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Abstract: This document describes Óbidos City Council Public Safety Scenario

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Glossary

Acronym	Meaning
ADSL	Asynchronous Digital Subscriber Line
BTS	Base Stations
C2	Command and Control
CBRN	Chemical, Biological, Radiological, and Nuclear
CMO	Óbidos Municipality (*Câmara Municipal de Óbidos*)
GNR	Republican National Guard
GSM	Global System for Mobile Communications
IM	Institute of Meteorology
INAG	Water National Institute
INE	National Statistic Institute
OP	Óbidos Patrimonium (municipal company)
PSP	Public Safety Police
QFU	Aviation Q-code for Magnetic Heading of a Runway
RLO	Radio Litoral Oeste
SIRESP	Integrated Networks System for Safety and Emergency of Portugal (*Sistema Integrado de Redes de Emergência e Segurança de Portugal*)
TETRA	TErrestrial TRunked RAdio
TETRA PTT	TETRA Push To Talk
WAC	Wireless Adaptive Communications
WCDMA	Wideband Code Division Multiple Access
Wi-Fi	Wireless Fidelity

References

Number	Reference
[1]	Óbidos Municipality web site: http://www.cm-Óbidos.pt/ (September 2011)
[2]	Portuguese National Statistical Institute: http://www.ine.pt (September 2011)
[3]	Óbidos aerodrome information: http://www.pelicano.com.pt/zp_Óbidos.html
[4]	GNR Óbidos: http://www.gnr.pt/default.asp?do=t04/14tn0vCnpn1/qrsv0vpn1EE
[5]	Óbidos Fire department: http://demo67.dapfoto.com/
[6]	Optical Fiber in Óbidos http://www.Óbidosdiario.com/index.php?option=com_content&view=article&id=228:Óbidos-com-fibra-optica-em-toda-a-vila&catid=77:noticias&Itemid=120
[7]	Radio Litoral Oeste: http://www.litoraloeste.net/
[8]	Environment impact study regarding Óbidos barrage http://www.iambiente.pt/IPAMB_DPP/docs/RNT1542.pdf
[9]	Óbidos barrage characterization: http://cnpgb.inag.pt/gr_barragens/gbportugal/Obidos.htm
[10]	Civil protection brochures http://www.prociv.pt/InformacaoPublica/RecInformativosPedagogicos/Pages/Folhetos.aspx
[11]	SIRESP http://www.siresp.com/
[12]	National Institute of Water www.inag.pt
[13]	National Commission for Data Protection http://www.cnpd.pt/
[14]	Institute of Meteorology website, http://www.meteo.pt

1. Introduction

The correct collection of information and requirements from the diverse participant cities is one of the project goals. Gathering and analyzing this information is possible identify the main concerns of the cities during the diverse scenarios. Identify the emergency services, public entities, main public places and communications structures are essential to achieve the better response to each possible scenario. This way, emergency operations' responsiveness can be improved achieving appropriate and efficient performances. Analyzing the diverse contributions from the partners is possible choose the better solution for the project implementation.

1.1 Purpose of the document

The objective of this document is to provide information about Óbidos Public Safety Scenario allowing the choice of the better one to our project needs. Collecting the information about emergency services, public entities, main public places and communications services of Óbidos, allowing the selection of the better one to the project and ensure that fits with the project requirements.

Óbidos town, due to its particular characteristics is a good solution for the SafeCity public safety scenario. The small size of the town, the old architecture and it associated risk for natural disasters, turns Óbidos a good solutions to implements a SafeCity infrastructure scenario. Óbidos town is a great opportunity to mix the problems associated to old buildings with new solutions to Public Safety Scenarios.

1.2 Scope and structure

The scope of this document is to identify and describe the emergency and public entities responsible in emergency scenarios and its capabilities, also innumerate the services and infrastructures of communications and its relevant characteristics to the Public Safety scheme. Some solutions and its implications to the Public Safety of Óbidos are also focused.

The information is separated by its different topics related to each intervention area and are complemented with some social ethics and their constraints.

2. Óbidos general overview

Óbidos is a small town, but one of the most known in Portugal. Óbidos Municipality has approximately 10900 (2001) inhabitants spread over 142.6 square kilometres Almost 30% of them are located it the Óbidos town [1]. The population density is around 76.10 inhabitants per square kilometre and with an almost constant tendency in terms of number of inhabitants. CMO is located in the West sub-region of the Estremadura of Portugal. Óbidos Municipality belongs to the Leiria District that has 9 parishes and it has borders with four municipalities (Peniche, Caldas da Rainha, Bombarral and Lourinhã) and with the Atlantic Ocean.

Beyond the Atlantic Ocean, the Óbidos Municipality has diverse watercourses, one dam and a bigger lagoon with swamps. The municipality has also a large green area and a significantly protected area around the lagoon.
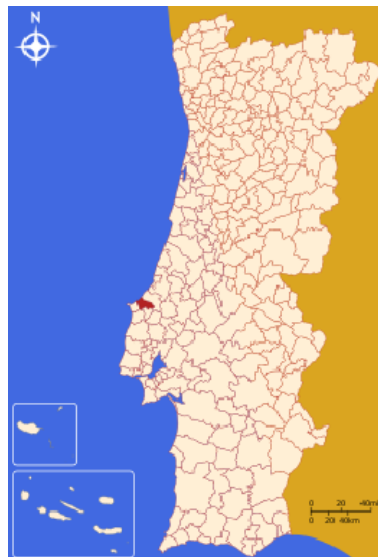
Figure 1 – Óbidos location in Portugal (from Wikipedia)

The economical activity is distributed by the different sectors like shown in Figure 2 [1]. Almost half of the economy is from tertiary sector, which corresponds to the service providers like commercial, education, health, telecommunications, tourism, banks, transports, etc. Table 1 [1] presents information related to the main economical activities of the municipality like hotels, banks, construction, and other social indicators like electricity consumption and activity/unemployment rates.
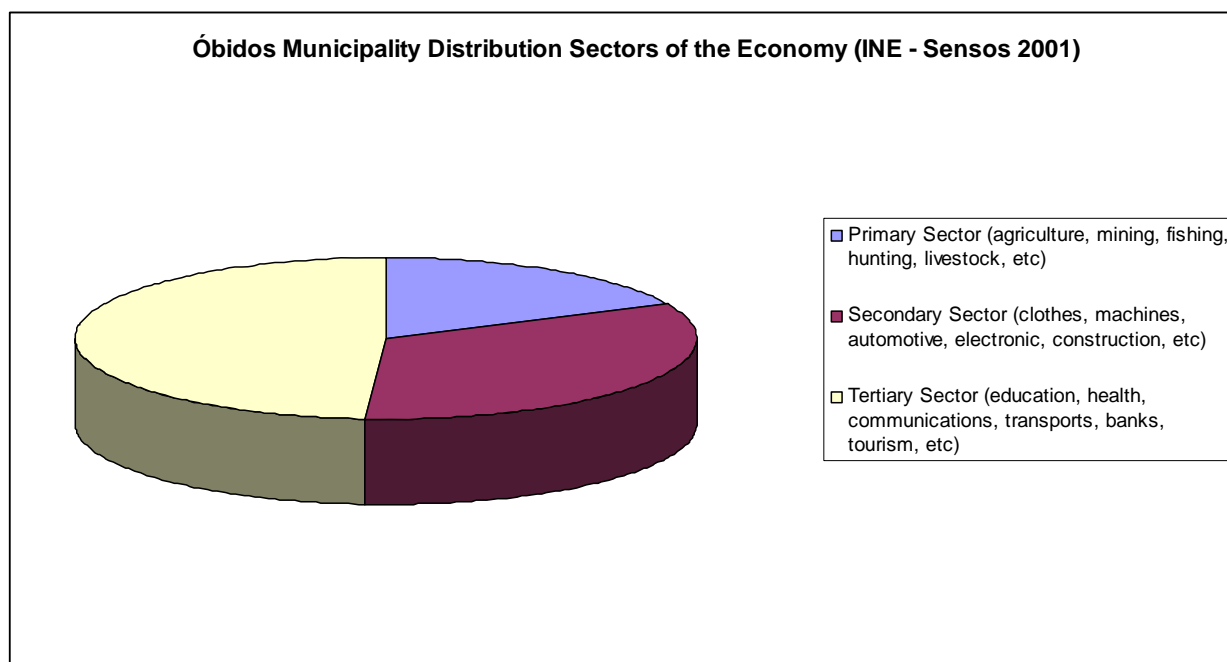
Figure 2 – Óbidos Municipality Distribution Sectors of the Economy (INE – Sensos 2001)

Main Economical and Social Indicators			
Accommodation capacity of Hotel establishments	265	places	2001/07/31
Overnight stays in Hotel establishments	30 736	n.º	2001
Occupancy rate of Hotel establishments	31,8	percentage	2001
Average per guest staying in hotels	1,3	nights	2001
Companies based	256	n.º	2001/12/31
Sales volume in companies based	103 106	thousand €	2000/12/31
Banks	6	n.º	2001
Money deposited in banks	54 940,3	thousand €	2001
Credit provided by banks	28 511,2	thousand €	2001
Concluded Works – Total of buildings	175	n.º	2001
Concluded Works – Total of residential buildings	133	n.º	2001
Licenses granted for construction of new buildings	207	n.º	2001
Licenses granted for construction of new residential buildings	172	n.º	2001
Domestic electricity consumption by consumer	2,3	thousand de kWh	2001
Industrial electricity consumption by consumer	24,7	thousand de kWh	2001
Activity rate in 2001	45,6	percentage	2001
Unemployment rate in 2001	4,4	percentage	2001

Table 1 - Main Economical and Social Indicators (INE Sensos 2001)

Another economical indicator is the purchasing power per capita which, based on INE [2], in Óbidos is 75.81% of the national average and 86.05% of the West sub-region.

2.1 **City areas**

Óbidos city is demographically and geographically small. However, it is a very dynamic city council regarding tourist and thematic events activities. During the year, there are several events that bring thousands of visitors to the Óbidos city. Behind these events, Óbidos has a day-to-day fairly quiet routine.

Figure 3 shows the Óbidos city map highlighting the most important areas regarding safety issues. Typically, during large events, public safety issues are more likely to emerge at a larger scale. Large events take place inside the city walls, so all this area and the car parking are the most important areas. Inside city walls, there are many points of interest for visitors such as typical houses, churches, castle, entrance doors, bars and restaurants, souvenir stores, museums and temporary expositors. Also inside city walls, there are service buildings such as the city council, tourist offices, GNR officer (police) and other small services (post office, for example). Outside, but near the city walls, the car parking is spread through several areas and visitors after parking their cars/buses can walk into the city walls. Also, on the outside there is a tourist office, taxi square, public bus station, some banks and a gas station. Furthest from the city walls, there are schools, a sports park, the train station, the medical centre and the fire fighters' station.
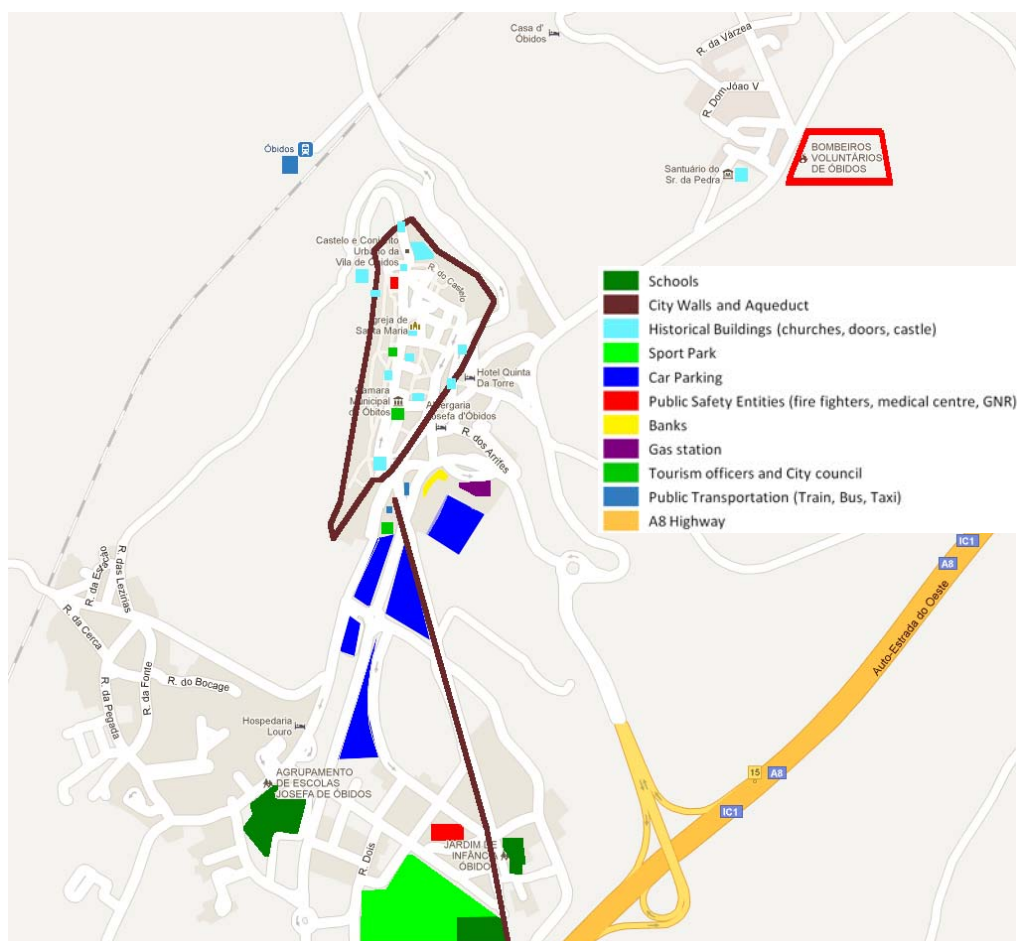
Figure 3 – Óbidos city map with the main areas highlighted

Regarding public safety (red highlighted on the map), Óbidos city has the GNR (police), fire fighters and medical centre slightly apart. The city council plays an important role in the communication with the

citizens and visitors, and also during emergency plans elaboration together with the public safety players.

Figure 4 shows an aerial view of Óbidos, from Google Earth, marked with the main areas of the city. The areas can be grouped regarding the residential area; the medical, education and sport area; and the area that includes the centre of Óbidos inside city walls and administrative services.
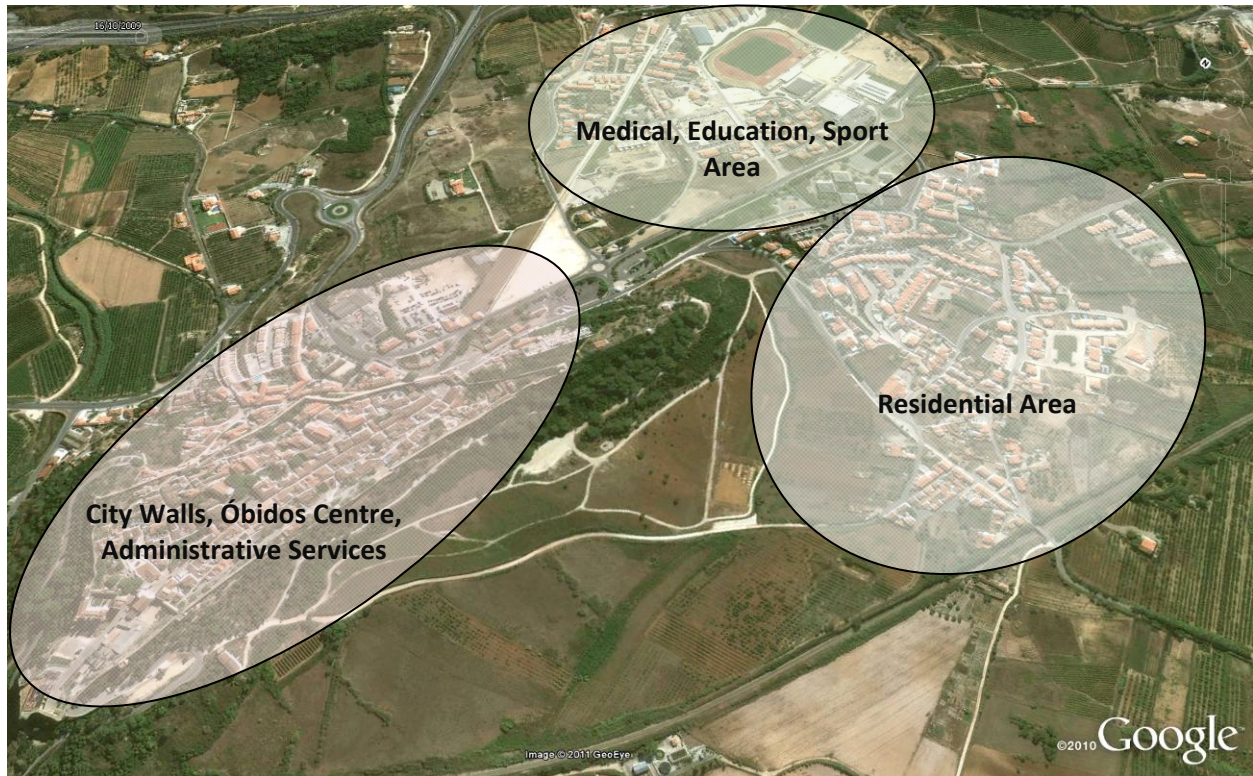
Figure 4 – Óbidos city from Google Earth.

2.2 Climate

Óbidos is located in the West sub-region of Portugal and similarly to the South region of Europe the climate is essentially Mediterranean climate. This climate is characterized by hot and dry summers and mild to cool and wet winters. The precipitation season usually occurs during 4 to 6 months and mostly overlap with winter season. The average precipitation on this region is about 330mm in winter seasons and 77mm on summer seasons [2].

The temperature variation of the West sub region is quite small compared to other climates. During the summer season the average temperature is between 15°C and 27°C and during the winter season between 5°C and 15°C. The occurrences of extremely high or low temperatures are rare, occurring only a few days each year [2].

2.3 Religion

In Óbidos Municipality, according to INE – Sensos 2001, the Portuguese population is 85% Catholic. In Portugal, 9% of the population has no religious. The number of other religions can be considered minorities in terms of number of followers.

2.4 **Culture and Education**

In Óbidos Municipality the illiteracy rate is 14% and has decreased 3% in the last 10 years. The new municipality project is concentrating the education community into three large school groups, joining and closing the smaller schools. Óbidos has diverse education schools from daycares to high schools and also a Municipality library.

The Municipality promotes a diverse cultural agenda along the year, from musical concerts to theatre and festivals.

2.5 **Major Events**

Óbidos is recognized by involve the entire community in its major events like Chocolate Festival, Christmas Village, Medieval Market and Opera Festival. One of the largest events organized in Óbidos is the Chocolate Festival which every year is visited by 200 thousand people. The festival occurs between March and April and with increasing number of participants and visitors every year. Nowadays, other events are becoming important attractions to the entire Portugal. Examples of these are the Christmas Village and the Medieval Market that increase the annual amount of visitors and also increases the local economy. The Christmas Village is obviously organized in December and the Medieval Market in July involving the inhabitants on the construction and medieval scenarios. The last known major event is the Opera Festival organized in August which brings well known names of the opera to Óbidos [1].

2.6 **Criminality**

Generically, the criminality in Portugal has been increasing in the last years but is still at low rates compared to other European countries. Specifically in Óbidos the criminality is very low compared, for example to larger cities in Portugal like Lisbon, Porto and Faro. The majority of crimes occurred in Óbidos are related to cars and houses, while the number of crimes against life and health remain low.

2.7 **Critical Infrastructures**

This section describes the critical infrastructures of Óbidos. It presents a brief description of the transportation infrastructures, command and control centres, communications, energy, state and municipal authorities' infrastructures and historical monuments.

2.7.1 Transportation Infrastructures

The transportation infrastructures, in Óbidos, include highways, railway, aerodrome and bus service.

2.7.1.1 *Highways*

The highways A8 and IP6 that cross the Óbidos Municipality are the most significant transport infrastructures. They are responsible of carrying most of the traffic in the municipality of Óbidos. A8 is one of the two highways that allow exit from Lisbon towards North. It is essentially used to transport people and goods between Lisbon and main cities in the coastline North to Portugal, for example Leiria, Figueira da Foz, Aveiro and Porto. The IP6 is mainly used to move people and goods between Peniche and the national territory. Important goods include fishing industry on the coast of Peniche and vegetables cultivation in the mainland.

2.7.1.2 *Railway*

Óbidos has one train station on the West train line of Portugal, which has a low number of passengers. The majority of passengers that arrive to Óbidos by train are associated to tourism. The low number of

trains and stations along this line make it difficult for the inhabitants to use railway for frequent travelling, for example, for commutation. The railway is essentially used for goods transportation to and from Lisbon along the coastline to North.

2.7.1.3   *Aerodrome*

Óbidos has a small aerodrome near the Óbidos lagoon which could be used for landing small aircrafts. The runway is around 700 meters long and 20 meters wide, and it also has a small area for aircraft parking and two small hangars, that are the property of the local flying club. The location is N 39º 23' 20.88' W 009° 11' 54'' with the elevation of 0.91m. The aerodome's QFU is 18/36 and its surface is of clay [3].

2.7.1.4   *Bus service*

The Municipality is covered by a bus service mainly focused on school transports. These buses travel among the diverse locations of the municipality with the principal objective to transport the 1900 students of Óbidos municipality from home to school and vice versa. CMO also provides a bus service (called OBI) responsible for moving the people between different points inside the municipal area. However, the volume of passengers is low. Public buses services provide people transportation to other Portuguese cities.

2.7.2 Command and Control Centres

In Óbidos Municipality there are several entities that participate in command and control operations regarding public safety. These entities are the GNR police (Republican National Guard), the fire department, health delegate and civil protection municipal office. All these entities integrate into the Public Safety Municipal Council.

2.7.2.1   *GNR (Republican National Guard)*

Portugal has two police forces GNR (Republican National Guard) and PSP (Public Safety Police). GNR is a security force of a military nature, consisting of military organized special troops with administrative autonomy. It has a jurisdiction throughout the Portugal territory and sea. The PSP is responsible for ensuring the democratic legality, to guarantee internal security and the rights of citizens regarding the Portuguese constitution and the law. Typically, the PSP is more focused in large urban centres, while GNR is targeted to rural areas and small towns.

Regarding the small area of Óbidos, the GNR is responsible for public safety across whole municipality. It is responsible of patrolling the urban and rural areas from Óbidos to the nearby villages that belong to the Óbidos municipality, including coastline. The highways are patrolled by a special group of GNR agents directed to that specific task. The GNR headquarter is located inside the city walls of Óbidos on the historical area and it consists of one commander, twenty five officers and several vehicles. The GNR is represented in the Public Safety Municipal Council [4].

2.7.2.2   *Fire Department*

The Óbidos municipality has a fire department located one kilometre apart from the city centre. The fire department is responsible of the whole area of Óbidos municipality including the barrage, coastline, part of the Óbidos lagoon and parts of the highways A8 and IP6. The fire department is composed of approximately one hundred fire fighters' voluntaries and twenty five ground vehicles and watercrafts. The fire-fighters are represented in the Public Safety Municipal Council [5].

2.7.2.3   Health Delegate

Public health delegate is the responsible person for the public health on a specific municipality. In particular, the delegate should be aware of health centres' operations. In Portugal, the public health delegate performs various activities such as prepare an annual report about the public health of the municipality and enforce the set of laws regarding the public health (Portuguese law 336/1993).

2.7.2.4   Protection Civil Municipal Service

The Civil Protection Office is an organic unity of the CMO that has the mission to determine, foresee, evaluate and prevent public safety risks. As well, it should inform and educate population regarding their own safety and protection and informing public safety entities. This office provides the municipal civil protection service that should cooperate with the National Civil Protection Authority regarding public safety plans in emergency situations, create plans for emergency situations, create preventive plans, promote cooperation among public safety entities (fire-fighters, health authorities and police) and promote communication among all relevant city entities regarding public safety.

2.7.2.5   Public Safety Municipal Council

The Public Safety Municipal Council aims to promote cooperation and information exchange between entities in the city of Óbidos and it is involved in the implementation of preventive actions regarding the public safety.

The main goals of this municipal council is to contribute to the knowledge of the public safety situation; implement proposals to solve public safety issues regarding citizens, including prevention actions; promote discussions about measures to fight criminality and social exclusion; and approve documents or solicitations to be transmitted to the entities related with specific safety issues.

This council is lead by the CMO president and includes several entities: parish representative, municipal assembly president, commandant of Óbidos fire fighters, Óbidos GNR police commandant, Protection Civil delegate, Public Ministry representative, Social Security representative, health centre director, health delegate, schools representative, five citizens and other relevant entities.

2.7.3 Municipal authorities

Óbidos is a Portuguese municipality that has local autonomy represented by the council. Similarly to other countries the national systems are present in each city by judicial and health systems.

2.7.3.1   Óbidos Council

The local authority on each municipality is given by the council president and it team. The Óbidos council actual president is Mr. Telmo Faria from the Social Democratic Party (PSD). The President team is formed by 1 vice president and 5 city councilmen that have the responsibility of the diverse areas, like education, Public Safety and social issues, etc. The council is also responsible to assure the coordination and mean sharing with the parishes. Some of the population needs like water service is responsible of each council and they may decide what entity provide it. The main council building is localized inside the castle halls in an old area.

2.7.3.2   Health centres

Óbidos municipality has no Hospital unit, but it has a Health centre that is located one kilometre from the city centre. To complement the health service, Óbidos has five other health centre extensions covering the remainder of the Óbidos municipality area. These health centres provide patients' diagnostics and take care of basic treatments. Patients that require emergency cares should be

transported to the closer Hospital or to the Hospital with the ability to handle the specific emergency requirement.

2.7.4 Energy and Water Infrastructures

2.7.4.1   Electrical Substations

One of the critical infrastructures in all cities is obviously the electrical substations and electrical distribution transformers. This kind of equipment need to be protected and must be available to provide electricity to population. A long period without electricity can affect seriously the response capability of vital services, as well other important services such as water supply and food conservation. In Portugal, EDP is the main producer, supplier and distributor of electricity while REN operates the transmission grid connecting generators and distributors and matches supply with demand.

In Óbidos there is one electrical substation located at Sancheira and several electrical distribution transformers all maintained by EDP.

Figure 5 – Electrical substation (left) and distribution transformers (center and right)

2.7.4.2   Water and Treatment Stations

Due to the same reason as for the energy stations, the water treatment stations are essential to normal life and especially in emergency scenarios. The emergency scenarios may not be full operative if there are water shortages for excessive time. Other situation to take into account is the availability of water for the fire department especially in high dry periods. They usually use untreated water, for example, to extinguish fires, but in emergency situation and when they do not have enough water the treated water may be used. Another concern is related to the possibility of water being contaminated by a sabotage or destruction of water treatment stations.

2.7.4.3   Óbidos dam

The Óbidos dam [8][9] was constructed to be a water reservoir for local agriculture and to control the winter floods of the Arnóia river that affect some lowlands of Óbidos area. The maximum capacity of the barrage is 5800 thousand cubic meter of water and has a flood area of 1010 thousands square meters. This infrastructure is critical due to the possibility of it to collapse leading up to a flood that destroy and damage what are in its path. The higher concerns are related to people and goods and specially the highway A8 that are 400 meter in front of the barrage. Other secondary concern is the fast rising water level in Óbidos lagoon.

The Óbidos dam is managed by the Agriculture and Rural Development Office of the Agriculture Ministry.

2.7.5 Historical monuments

The Óbidos lives from its history and the economy is very dependent of tourism. Consequently, the main monuments of Óbidos assume an enormous importance to the town and to the entire zone. The patrimonial heritage of Óbidos is very rich and it should be preserved and protected against robbery and vandalism acts, such as, graffiti.

2.7.5.1   Castle

The main attraction of the monuments in Óbidos is the Castle (Figure 6) and its walls and gates. The castle is of Roman origin and it was built under the Arab domain. After the Christian conquest (1148), the castle was repaired and enlarged many times. During the reign of King Manuel I the governor ordered the construction of a palace and changes of some parts of the castle.

In the Alcaide's palace, windows of Manueline style can be found. The chimney in the main room and the portal with the royal coat of arms of the Noronha family are also from this time. The palace suffered great damage during the 1755 earthquake. During the 20th century it was found completely in ruins. It was restored in order to house the State Inn – the first state inn in a historic building.

The castle is an important monument that requires maintenance and conservation of its structures. Inside the city walls there are several public services, habitations, restaurants and hotels.

Figure 6 – Óbidos Castle

The city gate is the main entrance to the castle. Here, one can admire an oratory with a balcony covered with 18th century tiles representing the Passion of Christ. One can find the inscription referring to the Patroness Saint of Óbidos, Our Lady of Sorrow, stating the following: "*The Virgin, Our Lady was conceived without original sin*".

Figure 7 – City gate

2.7.5.2   Churches

Óbidos have some important churches to the local inhabitants with some of them inside the walls side by side with council services and regular habitations and hotels. It is important to assure the integrity of

these churches to protect the people and materials near them. Some of the main churches are presented on Figure 8, Saint Mary Church, Saint Peter Church and Our Lord Jesus of the Stone Sanctuary. Behind these churches, there are a lot more: St. John the Baptist Church, St. Martin's Chapel, Almshouse Church, St. James's Church, Our Lady of Carmel Church and Third Order of St. Francis Church.

Figure 8 – Saint Mary Church (left), Saint Peter Church (center) and Our Lord Jesus of the Stone Sanctuary (right)

Saint Mary Church

Located in Saint Mary's Square, this church is located in the main square of the city. The church was founded during the Visigoth period. Later, it became a Mosque and after King Afonso Henriques' conquest from the Moors, it became a Christian Temple once again. The mannerist portico (main entrance) holds an image of Our Lady of Assumption. The interior is divided into three naves and has a painted wooden ceiling dated back to 1676. The walls are covered with blue and white tiles that date back to around 1680-1690. Also, two retables, a baroque style image of Our Lady of Rosary, renaissance tombs, a pipe organ and a set of oak wood chairs can be found here.

Saint Peter Church

The Saint Peter Church is a gothic temple founded during the Middle Ages, originally with three naves. This building was altered during the 16th century. The baptistery and the tower staircase have resisted many natural disasters, among them the earthquake of 1531. The portal is from the 17th century. It is also possible to see on the right side of the portico a stone relief with an amulet seal in the façade of this church, which confirms the reminiscences of the ancient temple. The 1755 earthquake destroyed the temple. Later, it was completely rebuilt. Nowadays, it can be found a gilded wood retable, a 17th century painting of St. Peter and the tomb of Josefa d' Óbidos painter, deceased in 1684.

Our Lord Jesus of the Stone Sanctuary

Inaugurated in 1747, this sanctuary is one of the most interesting Baroque buildings in Portugal, mainly due to its hexagonal shape. It was commissioned by King Joao V in memory of the accident from which he escaped from, by evoking Our Lord Jesus of the Stone. It is located outside the city, one kilometre far from the Óbidos centre.

2.7.5.3   *Water Aqueduct*

Originating in Usseira, the aqueduct (Figure 9) is 3 km long and its construction begun on the 16th century. The water was carried through a great number of high arches which crossed extensive vineyards and orchards and came to provide water to the town's main fountains. The aqueduct was constructed to transport water to Óbidos. It is nowadays inactive to that purpose but remains as an important tourist monument. It is located outside the castle walls, near the parking area, mainly used by

tourists' cars and buses that visit Óbidos. The high number of people occasionally walking near the aqueduct turns this monument as another critical infrastructure.

Figure 9 – Water Aqueduct of Óbidos [1]

2.8 Communication Infrastructures

2.8.1 Private Municipality Network

The CMO has a private network that connects multiple buildings using optical fibre. This network connects around 350 users and 8 buildings. It is mainly used for controlling employees' arrival and exit, students' electronic cards and other management issues. The servers are installed on the CMO administrative services building.

Municipality Building	Users/Computers	Distance to Servers
CMO Administrative Services (include servers)	100	0m
CMO Logistic Complex	40	2000m
Gallery	2	150m
Museum 1	2	50m
Museum 2	5	150m
Pool	5	1000m
School 1 (Josefa d'Óbidos)	100	850m
School 2 (Arcos)	100	1000m

2.8.2 Public Communication Networks

In Óbidos municipality there are fixed and mobile networks available with several different technologies such as GSM, WI-Fi, ADSL, cable and optical fibre [6].

Specific city areas are covered by a public free Wi-Fi access which allows the population to access the Internet. Mobile network in Óbidos providing mobile phone services has 100% coverage. It is provided by the three operators available in Portugal. It also offers network wide mobile Internet service with different speeds depending on the operator and the area.

About fixed networks, the Óbidos city council has a project to cover the entire town with optical fibre. Nowadays, the Óbidos town is covered by ADSL and cable connections depending on the Internet, TV and telephone providers [1].

2.8.3 Public Mobile Network

Similarly to the whole Portuguese territory, Óbidos has several base stations to assure the mobile communication services of the three mobile operators in Portugal. These BTS are responsible of assuring the mobile communication service in the specific area. They guarantee the mobile communication services as well as a way to perform emergency calls. Base stations are critical infrastructures, mainly in case of natural disasters, because often they are the only communication solution to isolated populations. If they collapse or become inoperative, those populations cannot contact emergency services and their families. The majority of base stations, in Portugal, use GSM and WCDMA technologies. Each BTS in Portugal belongs to a single mobile operator or it can be shared among operators.

2.8.4 Radio

Óbidos has a regional radio called Radio Litoral Oeste (RLO) [7] which has an important role carrying information to the local people. Nowadays, the radio has coverage in all neighbouring cities as shown in Figure 10. It can be an important way to inform population in case of natural disasters or manmade incidents. These radios are characterized by a simple emitters' technology, compared for example to television emitters. In case of damage they allow more easily to deploy a radio emitter system. The RLO can be considered a critical infrastructure due to the possible importance in some emergency scenarios.

Figure 10 – Radio Litoral Oeste coverage

3. Public Safety Characterization

Currently, the Municipality of Óbidos (CMO) has no specific public safety applications installed in its area of responsibility for any of the following domains.

3.1 Area A: Citizens Behaviour

The Óbidos Municipality has no CCTV for safety purposes, because Óbidos has few incidents regarding citizens' behaviour. Also, the Municipality does not have direct access to criminal databases. Through the local Police (GNR) it may be possible to access national Police databases from the Criminal Police or from the Public Safety Police, but solely on the purpose of police investigations.

The Public Safety Municipal Council can request confidential reports with statistical information about robberies, accidents, vandalism acts, public health threats, and so on. Based on this information, a strategy for public safety can be built. For example, if robberies are increasing significantly, the council can request police reinforcement.

CMO may have access to citizen data but only if made available by the citizens themselves. It may be possible to create a phone number directory based on contracts made between citizens and CMO or on forms filled by citizens. However, citizens will have to authorize the compilation of their phones numbers. Data could be retrieved from this database through citizen social security data.

3.2 Area B: Road Track Incidents Management

At the moment traffic issues are not a concern for CMO. Inside city walls the traffic is very restrictive. This restriction has impacts on rescue actions, since Óbidos fire fighters have only one old ambulance that can go through the narrow roads inside Óbidos city walls.

In addition, during large events, mainly at weekends and holy days, the outdoor parking places are filled with vehicles.

3.3 Area C: Environmental Monitoring

The environmental monitoring in Portugal is provided by the National Institute of Meteorology (IM). It provides several information services on the IM website [14] regarding meteorological information, forest fires risk level, thermal risk level and ultraviolet risk level. These information services are totally free and can be consulted by anyone. Also, it is possible to subscribe to a free service to receive all this information by email, according to the requirements. CMO use these information services to coordinate with the other safety players (GNR police, fire fighters and civil protection). Regarding the risk level foreseen by the IM, the CMO and national civil protection should alert and inform the population.

In addition, to support agriculture CMO has four meteorological stations that transmit temperature and humidity values through SMS messages to the farmers that have subscribed to the service.

Meteorological risk – based on the weather condition forecast, a national service (IM) provides a colored map according to a meteorological risk level.
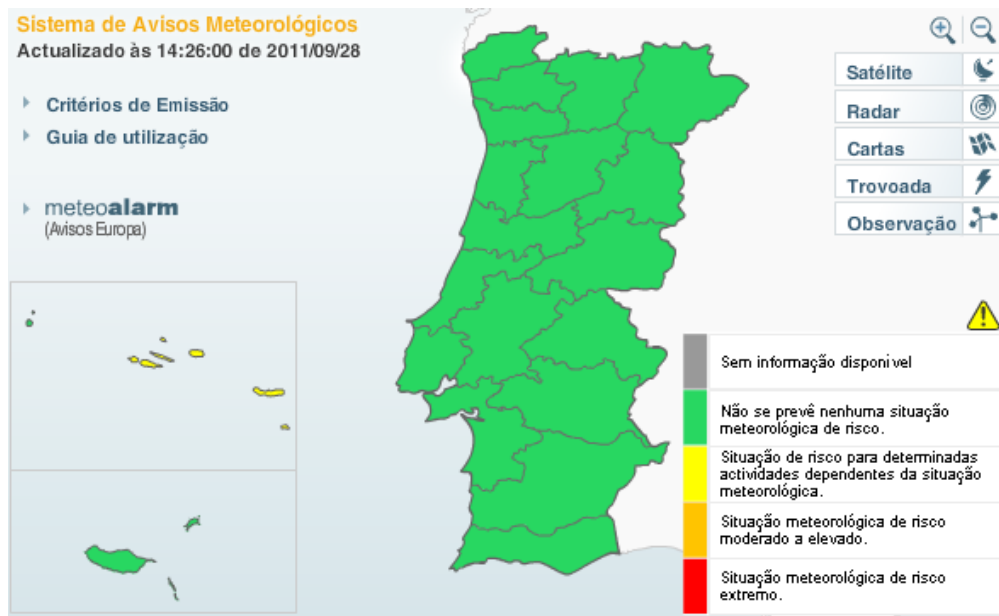
Figure 11 – Meteorological risk alerting [14]

Forest fires risk – a national service (IM) for alerting citizens about the risk of fire using a colour scale of five levels.
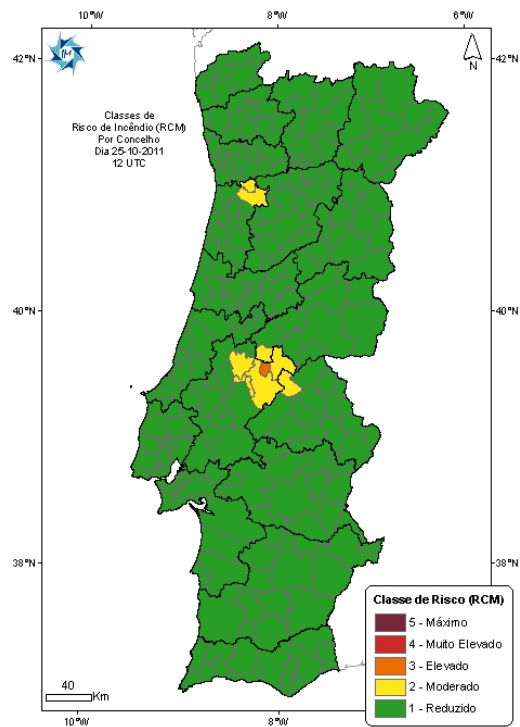
Figure 12 – Fire risk map [14]

Thermal stress – a national service (IM) provides information about bio meteorological indexes.
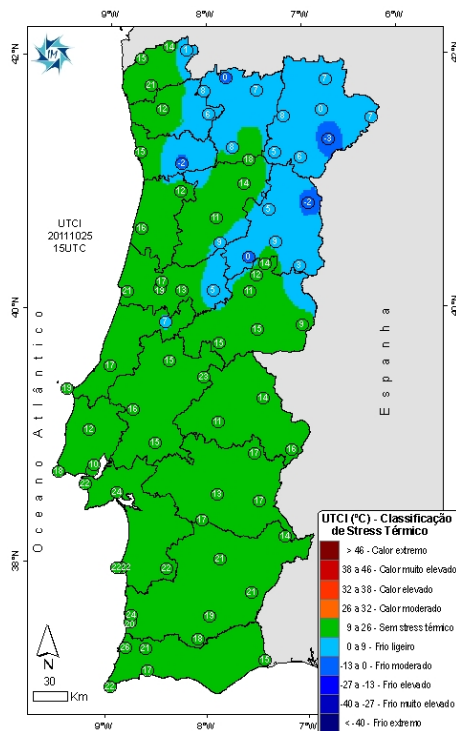
Figure 13 – Thermal stress map [14]

Ultraviolet Index – a national service (IM) provides a numerical scale about ultraviolet index and according with that presents protection measures to citizens.
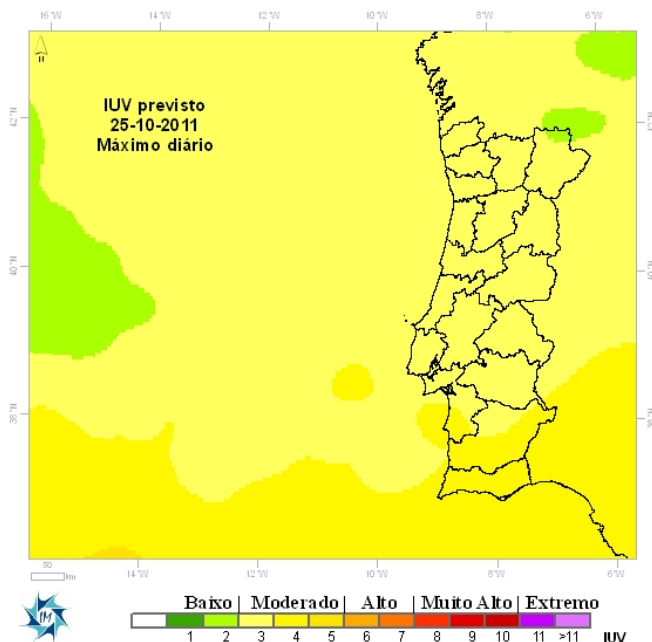
Figure 14 – Ultraviolet map [14]

3.3.1 Seismicity monitoring network

Seismic activity is monitored by the Institute of Meteorology (IM) that operates a seismicity network with 27 seismograph stations in Portugal Continental, 21 seismograph stations in Azores Island and 5

seismograph stations in Madeira Island. In Figure 15 is presented a map with the locations of seismic activity during one month nearby Portugal Continental.
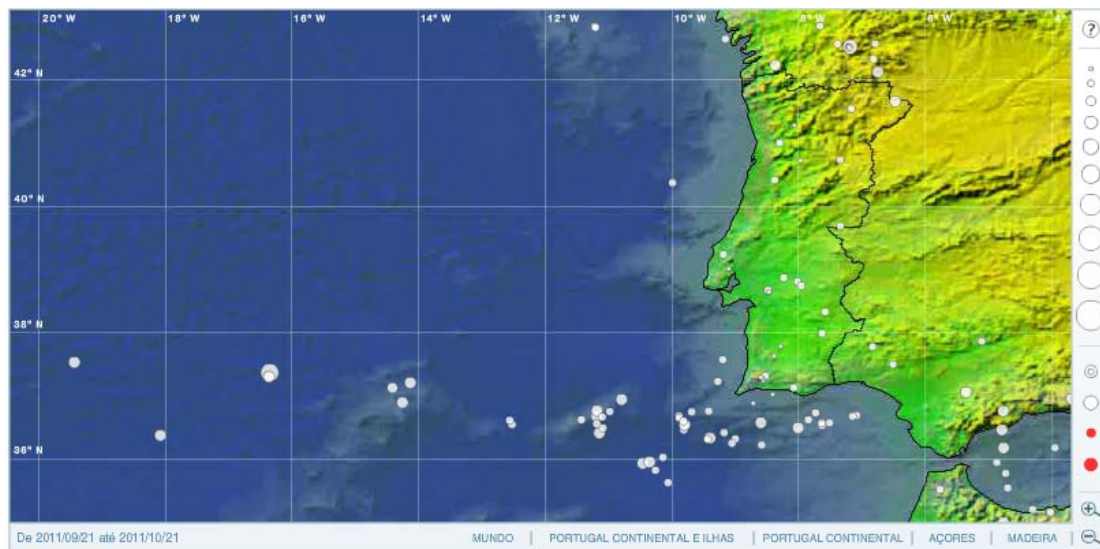
Figure 15 – Seismic activity in Portugal Continental [14]

3.4 Area D: Alerting Citizens

Typically, in Portugal the main means for alerting citizens are physical signals or the media, mainly by radio, TV, Internet and newspaper. Environmental risks to citizens provided by environmental monitoring services presented in 3.3 are transmitted to citizens through these communication channels, for alerting and warning them. However, these media services may not be immediately available and transmissions depend heavily on structures that are outside the control of the municipality, i.e., TV, radio and newspaper are not within the direct command of the alert information owner.

Other types of natural disasters, public safety risks such as public demonstrations, terrorist attacks, public health risks, CBRN risks, or manmade accidents (traffic, industrial) use the same media means to alert citizens. Regarding several public safety risk the Portuguese national civil protection provides a set of brochures [10].

CMO alerts, informs and warns citizens by using their official website, or using regional or national radio and newspaper (regional newspapers: *Gazeta da Caldas*, *Jornal das Caldas*; regional radio: RLO), or national TV.

3.4.1 Erosion zone alerts

Erosion zone signs – near the coastline there are some erosion zones that may collapse. A national service is in charge for detection and signaling these zones (INAG). CMO has coastline with erosion zones that require this kind of alerts.
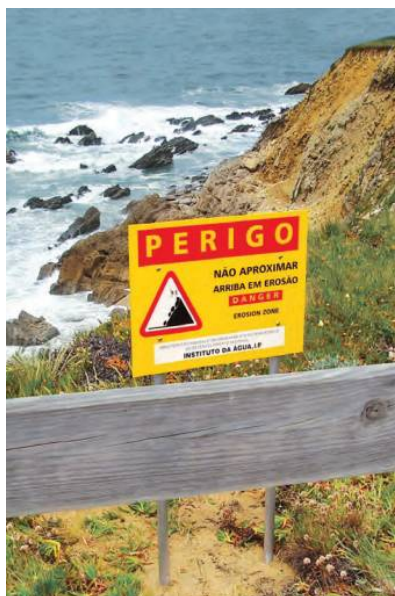
Figure 16 – Erosion zone signal [12]

3.4.2 CMO website

The CMO uses the Internet, in particular the official CMO website, to inform, alert or warn citizens about public safety subjects. In a specific section, the website provides information about civil protection and public safety. For example, Figure 17 presents one information statement on the CMO web site about cleaning drains to prevent floods by the first fall rains.

Figure 17 – Civil protection warning [1].

3.5 Area E: Ad-hoc networks

In Portugal, the police, medical emergency and fire department all use disjoint TETRA networks. Most of the entities previously mentioned also make use of commercial regular mobile phones (GSM). At the regional level (district), the civil protection authority has some satellite terminals that make use of commercial services. Municipal services use regular GSM mobile phones and both wired and wireless communications at their offices and in their networks.

Communication between different bodies is currently achieved essentially at command level by telephone and then passed down through the official chain of command or in the field by direct contact between services or through GSM phones. The foreseen SIRESP [11] network (TETRA based) is planned to enable interconnection of networks from different bodies (police, firemen, medical emergency, civil protection and military). However, this is not totally implemented yet.

The current communication network does not cover all of the needs (present and future) of the public safety bodies. In particular, the support for data exchange and imagery and possibly video exchange is not possible currently.

When municipality hosts or organizes large events, the CMO services use GSM and TETRA PTT communications. The local police (GNR), fire fighters and municipality (CMO/OP, where OP is Óbidos Patrimonium, a municipal company) use different frequencies and networks. Therefore, when coordination is required or when emergencies occurs, GSM or direct contact is used.

4. Social, Ethical and Legal implications

Certain Public Safety applications, especially those enabling surveillance capabilities, usually have inherent implications of ethical aspects. This section researches the Portuguese laws and restrictions for this type of applications.

In Portugal, the National Commission for Data Protection [13] monitors personal data processing with a rigorous respect by the human rights and their freedom considering the national constitution and the law. The national laws regarding data protection are related with personal data protection, health, electronic communications, video surveillance, jobs, cyber crime and law.

Regarding SafeCity project, the Portuguese laws that might be applicable are the following ones.

Protection of personal data laws:

- Electronic personal data utilization (Article 35 of the Portuguese Republic Constitution);

- Data Protection Portuguese (Portuguese Law 67/98);

- Personal Data Protection Directive (European Directive 95/46/EC).

Electronic Communication laws:

- Regulates the protection of personal data in the Electronic Communications (Portuguese Law 41/2004 that transposes the European directive 2002/58/EC);

- Electronic Communications Directive (European Directive 2002/58/EC);

- Concerning the processing of personal data and the protection of privacy in the electronic communications sector (European Directive 2006/24/EC). This directive amends the European Directive 2002/58/EC.

Video surveillance:

- Use of video surveillance by private security services and self-protection (Portuguese Law 35/2004);

- Regulating video surveillance by security forces in public places of common use (Portuguese Law 1/2005). The video surveillance may be used, underneath authorization that can be provided by CNPD, for protection of buildings and public facilities and their access, protection of facilities of interest to the national defence and protection of the safety of persons and property, public or private, crime prevention in places where there is a reasonable risk of occurrence. The video may be stored up to one month. The crime detection on video/images/sound should be reported up to 72 hours after its detection to the Public Minister;

- Regulates the means of electronic surveillance road used by security forces (Portuguese Law 207/2005);

- Regulates the use of road surveillance systems by EP and road concessionaires (Portuguese Law 51/2006);

- Regulates the installation and use of video surveillance systems on taxis (Portuguese Law 33/2007).

5. Challenges in Public Safety

In Portugal, public safety has a hierarchical organization beginning by a national wide entity (*National Authority for Civil Protection*), then there are several regional entities and, at last, there are the municipalities, local police, local fire department and local medical emergency. Consequently, public safety is not focused on cities and their particular requirements. So, a local management can enhance the public safety that better fulfills the cities requirements.

For Óbidos public safety scenario in particular, SafeCity project can provide a highly relevant set of capabilities for planning, coordination and implementation of activities of public safety and civil protection in the context of responding to risk events (for example, natural disasters such as forest fires or events as large-scale festivals such as Chocolate Festival or Medieval Market). Risk events can endanger the safety of the population, the historical heritage of the city or both. For example, responding to a natural disaster like an earthquake that has greatly affected the village, or monitoring and responding to incidents during the course of a large event.

5.1 Current Limitations and Gaps

Overall coordination of public safety processes is somewhat difficult due to the characteristics of the city. Óbidos architecture is stagnant (inside the historic village centre, building facades and heights cannot be modified. Construction is old and streets are very narrow. For example, the fire fighters have only 2 vehicles (one fire truck and one ambulance) capable of working inside the historic centre. This means the capability to respond to an emergency in the centre is quite limited. The introduction of technologies for detection and alerting can circumvent the lack of capabilities in response, and C2 technologies may make it easier to coordinate responses on foot for example.

5.2 On-going innovative Initiatives

CMO is a very dynamic city that embraces innovations. Regarding historical building monitoring, the local police from the Leiria region (GNR territorial command) is developing a study for CMO about a CCTV project for the complete perimeter of the historical part of Óbidos. The purpose of this system will be to defend the national historic heritage.

5.3 Ideas for the future

5.3.1 Alerting Citizens using innovative mobile applications

Public safety involves alerting citizens when emergency situations are happening. In Portugal, the only mean to alert citizens is through the public media broadcasted via the radio, TV, Internet and newspapers.

Alerting citizens with mobile applications and back-office can be implemented to provide the ability to send alerts to the population through common mobile devices (mobile phones and smart phones) with information on how to proceed or react to emergency situations. Mobile application should present alerts according to severity level (for example: critical, emergency, warning and exercise), date and time, alerting type (for example: weather, traffic, terrorism, etc.), summary description, instructions how to react and configure alerting area. It can alert citizens using cellular network or city hotspots (WiFi). In situation that the infrastructure are damaged an ad hoc node can act as a public WiFi hotspot. At the

command and control centres citizens' alerts can be produced and broadcasted. SafeCity platform manage the alerts and ensure that they are delivered to the citizens.
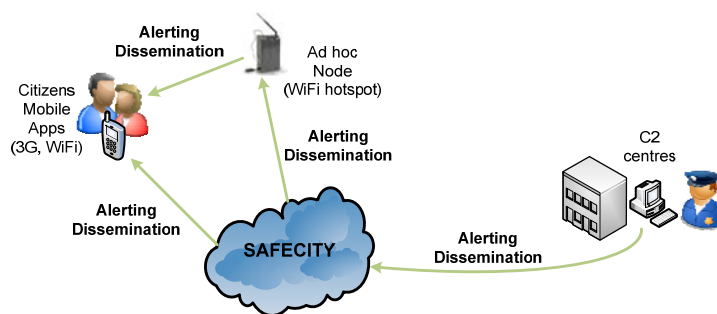
Figure 18 – Diagram of alerting citizens

Citizens should be motivated to install and use this alerting application, mainly when some predictable emergency risk situations are present. For example, citizens should receive an alert of bad weather prediction and instruction of how to react.

5.3.2 Ad-hoc network communications

Ad-hoc networks are useful for public safety when network infrastructures are not available. Also, it can be used for quick deployment of a sensor network and provide an ad-hoc communication means. A communications network using ad-hoc communications equipment developed by Tekever (WAC - Wireless Adaptive Communications) will support the exchange of information between sensors, command centres and field operational command (e.g.: police, fire fighters and medical entities). This network will enable rapid deployment in the field without the need for configuration by users.

Potentially, WAC device can be used for voice, data, image and video transmission. The use depends on the equipment and the required functionalities. In particular, at a first stage, an ad-hoc network will be implemented to provide voice and data (from sensors) using several WAC devices. The WAC devices should be quickly deployable and are self-configuring devices. The following picture illustrates the ad-hoc network based on WAC devices.
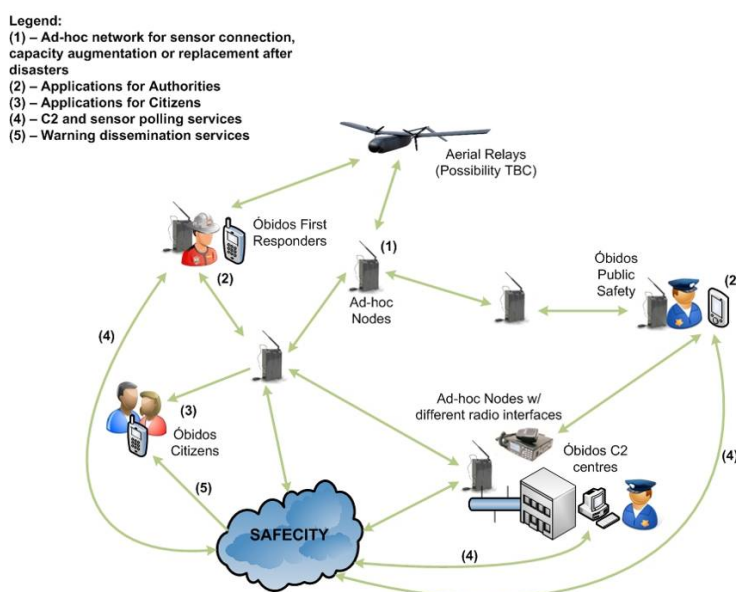
Figure 19 – Diagram of ad hoc network deployment

Ad-hoc nodes can be used on a scenario of incident prevention on large events, providing voice communication between many operators with dynamic groups. At the same time, sensors' data can be collected and transmitted up to the command centre using the ad-hoc network.

A command and control (C2) support system is important for the public safety decision-makers, since it may receive operational data from ad-hoc networks and based on that it can generate new orders. This system is essential for coordinating orders and taking advantage of ad-hoc networks to produce more efficient decisions. C2 support system has the mission to gather sensors data from the operation field, compile the sensors data and build an operational board to aid decision-makers to coordinate operation field orders.

5.3.3 Outdoor Panels

CMO can use outdoor panels to alert, inform and warn citizens about public safety issues. A panel can be a big screen that is controlled remotely from the C2 centre. Depending upon the technology, the content can be multimedia (video, image and audio) or simply text. The outdoor panels should be strategically deployed on critical locations regarding public safety. They could, for example, notify citizens regarding public health, forest fires and bad weather forecasts.

5.3.4 CCTV

A CCTV circuit can be deployed on the main points of the city: main walk way, main monuments and event place. The objective is to monitor visitors' behaviour during large events and detect vandalism or robbery acts on important monuments. Automatic procedures for video analysing should be used to help C2 centre's operators on incident detection.

5.3.5 Sensors and Data Fusion

Óbidos has a particularity that it is only possible to enter to the centre of the city through few doors or gates, most of them can be used only by people. This way, it is possible to deploy sensors on these doors to calculate the number of visitors inside city walls, for example to prevent crowd panic. Also, it should be possible to calculate the approximate number of visitors that are inside city walls cross checking data with hotel reservations.

5.4 Future Characterization

The future applications of Óbidos city are represented on the map in Figure 20. It describes the main locations regarding the Óbidos city: the main walk way, the events location and the city walls (that includes the majority of monuments). Sensors can be deployed on each door leading to the city (shown with red marks) to count the number of visitors. Depending on this number several safety measures can be considered. Throughout the main walk way and on the event places CCTV cameras can be deployed for monitoring visitors and incidents detection. Also, outdoor panels (blue circles) can expose important information about events and public safety. These outdoor panels should be deployed at important locations and be visible to visitors and citizens. They can be located at the main city door, inside city walls and inside events place. Public safety entities (fire fighters, police and medical entities) can communicate among them and, with the C2 centre, coordinate efficiently all the operations. They can use typical communication means or if critical communication infrastructure fails, they can communicate using ad-hoc networks. The C2 centre receives all data from all these systems and process it to be able to make decisions when incidents happen.

Figure 20 – Future characterization map

Annex A – Questionnaire

1. Contact Data Collection

Information about the organization

Organization/Department: Óbidos municipality (CMO)…………………………………………….

Principal Activity: Public administration………………………………………………………………………….

Address: Largo de São Pedro …………………………………………………………………… ………………

City: Óbidos……………………………………………………………………………… …………………

1st Interviewed Person Information

Full name: TELMO HENRIQUE CORREIA DANIEL FARIA ……………………………………………………

Role in the organization: Mayor………………………………………………………………………………

Email: presidente@cm-Óbidos.pt……………………………………………………………………….

Telephone: +351 262 955 500……………………………………………………………………………

2nd Interviewed Person Information (if applicable)

Full name: RICARDO ANTÓNIO DOS REIS GOMES CAPINHA……………………………………………………

Role in the organization: Head of Cabinet………………………………………………………………………

Email: chefe.gabinete@cm-Óbidos.pt…………………………………………………………………………

Telephone: .+351 262 955 500 or +351 935 727 272………………………………………………………………

Interviewed Person Signature (in case of face-to-face meeting):

In Óbidos., the 26 of July of 2011

2. SafeCity Introduction

SafeCity aims at making Public Safety capabilities smarter through advanced Internet networking and computing technologies. Future Internet will be design to ensure that people feel safe in their surroundings at time that their surroundings are protected.

SafeCity framework is envisaged to help Public Safety organizations collecting, sharing and analyzing data more effectively in order to make smarter real time decisions while planning and responding from incidents and emergencies. SafeCity is focused on four main areas depending on their functionality: Situational awareness detecting anomalous behavior of citizens & vehicles, Ad-hoc network usage to enable access anywhere, Alerting citizens capabilities and Command and control capabilities.
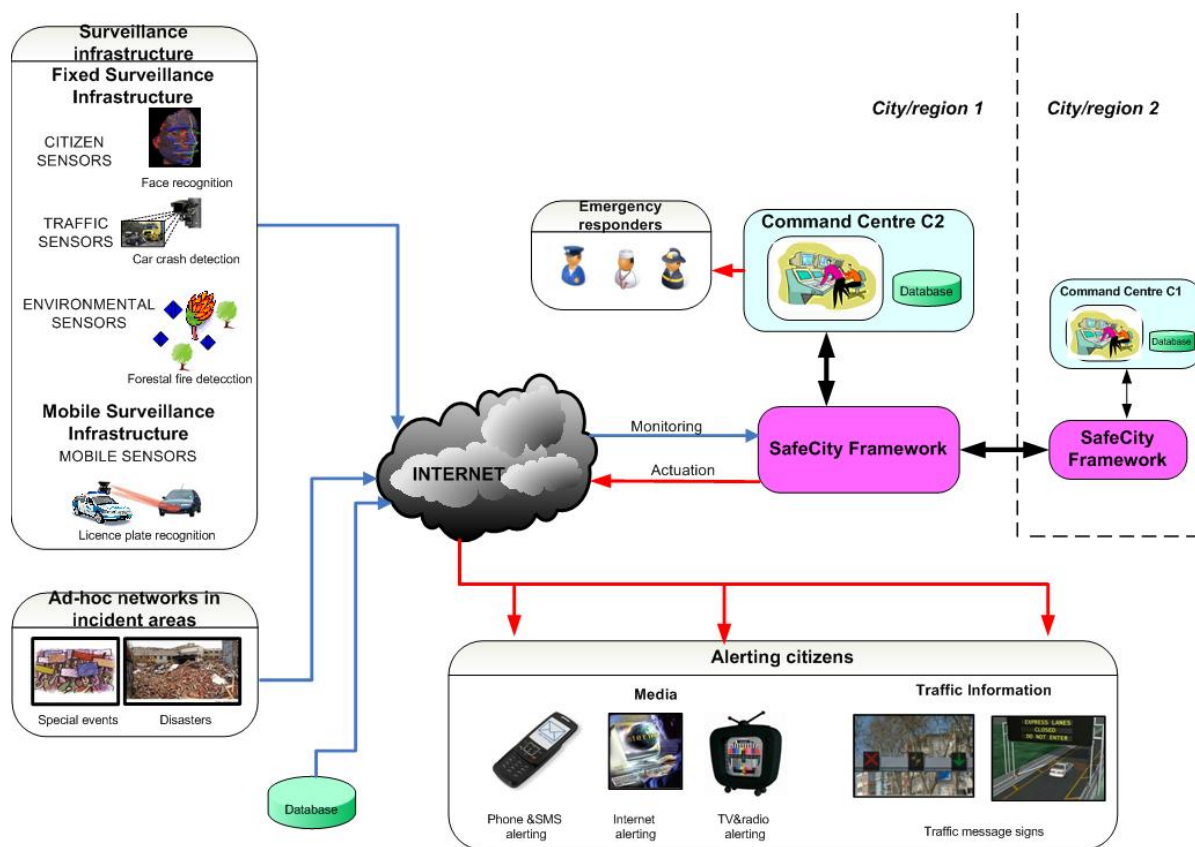
SafeCity High-level framework

This research counts on the close collaboration of Public administration entities in charge of Public Safety Services of medium and large EU cities, who are the target audience of present questionnaire. The first part of the questionnaire aims at gathering the current state of art of Public Safety systems in European Cities, where as the second looks into the future searching for pending challenges and existing needs in this area and innovative capabilities that could easily be achieved with the future internet. Several of these user-driven applications will be developed within the project, and therefore, it will closely follow the user guidelines and requirements collected through this questionnaire.

3. Current State of the Art

3.1.1 Area A: Situational Awareness

Situational Awareness involves being aware of what is happening around you to understand how information, events and your own actions will impact your goals and objectives.

Based on SafeCity framework, depending on aspect to be monitored sensors could be classified into:

- Citizen sensors enabling detection of alerting situations caused by pedestrians, citizens (e.g. visual monitorization with CCTV).

- Road-track sensors enabling detection of alerting situations cause by vehicles.

- Environmental sensors enabling detection of alerting situation caused by environmental conditions.

- Mobile sensors enabling detection of alerting situations on the move (e.g. from patrol vehicles).

3.1.2 Area B: Ad-hoc Network

SafeCity is researching to enable the introduction of far more devices and sensors, data management and storage devices. Moreover, it is design to include ad-hoc mobile communication networks that could be deployed at strategic points where an incident occurs especially when communication infrastructures get damaged or a special event happens (strike, manifestation, special games, etc).

3.1.3 Area C: Alerting Citizens

Information processing centres help to reduce response time at first stages of an emergency response since they can act on subordinate actuators or alert Public Safety Command Centres in real time. SafeCity framework aims at providing mechanisms for writing and sending unique bushfire emergency messages centralized in a Command Centre, innovative service highly appreciated by end users. C2 centres will be able to deliver opportune information to population through telecommunication networks including 3G, 4G, LTE, TV even internet.

3.1.4 Area D: Command Centre Technologies

SafeCity framework is based on decision-making algorithms which enable the system to collect and process input data and take action in real time. It is able to detect anomalous behaviours of heterogeneous multi-format data and generate alerting ad-hoc information to certain users as Command Centres.

It is really important to identify and characterize **existing applications or systems** that provide Public Safety members of similar functionalities belonging to any of the 4 areas presented. Please, identify exiting applications related to the different areas. For **each application** please respond the following questions:

STATE OF THE ART			
SUBJECT	**Q NR**	**QUESTION**	**ANSWER**
APPLICATION CHARACTERIZATION	Q1.	Indicate brief description of the application. In which situations/operations do you use this application? You could support your inputs with references to case scenarios and/or past incidents.	Currently, the Municipality of Óbidos (CMO) has no specific security application installed in its area of responsibility for any of the following domains: - Situational awareness; - Ad-hoc networking; - Alerting citizens; - Command centres;.
	Q2.	In which **SafeCity area** (A, B, C or D) do you frame this application?	N/A
	Q3.	**Actuation procedure** followed during the utilization of this application.	N/A
	Q4.	Related to your organization operations, indicate key **requirements** of this application. Paying special attention on ICT needs (e.g. Band Width, rate (bps), latency, QoS, data storage requirements, trained/supervising personnel, energy costs, etc).	N/A
	Q5.	Which concrete sensors does your organization use for this application? What is the purpose of each of them? What is the format of the output data? Are these standardized with respect to fusion processes?	N/A
	Q6.	Is this an **automated process**? If so, up to which level? Does	N/A

STATE OF THE ART			
SUBJECT	**Q NR**	**QUESTION**	**ANSWER**
		this include definition of data tags?	
	Q7.	What kind of type and data are being forwarded to the citizens, regarding the original sensors outputs?	N/A
	Q8.	How interrelated are the different families of sensors that you apply? How interoperable are the different technologies? How can one support/ complement the other? How can one affect the others in case of malfunction	N/A
	Q9.	**Advantages** of the use of this application.	N/A
	Q10.	**Gaps** detected (e.g. additional info, inefficiencies, etc). Could you categorize such limitations as being a result of: ▪ current ICT development ▪ current integration lacks (interoperability issues) ▪ not full awareness of crisis situation requirements (advanced changes) ▪ Information management and network complexity	N/A
	Q11.	Would you see such **limitations** being corrected/refined via supported/back-up technology?	N/A
	Q12.	**Infrastructure** involved in this application (e.g. data bases, wired fibber connections, wireless standards, etc), private or public networks. Main constrains imposed by this infrastructure (e.g.data	N/A

STATE OF THE ART			
SUBJECT	**Q NR**	**QUESTION**	**ANSWER**
		losses, network coverage, different networks interpretabilities, data security, etc.)	
	Q13.	Is it Internet-based application? Does it use any internet connection?	N/A
	Q14.	Which information security policies do you use within this application?	N/A
	Q15.	Which ethical, social and legal policies do your organization satisfies in order to make use of this application (e.g. considering sensitive data)? How does this affect your data formats and permissions?	N/A

Please include the following answers regarding each specific area:

STATE OF THE ART			
AREA	**Q NR.**	**QUESTION**	**ANSWER**
AREA A: SITUATIONAL AWARENESS	Q16.	What social policies do you apply (e.g. regarding social division)?	N/A
	Q17.	Does your organization have different data sources (e.g. criminal data base)? In that case, please list them.	The Municipality does not have direct access to criminal databases. Through the local Police it may be possible to access national Police databases from the Criminal Police or from the Public Safety Police, but solely for police investigations. CMO may have access to citizen data but only if made available by the citizens themselves. It may be possible to create a telephone directory based on contracts made between citizens and CMO or on forms filled by citizens. However,

STATE OF THE ART			
AREA	**Q NR.**	**QUESTION**	**ANSWER**
			citizens will have to authorize the compilation of their phones. Data could be retrieved fro mthis database through citizen social security data.
AREA B: AD-HOC NETWORK	Q18.	Which communication networks are currently used between different bodies and among members of the same body (PMR, Radio TETRA, TETRAPOL, UHF, Radio, Satellite links, GSM/GPRS/UMTS, WiFi, WiMax, etc)?	The Police, Medical emergency and firemen all use disjoint TETRA networks. Most of the entities previously mentioned also make use of commercial regular mobile phones (GSM). At the regional level (district), the civil protection authority has some satellite terminals that make use of commercial services. Municipal services use regular GSM mobile phones and both wired and wireless communications at their offices and in their networks. Communication between different bodies is currently achieved essentially at command level by telephone and then passed down through the official chain of command or in the field by direct contact between services or through GSM phones. The foreseen SIRESP network (TETRA based) is foreseen to enable interconnection of networks from different bodies (police, firemen, medical emergency, civil protection and military). However, this is not implemented yet.
	Q19.	Does your current communication network satisfy all the needs you require to perform an efficient work when a special event or an emergency happen? Have you ever deploy portable base stations to improve covertures or capacity of the cellular network you are using? How effective is this approach (coverage, data quality, etc)? How efficient is this approach (cost/ benefit ratio)?	The current communication network does not covers all of the needs (present and future) of the public safety bodies. In particular, the support for data exchange and imagery and possibly video exchange is not possible currently. when the municipality hosts or organizes large events, the CMO services use GSM and TETRA PTT communications. The local police (GNR), firemen (BV) and municipality (CMO/OP, where OP is Óbidos Patrimonium, a municipal company) use different frequencies and networks. Therefore, when coordination is required or when emergencies occur GSM or direct contact is used. The local police from the Leiria region (GNR territorial command) is developing a study for a CCTV project for the complete perimeter of the historical part of Óbidos. The purpose of this system will be to defend the National historic heritage.

STATE OF THE ART			
AREA	**Q NR.**	**QUESTION**	**ANSWER**
AREA C: ALERTING CITIZENS	Q20.	Which kind of incidents or situations do you consider important to be alerted of?	The following are interesting to be alerted to: - Natural disasters; - Public safety risks such as public demonstrations, terrorist attacks, public health risks, CBRN risks - Manmade accidents (e.g. traffic, industrial)
	Q21.	How do you think it would be the best way to alert citizen about these incidents?	By using existing technologies and devices which are already part of the citizens' day-to-day routines such as: - Mobile devices (such as mobile phones) to allow contact anytime, anywhere using SMS or internet access; - Internet; - Electronic billboards spread across the municipality; - Radio; - Tv; The first three bullets are preferable since radio and TV are not immediately available or real-time and transmissions depend heavily on structures that are outside the control of the municipality, i.e. TV and radio are not within the direct command of the alert information owner.
	Q22.	What social implications do you see arising (division, mass panic, etc) and which policies do you define in order to deal with these situations?	The most important implication arising from problems at large events is mass panic. To deal with this, the municipality prepares strategic emergency plans that establish a number of solutions such as emergency evacuation paths, entities to contact in case of emergency, evacuation means, etc.
AREA D: COMMAND CENTRE	Q23.	At which level(s) of your organization, control centre technologies are used? If several levels of your organization use control centre technologies could you precise	See previous answer.

STATE OF THE ART			
AREA	Q NR.	QUESTION	ANSWER
TECHNOLOGIES		information managed at each level of the organization? And relation between/role of each level of the organization?	
	Q24.	What anomalous situations do you consider important to be alerted of in the Command Post (Citizen Behaviour, suspicious objects…)?	The following are interesting: - Natural disasters (e.g. fires) - Protection of historical heritage (e.g. churches, city walls, historic buildings) - Suspicious citizen behaviour in public areas - Public risk data coming from different sources (e.g. health authorities, civil protection, meteorology, etc.) - Abnormal traffic congestion
	Q25.	What management direction do you follow regarding data fusion, distribution and overall coordination of the related processes? Mention if applicable, learned-by-experience lessons upon gradually moving to more efficient architectures.	Overall coordination of processes is somewhat difficult due to the characteristics of the village. Óbidos architecture is stagnant (inside the historic village centre, building facades and heights cannot be modified. Construction is old and streets are very narrow. For example, the firemen have only 2 vehicles (one fire-fighting and one ambulance) capable of working inside the historic centre. This means the capability to respond to an emergency in the centre is quite limited. The introduction of technologies for detection and alerting can circumvent the lack of capabilities in response and C2 technologies may make it easier to coordinate responses on foot for example.

4. Beyond the State of the Art

4.1.1 Area A: Situational Awareness

4.1.1.1   *Video Analytics Application*

Video Analytics application will aim to achieve the following feasible within the project duration, tasks:

- Connect to existing CCTV Cameras from existing city-wide CCTV systems

- Analyze video inputs in near real time in most cases, looking for Suspicious, Suspicious objects, suspicious entries in highly secure areas, suspicious behavior pattern based on predefined profiles and historical data.

- Based on the Video analysis results, the system will generate alerts to users based upon Abnormal behavior or movement, Victim typology, Known patterns, or appearance, Web Link Analysis

4.1.1.2   *Real-Time Positioning for Decision Support Application*

Based on a 3D model of the town, this application will offer a 2D/3D view of the town, representing people in it. Two kind of information will be included:

- 3D position of the people in real time extracted by video analysis

- 3D position and behaviour of people, obtained by artificial intelligence algorithms, when real information is not available.

4.1.1.3   *Road Track and environmental sensors Application*

The objective application is to implement a subset of the city-wide smart sensing system. The focus will be on traffic safety. The system will be able to:

- Identify incidents and unusual behavior in traffic patterns including abnormal or restricted vehicle (and pedestrian) behavior, accidents, congestion situations and traffic jams

- Sense critical environmental changes such as weather, road condition, foreign objects

- Take certain preventive safety measures alert emergency and/or maintenance units, warn nearby cars and citizens, provide real-time route optimization based on sensor information

4.1.2 Area B: Ad-hoc Networks

4.1.2.1   *Ad-hoc Network application*

The objectives of the AD-HOC network components can be stated into the following:

- Provide physical network support to resources in the field (either during regular operations or as a fast replacement for infrastructures destroyed by natural or man-made disasters).

- Provide connectivity between the sensors (e.g. CCTV cameras) and the Internet through the use of Ad-Hoc nodes thus contributing to achieving the "accessible from anywhere" capability.

- Allowing Users to interact with CCTV and other sensors via mobile devices.

- Support commercial wireless standards such as GSM, WiFi or even TETRA and WiMAX as well as similar Networks.

The AD-HOC application will be useful in the following scenarios:

- Crisis and emergency response situations.
- Provision of extra capacity following catastrophes or during large events.
- As a lifeline after a disaster where no other communication infrastructure is available

4.1.3 Area C: Alerting Citizens

SafeCity will identify needs and gaps in this functionality area. However, at this stage no specific application implementation is foreseen.

4.1.4 Area D: Command Centre Technologies

4.1.4.1   Decision Support System

The purpose of this application is to integrate MIT Decision and Support System with the SafeCity applications, in order to create a unified User interface for the system. The purpose of including the Decision support system is to create a unified User interface that allows all the SafeCity Applications to be accessed via single terminal.

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**

Video Analytics Application	Q26.	What are the demands you pose on the operation **Video Analytics Application** (1= very important, 2=important, 3=less important, 4=unimportant) If possible, establish also some parameters related to each technical requirement:	▪ Orphan objects detection, intrusion detection, facial detection, face recognition:
			   o [2] Distance
			   o [3] Application environment (indoor, outdoor,…)
			   o [1] Kind of object to be detected
			   o [3] Cross check detection with Criminal Data Bases
			▪ Anomalous pattern detection:
			   o [1] Persons
			   o [2] Objects
			▪ Tracking of:
			   o [3] Persons
			   o [3] Objects
			▪ [1] Speed in data processing once it has been collected
			▪ [3] Working autonomy
			▪ [2] Cost of maintenance (sensors maintenance and operation, data storage facilities, etc.)
			▪ [2] Confidentiality

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
			▪ [3] Requirements to configure and operate
			▪ [2] Justification of algorithms in defining suspicious and anomalous behaviors. How do you define suspicious and anomalous behaviours
			▪ Operating
			○ [1] On demand
			○ [2] Continuously
			▪ [2] Interconnection with other sensors (triggering inputs / outputs). If so, specify what type of sensor/output would you find necessary? What would be a suitable shared data format?
	Q27.	Which characteristics do you consider important to define exact profile (Location, Time, Behaviour…)	Location, time, behaviour and object/person features (physical build, facial features, clothing, distinctive features such as limps, tattoos, licence plates, car make, etc.) The main importance of CCTV for Óbidos is to maintain public order and to defend/protect heritage and historic buildings.
	Q28.	Evaluate how useful Video Analytics application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant)	3

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
	Q29.	In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases? (connectivity, trained personnel, additional data processing, etc)?	The challenges are essentially related to the training of personnel in the use of these tools and the reliability of the data collected and of the video analytics outputs as they may dictate action and commitment of resources to particular situations. Initially, their introduction could be foreseen mostly for forensic purposes.
	Q30.	Which scenarios you consider that would be applicable to Video Analytics application? Please refer to potential as well as past incidents applicable	Surveillance of important buildings and areas (historical landmarks and parking lots for example) and crowded areas such as tourist attractions or public transportation hubs.
	Q31.	Given your existing experience, what social, ethical and legal implications would you see to arise? What respective policies could your organization apply in each case?	TBC
Real time Positioning for Decision support Application	Q32.	What are the demands you pose on the operation **Real-Time Positioning for Decision Support Application** (1= very important, 2=important, 3=less important, 4=unimportant) If possible, establish also some parameters related to each technical requirement:	▪ [Don't understand the parameter] Distance: ……………………………………………… ▪ [2] Application environment ▪ [2] Working autonomy: …………………………………………… ▪ [1] Cost of maintenance: …………………………………………… ▪ [1] Reliability: …………………………………………… ▪ [1] Confidentiality ▪ [3] Requirements to configure and operate:

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
			………………………………………………
	Q33.	Which scenarios you consider that would be applicable to Real-Time Positioning for Decision Support application? Please refer to potential as well as past incidents applicable	Crisis response
	Q34.	Please precise for scenarios you describe at which operational level location information is relevant (on a local PDA, on a mobile Control Command vehicle screen, on a global city control room screen? Other?) ▪ What kinds of vehicles are interesting to locate/track? In which situation? ▪ In which situation is it interesting to locate and/or track a specific person? ▪ When tracking information is not available anymore (vehicle/person goes out of the scope of cameras), would it be interesting to have some information for decision support such as re-apparition zone of the person/vehicle? ▪ What kinds of events are interesting to locate? In which situation?	It is interesting to have location information both at command centre level but also and especially at mobile level for teams on the field in mobile devices or vehicles. Interesting vehicles to track correspond essentially to automobiles. The most interesting situation corresponds to tracking a car after the detection of an anomalous manoeuvre. The above also applies to person location and tracking. The re-acquisition of persons/vehicles is interesting but not sure if entirely feasible. Interesting events to locate include all major envents that gather a significant number of people which in most cases are organized (e.g. festivals, concerts) and hence their locations are known. Spontaneous

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
			gatherings opf large crowds (not exactly events) might be interesting to locate.
	Q35.	Evaluate how useful Real time Positioning for decision support application application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant)	2
	Q36.	In your opinion, what are the challenges to integrate this application into your activities performed during	The main issue regarding integration of real time positioning data from citizens into Municipality activities is related to the purpose of the information

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
		prevention and preparedness phases?	and its use. This type of information will probably be more useful for response phases to crisis events and for the civil protection rather than the actual municipality.
	Q37.	Given your existing experience, what social, ethical and legal implications would you see to arise? What respective policies could your organization apply in each case?	Privacy issues of tracking individual persons who haven't committed any illegal activity.

Road Track and environmental sensors application	Q38.	What are the demands you pose on the operation of SafeCity **Road track & environmental sensors application** (1= very important, 2= important, 3= less important, 4= unimportant) If possible, establish also some parameters related to each technical requirement:	▪ [3] Detect unusual traffic patterns
			
			▪ [1] Identification of incident
			
			▪ [3] Sense critical environmental changes
			
			▪ [2] Monitoring of structural health of bridges and buildings
			
			▪ [3] Monitoring of inhospitable/dangerous environments
			
			▪ Weather station
			
			   o [3] Temperature
			
			   o [3] Weather conditions
			
			   o [2] Weather forecast
			
			▪ Road General condition
			
			   o [3] Ice
			
			   o [4] Snow

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
			o [3] Rain ▪ Events and occasions o [3] Holidays and vacation periods o [2] Tourist seasons (visitors not aware with the area) o [2] Grand seasonal events ▪ 1 Speed in data processing once it has been collected ▪ [1] Reliability ▪ [3] Confidentiality
	Q39.	Please specify what kind of information your organization would require to receive from the respective technology, in order to foresee such risks. Please refer to appropriate case scenarios, where possible.	TBC
	Q40.	Evaluate how useful Road Track and environmental sensors application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant)	2

Beyond the state of the art			
AREA A Situational awareness	**Q Nr.**	**QUESTION**	**ANSWER**
	Q41.	In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases?	Training citizens and municipality workers in the use of this application. In particular, mobile access to application by municipal workers is important to ensure the best response in the lowest possible time. Another challenge will be to integrate the information coming from this application into the regular workflows of the workers (e.g. road workers).
Intelligent transportation system	Q42.	Would you consider an intelligent transportation system to be an important part of the city's infrastructure? Which parameters do you consider the most important? (1= very important, 2= important, 3= less important, 4= unimportant)	▪ [ ] Automatic activation of breaking systems or fuel control. ▪ [ ] Maintain driver and passenger comfort and safety through the use of sensors for airbags control and seatbelt pre-tensioning. ▪ [ ] Use of sensors for fatigue and mood monitoring to ensure safe driving ▪ [2] Use of a broad city-wide distributed sensor network to indicate traffic flows, administer tolls or provide continually updated destination routing feedback to individual vehicles. ▪ [2] Use of global and local information, combining GPS information with cellular networks

Beyond the state of the art			
AREA B: Ad-hoc Networks	**Q Nr.**	**QUESTION**	**ANSWER**
Ad-hoc Network application	Q43.	What are the demands you pose on the operation of SafeCity **Ad-hoc Network application** (1= very important, 2= important, 3= less important, 4= unimportant) If possible, establish also some parameters related to each technical requirement:	[2] Characteristic of devices: weight, size, robustness, accuracy, etc [2] Node time deploy [1] Kind of data [1] BW [1] Reliability [3] Supporting data storage on the field [1] Allowing sensors intercommunications in the field (in such case, please reference families of sensors of which you would consider necessary/important to be integrated on a defacto basis) – Video surveillance and environmental sensors
	Q44.	Evaluate how useful Ad-hoc network application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant) In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases?	1
	Q45.	Which scenarios you consider that would be applicable to Ad-hoc Network application?	Crisis response – such as supporting coordination of response assets after natural or man-made disasters

Beyond the state of the art			
AREA B: Ad-hoc Networks	**Q Nr.**	**QUESTION**	**ANSWER**
			Support to day-to-day operations of field teams (firemen, police, etc.) Support to Wireless Sensor Networks for Situational Awareness Augmentation of service capacity due to local or special events

Beyond the state of the art			
AREA C: Alerting Citizens	**Q Nr.**	**QUESTION**	**ANSWER**
Alerting Citizens applications	Q46.	Which applications do you consider useful to be part of your daily operation? Including in each case: ▪ Which requirements/demands would you have regarding to this application? ▪ Evaluate how useful this application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant) ▪ In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases?	The Alerting citizens application should enable the user to choose subsets of citizens by group (e.g. age, area of residence, occupation, etc.) instead of all or nothing, and should enable also the choice of communication vehicle (e.g. mobile phone, TV, radio, etc.) IMPORTANCE of APPLICATION = 2 The main challenge is related to ensuring citizen acceptance and citizen take-up of the system. Additionally, training of workers in the adequate usage of the alerting system (e.g. training to prevent issue of

			false alarms) is extremely important. Also, coordination with nation-wide means and resources.

Beyond the state of the art			
AREA D: Command Centre Technologies	**Q Nr.**	**QUESTION**	**ANSWER**
Decision Support System application	Q47.	What are the demands you pose on the operation of SafeCity **Decision Support System** (1= very important, 2= important, 3= less important, 4= unimportant). If possible, establish also some parameters related to each technical requirement.	▪ [2] Working autonomy: ……………………………… ▪ [1] Facilitate to configure and operate: ………… ▪ [1] Reliability: ………… ▪ [2] Work distribution and decentralization: ………………………………
	Q48.	Evaluate how useful Decision Support System application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant) In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases?	2 Training of users in the adequate usage and application of the command centre. Education of users in accepting decision support tools and establishing the limitations of autonomous decision taking.

Please indicate if you considered any other application that might not adjust to the previous areas, including:

Beyond the state of the art			
AREA D: Others	**Q Nr.**	**QUESTION**	**ANSWER**
Other applications	Q49.	Which applications do you consider useful to be part of your daily operation? Including in each case: ▪ Which requirements/demands would you have regarding to this application? ▪ Evaluate how useful this application could be to your specific organization (1= very important, 2= important, 3= less important, 4= unimportant) ▪ In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases?	
Ubiquitous Sensor Network	Q50.	Would you consider important the existence of a Ubiquitous Sensor Network (USN), a term which is used to describe a network of intelligent sensors (including people with their mobile phones) that could appear everywhere? A USN can be used to provide an intelligent information infrastructure to support a multitude of different applications (utility infrastructure, buildings, roads, rails, vehicles, goods, people…) ▪ Which requirements/demands would you have regarding to this vision? ▪ Evaluate how useful this application could be to your specific organization (1= very important, 2= important,	A USN would constitute an interesting tool for the municipality, as long as the necessary tools to manage the huge amounts of data, to manage the privacy of the citizens and the tools capable to sift through the data and identify events and pinpoint these to the users could be implemented. There is currently no clear identification of the types of data that should be collected by such a type of sensor network. However, In principle, the municipality would be interested in compiling the data mentioned in the previous applications through this sort of crowdsensing. Based on this assumption (collection of video surveillance, environmental data, traffic data and other

		3= less important, 4= unimportant)
		
		▪ In your opinion, what are the challenges to integrate this application into your activities performed during prevention and preparedness phases
			sensors data through crowds), we would require that this network support the storage and management of the high amounts of data that could be expected. It would also be necessary for the network to support tools for sifting and analysing the data automatically raising alarms whenever an operator's attention is required (the possibility of full control over the data by the operator would nonetheless be required). Finally, the privacy of the citizens involved would need to be cared for.
			
			Usefulness of the application = 3
			
			The challenges are essentially the same as before:
			
			    - Training of users in the operation of the system
			    - Education of citizens and users to accept the system;
			    - Including the results of data analysis into the regular flows of safety players
			
			In addition, there would be the additional challenge of implementing the infrastructure capable of storing and managing all the generated information in a secure and reliable fashion.