time" data <= 5 min for analytics batches	
4	IoT SP Process Throughput	This KPI is intended to measure the throughput in processing the IGW incoming messages. From this KPI it is possible to define the number of measurements that can be processed by the platform without significant decrease of performances.	<= 6000 measurements per min	
5	Listened data ratio	KPI to measure the ratio among the IoT data received and the data that has been collected by the sensor in a defined timeframe (day, week etc...)	80%	
6	Packets' drops (loss rate)	This metric directly reflects the congestion level of the network. It can be measured at the different nodes (i.e. at the transmission buffer level).	20%	
7	False Positive Rate	This metric reflects the number of raised alerts which are not attacks. The objective of the security service will be to have this ratio as small as possible to avoid false alarm inspection and therefore time delay.	5%	
8	Accuracy	This metric reflects the ratio of correctly identified results. It can be calculated through Accuracy=(TP+TN)/(TP+TN+FP+FN) with TP: True Positive, TN: True Negative, FP: False Positive, FN: False Negative.	90%	
9	Time to detect	This metric represents the delay between the start of an attack and its detection. SCENE security service will try to provide a delay as small as possible.	Only in 2nd phase of pilots.	
10	Positive feedback from prospective clients	This metric represents the market attractiveness of the SCENE platform.	90%	
11	Successful integration	All components work together without problems.	90%	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
12	Functional end-user applications	Deployment of fully functional end-user applications.	90%	
13	Management framework approved by end users	Evaluation of the management framework.	90%	
14	KPI.14 - Gateway - Service Platform transmission quality	Gateway - Service Platform transmission quality. This KPI gives a measure of the quality of the data transmission from the Gateways to the Service Platform. It is calculated as the ratio between the measurements correctly sent by the Gateways and the measurements that effectively are received and processed by the Service Platform in a specific time interval.	90%	

6 FRANCE USE CASE – HIGH CAPACITY SENSORS

A.	END USER
Keolis (transport operator of Rennes Métropole)	
SCENE Partners involved	
JCP-C	Pilot coordinator, IGW, content delivery
AlmavivA	Service platform
VisionWare	Security validation
CEA	Security validation

B.	Use Case Title
Monitoring High capacity sensors in the city	

C.	USE CASE DESCRIPTION
Accurate description of the Use Case. It should be as detailed as possible in order to include all the main aspects of the scenario and the monitoring activity needed. *Please describe different Use Case scenarios with different difficulty, if applicable.*	
Description	
The proposed Use Case aims at extending current practices in air quality measurements by providing an end-to-end urban platform in the Rennes Metropolitan area (43 cities), thus allowing citizens to access and use data on air quality and policy makers to take informed decisions. Data on air quality measurements will be collected by placing sensors on buses for local transportation and, in case of measurements for catastrophic events, the municipality intends to use drones, out of the scope of the SCENE project. High Performance Computing (HPC) capabilities will be used by the customer to perform numerical simulation with an accurate pollution dispersion model. The Action will use HPC resources both centrally in supercomputing centres and distributed on enhanced sensors. The resulting data will be made available to citizens thanks to the Open-Data Public Metropolitan Service that is being developed separately by the Rennes Metropolitan area (https://data.rennesmetropole.fr/page/home/). Metadata will be published on the French national Open Data Portal (https://www.data.gouv.fr/) and harvested by the European Data Portal from there. The platform will be used after the end of the Action by Rennes Metropolitan area and other stakeholders involved in the air quality measurement services and process, in particular through the implementation of a new business model called “HPC as a service”. Within this model, specialized HPC companies provide a service based on harnessing Open Data and using HPC	

resources. Furthermore, simulation/visualization services will be offered for any stakeholder who would need them. Moreover, additional data and capabilities could easily be included, and the platform could be easily transferable and replicable to other cities. Practically, the SCENE platform will be embedded in a bus operated by Keolis (transport operator of Rennes Métropole) and will collect and process the data of air quality sensors placed on top the bus but also on others places in the city.

D.	TRIGGER EVENTS
Detailed description of the Events of Interest in terms of objects (i.e. cars, people, bridges) and their behaviors/variables that must be detected/measured. It is fundamental to describe what triggers an event or what permanent variable is tracked by the sensor. Add information if there are threshold values above/below which the particular event is verified (i.e. if a car is stropped more than 5 minutes then it is considered 'double parking' and ', this is an event of interest and then it must be detected). *Please specify the scenario Id for every Event defined (one, more or ALL) if multiple scenarios are described above*	
A periodical event will be scheduled to collect the Air Quality data from the sensor mounted in the bus.	

E.	AREAS DEFINITION
General description of the areas to be monitored in terms of extension, if urban or rural, if outdoors or indoors, expected conditions, etc.	
The areas to be monitored are parts of the bus route in the Rennes Metropolitan. There is possibility to extend the area in the Rennes Metropolitan region if SCENE platform installed on the multiple buses.	

F.	CRITICAL ELEMENTS
Accurate description of the risk factors involved in the Use Case definition. For example, if a sensor is to be deployed in a coast area, salt and sand may be risk factors for the integrity of the sensor itself.	
The remote/field parts of SCENE platform (e.g. IGW, sensors, etc.) should be secured and packed to avoid any external intervention. The outdoor Air Quality sensor should be packed to protect it from damage (e.g. water, moisture, etc.) but its input and output air flow hole should be opened in order to allow the air flow passed via a sensor to measure the accurate values. The sensor will not provide the accurate value if its air flow holes are blocked.	

G.	EXPECTED RESULTS
Comprehensive explanation of the expected results (i.e. regarding cars and people, possible results are vehicles identification, number of people involved, evidence recording and storage for legal use). *Please specify the scenario Id for every expected result (one, more or ALL) if multiple scenarios are described above*	
The expected outcomes are continuous measurement of the air quality sensor data which will be sent to the SCENE Service Platform (SP).	

H.	ALERT
In case of event detection, a notification is sent. Specify in which way you prefer it (email, text, etc.) and if you want any other real time data (i.e. picture, short video, etc.)	
The alert should be sent via email/text in case of high value of air quality measurement observed in terms of Particulate Matter (PM), which reflects dust, smoke, mist, respirable particles, inhalable particles, etc.	

I.	POTENTIAL MARKET
Indication about any other possible market in which the present Use Case could be applied	
The proposed use-case is a key catalyst that provide vital information of air quality in the target area. There are many cities in the world which lack this information, and measurement of air quality could play a vital role to tackle the air pollution through planning (e.g. plant more trees) and strict actions against the factors which cause of pollution, policy makers to take required decisions. The other potential markets which could use air quality information for residential schemes, future planning regarding the environment protection, fresh and clean air for citizen, etc.	

J.	OTHER
Please specify any possible additional information useful for the Use Case definition namely how the privacy of uninvolved parties is protected)	
French air quality use-case collect the information about air quality, and there is no privacy factor involved.	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
1	Network QoS	Simulation will be done for two networks (4G and WiFi). It assumes that user will use 4G just in case Wi-Fi network is not available. The content will be prefetched at stopping point before a user or group of users (in case of bus) reached next stopped point.	25% gain on video network traffic	
2	IGW data latency	This KPI is intended to measure the time lost in the IGW processing of data. Value is determined by measuring the time gap among the time the data is received by the IGW Gateway and the time it is transmitted to the SP. Assuming that IGW always has connectivity.	Only in 2nd phase of pilots.	
3	SP Data Latency	This KPI is intended to measure the efficiency in Service Platform elaboration by detecting the gap between the time the gateway publishes data to the central server and the time the data is available, after filtering, transformation and enrichment, into the data layer available for inquiring and analytics functions.	<= 10 sec for "near-real-time" data <= 5 min for analytics batches	
4	IoT SP Process Throughput	This KPI is intended to measure the throughput in processing the IGW incoming messages. From this KPI it is possible to define the number of measurements that can be processed by the platform without significant decrease of performances.	<= 6000 measurements per min	
5	Listened data ratio	KPI to measure the ratio among the IoT data received and the data that has been collected by the sensor in a defined timeframe (day, week etc...)	80%	
6	Packets' drops (loss rate)	This metric directly reflects the congestion level of the network. It can be measured at the different nodes (i.e. at the transmission buffer level).	20%	
7	False Positive Rate	This metric reflects the number of raised alerts which are not attacks. The objective of the security service will be to have this ratio as small as possible to avoid false alarm inspection and therefore time delay.	5%	
8	Accuracy	This metric reflects the ratio of correctly identified results. It can be calculated through Accuracy=(TP+TN)/(TP+TN+FP+FN) with TP: True Positive, TN: True Negative, FP: False Positive, FN: False Negative.	90%	
9	Time to detect	This metric represents the delay between the start of an attack and its detection. SCENE security service will try to provide a delay as small as possible.	Only in 2nd phase of pilots.	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
10	Positive feedback from prospective clients	This metric represents the market attractiveness of the SCENE platform.	90%	
11	Successful integration	All components work together without problems.	90%	
12	Functional end-user applications	Deployment of fully functional end-user applications.	90%	
13	Management framework approved by end users	Evaluation of the management framework.	90%	
14	KPI.14 - Gateway - Service Platform transmission quality	Gateway - Service Platform transmission quality. This KPI gives a measure of the quality of the data transmission from the Gateways to the Service Platform. It is calculated as the ratio between the measurements correctly sent by the Gateways and the measurements that effectively are received and processed by the Service Platform in a specific time interval.	90%	

7 PORTUGAL USE CASE – DOUBLE PARKING IN CITY ENVIRONMENTS

A.	END USER
Município Matosinhos	
SCENE Partners involved	
VisionWare	Pilot coordinator, IoT sensor provider
JCP-C	IGW, content delivery
AlmavivA	Service Platform
CEA	Security validation

B.	Use Case Title
Double parking in city environments	

C.	USE CASE DESCRIPTION
Accurate description of the Use Case. It should be as detailed as possible in order to include all the main aspects of the scenario and the monitoring activity needed. *Please describe different Use Case scenarios with different difficulty, if applicable.*	
Description	
The Portuguese Use Case for the SCENE Project, will concern the abusive parking of cars on the road, alongside already – legitimately – parked cars. The developed system will consist of a camera – also referred to as "sensor" – that is fixed on a lamp post or similar, of an intelligent gateway that may be mobile and located on a bus or utility vehicle, and of a service platform that will be located remotely in respect to sensor and gateway and will give access to the information to a system operator. The sensor will work autonomously and without human interaction. Integrated AI will detect a double-parked car and take a picture (also called "evidence") that will store time, location and the license plate number. After a pre-determined, programable, time the system will take another picture of the same car and register the event as a double-parking violation. Otherwise, if the car is not anymore present after the given time, the first picture will be deleted. The sensor will then wait for a gateway to come within communication range and transmit the event information (start and end time, location, license plate) and evidences. The gateway will relay this information to the central service platform, without keeping any copies after successful transmission. The service platform will be operated by a local authority, in the Portuguese case a Municipal Police Force – Polícia Municipal. The obtained information will be used, according to local and national laws and regulations, to trigger an event: either a ticket and respective fine can be processed for	

the infraction, or a patrol can be sent to the location to personally proceed with the infraction processing or another action, decided by the operator. If the operator discards an event, for whatever reason, the service platform will delete the evidences. The evidence for a triggered event will either be kept on the platform for a pre-determined time frame or be downloaded by the authority for proper storage. To protect privacy, other license plates and any human faces will be blurred in the sensor.

D.	TRIGGER EVENTS
Detailed description of the Events of Interest in terms of objects (i.e. cars, people, bridges) and their behaviors/variables that must be detected/measured. It is fundamental to describe what triggers an event or what permanent variable is tracked by the sensor. Add information if there are threshold values above/below which the particular event is verified (i.e. if a car is stropped more than 5 minutes then it is considered 'double parking' and ', this is an event of interest and then it must be detected). *Please specify the scenario Id for every Event defined (one, more or ALL) if multiple scenarios are described above*	
The events will be triggered by double-parked cars within the observed area. The double-parking is detected as a car stopped in the "forbidden zone" for over 5 minutes. We expect to see the detection in the following scenarios: a) The car double-parks for over 5 minutes; b) The car stops but leaves before the passage of the 5 minutes: c) The car is double-parked in a position where the license plate is not visible; d) The double-parked car has dirty / smudged license plates.	

E.	AREAS DEFINITION
General description of the areas to be monitored in terms of extension, if urban or rural, if outdoors or indoors, expected conditions, etc.	
The first phase of pilot will be tested within the Lionesa industrial park. A street will be selected and the camera will be mounted on a location which is safe from vandalism (indoors) and covers the street. The IGW will be mounted on a mobile vehicle, which simulates the bus.	

F.	CRITICAL ELEMENTS
Accurate description of the risk factors involved in the Use Case definition. For example, if a sensor is to be deployed in a coast area, salt and sand may be risk factors for the integrity of the sensor itself.	
The legal aspects have to be carefully analyzed, both with regards to placing a camera in a public space and processing personal data.	

G.	EXPECTED RESULTS
Comprehensive explanation of the expected results (i.e. regarding cars and people, possible results are vehicles identification, number of people involved, evidence recording and storage for legal use). *Please specify the scenario Id for every expected result (one, more or ALL) if multiple scenarios are described above*	
We expect to accurately detect double-parked cars and to receive the evidences in the service platform.	

H.	ALERT
In case of event detection, a notification is sent. Specify in which way you prefer it (email, text, etc.) and if you want any other real time data (i.e. picture, short video, etc.)	
The alert is sent to the service platform, including a timestamped picture of the beginning of the infraction and another after 5 minutes and the license plate of the car. This will be demonstrated in the client application.	

I.	POTENTIAL MARKET
Indication about any other possible market in which the present Use Case could be applied	
The potential market is all mid-range municipalities with parking constraints / issues.	

J.	OTHER
Please specify any possible additional information useful for the Use Case definition namely how the privacy of uninvolved parties is protected)	
The area where the pilot is executed will be clearly marked, to avoid unaware people to be caught within the field of camera observation. The images are greyed out – anonymized – so the only captured data is the license plate of the car which will be used in the demonstration. This will be a company car, not allocated to any specific person. With these precautions, the first phase pilot in Portugal can be done without processing any personal data.	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
1	Network QoS	Simulation will be done for two networks (4G and WiFi). It assumes that user will use 4G just in case Wi-Fi network is not available. The content will be prefetched at stopping point before a user or group of users (in case of bus) reached next stopped point.	25% gain on video network traffic	
2	IGW data latency	This KPI is intended to measure the time lost in the IGW processing of data. Value is determined by measuring the time gap among the time the data is received by the IGW Gateway and the time it is transmitted to the SP. Assuming that IGW always has connectivity.	Only in 2nd phase of pilots.	
3	SP Data Latency	This KPI is intended to measure the efficiency in Service Platform elaboration by detecting the gap between the time the gateway publishes data to the central server and the time the data is available, after filtering, transformation and enrichment, into the data layer available for inquiring and analytics functions.	<= 10 sec for “near-real-time" data <= 5 min for analytics batches	
4	IoT SP Process Throughput	This KPI is intended to measure the throughput in processing the IGW incoming messages. From this KPI it is possible to define the number of measurements that can be processed by the platform without significant decrease of performances.	<=6000 measurements per min	
5	Listened data ratio	KPI to measure the ratio among the IoT data received and the data that has been collected by the sensor in a defined timeframe (day, week etc...)	80%	
6	Packets' drops (loss rate)	This metric directly reflects the congestion level of the network. It can be measured at the different nodes (i.e. at the transmission buffer level).	20%	
7	False Positive Rate	This metric reflects the number of raised alerts which are not attacks. The objective of the security service will be to have this ratio as small as possible to avoid false alarm inspection and therefore time delay.	5%	
8	Accuracy	This metric reflects the ratio of correctly identified results. It can be calculated through Accuracy=(TP+TN)/(TP+TN+FP+FN) with TP: True Positive, TN: True Negative, FP: False Positive, FN: False Negative.	90%	
9	Time to detect	This metric represents the delay between the start of an attack and its detection. SCENE security service will try to provide a delay as small as possible.	Only in 2nd phase of pilots.	

K.	KPI Measurement			
Id	KPI	KPI Description	Expected	Measured
10	Positive feedback from prospective clients	This metric represents the market attractiveness of the SCENE platform.	90%	
11	Successful integration	All components work together without problems.	90%	
12	Functional end-user applications	Deployment of fully functional end-user applications.	90%	
13	Management framework approved by end users	Evaluation of the management framework.	90%	
14	KPI.14 - Gateway - Service Platform transmission quality	Gateway - Service Platform transmission quality. This KPI gives a measure of the quality of the data transmission from the Gateways to the Service Platform. It is calculated as the ratio between the measurements correctly sent by the Gateways and the measurements that effectively are received and processed by the Service Platform in a specific time interval.	90%	