ANEXO 11 : ESPECIFICACIONES GOOGLE TRANSIT, APPS MOVILES Y PROYECTO IMODEBUS FP7-ICT-STREP-10

AYUNTAMIENTO DE PALENCIA

Medio Ambiente

DESARROLLO DE APPS MÓVILES DE PROMOCIÓN DE TRANSPORTE PÚBLICO PARA SMARTPHONES

INDICE

1. OBJETO DE LA PROPUESTA

La puesta a disposición de los usuarios de una aplicación para dispositivos móviles permitirá que los usuarios **consulten de manera rápida y sencilla a la información más relevante** que facilita el empleo de dicho transporte: tiempos de llegada, cómo llegar a un destino determinado y qué transbordos efectuar, cómo encontrar la parada más cercana, qué incidencias se recogen en el servicio, etc.

Para ello, será necesario combinar los datos provenientes en tiempo real de diversos SAE's con información del entorno del usuario como su posicionamiento geográfico. El objetivo, facilitar al máximo la información que requiere un viajero para hacer más sencilla la utilización del medio de transporte.

- Aplicación nativa para dispositivos con sistema operativo **iOS** y **Android**.
- Puesta a disposición del usuario en tiendas on-line: **App Store** y **Google Play.**
- **Notificaciones** en el dispositivo cuando haya nuevas actualizaciones.
- **Integración** de toda la información del Servicio de Transporte en el móvil.

2. DESCRIPCIÓN DE LA SOLUCIÓN

2.1. ALCANCE BÁSICO OBLIGATORIO EN EL CONTRATO

2.1.1. PERSONALIZACIÓN A LA IMAGEN DE CIUDAD

Desarrollo de la aplicación con el look propio del servicio de transporte, de forma que tenga homogeneidad con la imagen de la marca del resto de servicios ofrecidos. Es posible personalizar fondos, cabeceras, logos, tipografía…

2.1.2. PUESTA A DISPOSICIÓN EN TIENDAS ON-LINE

Gestión de la incorporación de la aplicación a las tiendas on-line de las plataformas:

- App Store (Apple)
- Google Play (Android)

2.1.3. TIEMPOS DE LLEGADA

Esta funcionalidad permitirá conocer el **tiempo de llegada** estimado del próximo autobús de la línea que se desea coger a su paso por la parada seleccionada. Para ello, las paradas vendrán

categorizadas por línea y listadas por orden de trayecto para facilitar su selección. La información mostrada será obtenida de los webservices del SAE.

- **Favoritos**. Cualquier parada se puede configurar como **favorita** clicando sobre el icono de estrella. Las paradas seleccionadas como favoritas se mostrarán al inicio, lo que agiliza la consulta de los tiempos de llegada en las paradas habituales.
- **Filtro por línea**. Cuando se acceda a los tiempos de llegada de una parada será posible conocer las estimaciones de todas las rutas que pasan por la misma activando y desactivando lineas al clicar en los iconos de las mismas.
- **Ruta a pie.** Instrucciones en lista o en mapa de cómo llegar a la parada consultada desde la posición geográfica del usuario.
- **Google StreetView.** Panorámicas a nivel de la calle que permiten a los usuarios ver la zona de interés y les ayuda en la localización de la parada.

2.1.4. ESTADÍSTICAS DE USO

Monitorización e informes mediante **Google Analytics.** Este servicio permitirá realizar un seguimiento de las estadísticas de uso de la aplicación:

- Accesos diarios.
- Número de consultas por parada.
- Búsquedas de cómo llegar más comunes.
- Paradas definidas como favoritas por los usuarios.
- Características de los dispositivos que han usado la app.
    - Modelo de hardware
    - Sistema Operativo
    - Proveedor de servicios
- Número de descargas.

2.2. ALCANCE AVANZADO OPCIONAL EN EL CONTRATO

2.2.1. CÓMO LLEGAR

Esta funcionalidad proveerá la información necesaria para saber **cómo llegar en transporte público de un punto de la ciudad a otro**. Por defecto se utilizará la **ubicación del usuario** en el momento de la consulta, aunque también es posible especificar cualquier otro punto insertando una

dirección. De forma adicional, se incluirá un **desplegable con los lugares más emblemáticos** de la ciudad y un **autocompletado de nombres de calles** para facilitar el acceso a la información.

Estará implementado mediante el servicio Google Transit, por lo que **para su inclusión será necesario añadir a la plataforma la información actualizada con las líneas y horarios.**

Las instrucciones acerca de cómo llegar a un destino determinado podrán ser visualizadas bien en **lista** o dibujadas sobre un **mapa**.

2.2.2. PARADAS CERCANAS

Mediante este servicio los usuarios podrán investigar dónde se encuentran las paradas más cercanas a su situación en un momento dado. Al entrar en esta función se listarán las paradas más cercanas por distancia en línea recta. Adicionalmente, será posible visualizar dichas paradas en un **mapa** o mediante **realidad aumentada**.

2.2.3. INFORMACIÓN DE LAS LINEAS

Sección en la que se podrá poner a disposición del usuario toda la información de las líneas que componen el servicio:

- Recorrido del Itinerario.
- Sinóptico (termómetro) de paradas del trayecto.
- Horario y frecuencias del itinerario.
- Representación de la ruta sobre la base cartográfica.
- Acceso directo a la ficha de tiempos de llegada de las paradas.

2.2.4. INCIDENCIAS

Mediante esta funcionalidad se podrán listar las **incidencias activas** en el servicio de transporte. Por ejemplo, si hay obras en una calle y una línea ha sufrido un desvío, o si un autobús ha sufrido una avería y se advierten retrasos para ese trayecto.

Otra alternativa consistirá en incluir en la parte inferior del home un módulo que muestre los últimos tweets de una cuenta oficial que informe del estado del servicio. Así, cuando los usuarios entren a la app visualizarán los últimos avisos e incidencias emitidos vía **Twitter**. El módulo se podrá configurar para que muestre todos los tweets de la cuenta o sólo los que incluyan una determinada palabra o hashtag.

2.3. OTRAS FUNCIONALIDADES OPCIONALES

2.3.1. SISTEMA DE REPORTE DE INCIDENCIAS

Plataforma orientada a que los usuarios del servicio puedan estar informados en tiempo real mediante **notificaciones push** de las incidencias del servicio que ocurran en las lineas que suelen utilizar. En un servicio de notificaciones push se distinguen 3 actores principales:

- **Servidor**. Es el encargado de generar las notificaciones y de decidir a qué dispositivos tiene que enviarlas. En el presente proyecto se propone habilitar un servidor con una interfaz web a través de la que los controladores generarán las incidencias.

- **Servicio de notificaciones**. Ya sea de Google (GCM) o de iPhone (APNS), será el encargado de distribuir las notificaciones enviadas por el servidor a los dispositivos indicados.

- **Dispositivo**. Cualquier smartphone Android o iPhone con la aplicación instalada.

2.3.2. SISTEMA DE AVISOS DE TIEMPOS DE LLEGADA

Funcionalidad para que los usuarios puedan configurar **alarmas** que les avisen de cuando el autobús que están esperando se encuentra a un tiempo determinado de la parada.

2.3.3. ALERTAS DE LLEGADA A DESTINO

Sistema para que un usuario del servicio que esté esperando pueda programar una alerta para que le avise cuando esté llegando a su destino.

2.3.4. DISCAPACIDAD VISUAL: VOICEOVER

VoiceOver es un lector de pantalla integrado en dispositivos con sistema operativo **iOS** que funciona mediante gestos y que permite a los usuarios con discapacidades visuales navegar y utilizar aplicaciones móviles. Esto es posible porque al activarlo (Ajustes > General > Accesibilidad) suenan en voz alta todos los textos incluidos en la app y cambia el modo de interactuar con la misma (doble tap, pulsación dividida…).

En la presente propuesta se plantea como opcional la posibilidad de adaptar la aplicación para que sea totalmente compatible con VoiceOver:

- Alineación de botones para efecto "flick right".

- Generación de etiquetas para lectura de botones.
- Cabeceras con botones ubicadas de forma consecutiva.
- Interpretación de datos remitidos por WS.
- Incremento de tamaño de botones de líneas.

2.3.5. DISCAPACIDAD VISUAL: TEMAS DE ALTO CONTRASTE

Desde los ajustes de la aplicación las personas con deficiencias visuales podrán elegir entre **tres temas de alto contraste** (recomendados por ONCE) para utilizarla:

- Amarillo sobre negro.
- Rojo sobre verde.
- Blanco sobre violeta.

Al seleccionar uno de estos contrastes automáticamente se adaptarán los estilos de todas las pantallas de la aplicación.

2.3.6. ADAPTACIÓN PARA TABLETS

Redimensionamiento de la aplicación para su correcta visualización sobre tablets **Android/iOS**:

- Conversión entre las diferentes **densidades de pantalla** (120 LDPI, 160 MDPI, 240 HDPI, 320 XHDPI).
- Tamaño de **iconos** e **imágenes**.
- **Tamaños de pantalla** (Small, Normal, Large, Xlarge).

2.3.7. PANTALLA HORIZONTAL

Adaptación de la aplicación para poder **cambiar la orientación del dispositivo:**

- Vertical (portrait).
- Horizontal (landscape).

Dado que ambos formatos presentan características muy distintas es necesario **generar dos versiones diferentes de la interfaz gráfica**. La rotación es una función que permite ofrecer una vista más cómoda al usuario según la posición del dispositivo que esté utilizando en ese momento. Para ello habrá que implementar nuevos recursos de layout para todas las pantallas: Tiempo de Llegada, Cómo Llegar, Paradas Cercanas, Líneas, etc.

2.3.8. APLICACIÓN DE SUPERVISIÓN PARA INSPECTORES

Adaptación de la app pública para generar una aplicación profesional que permita a un inspector de transporte realizar **labores de supervisión de la operación en dispositivos móviles con sistema operativo Android o iOS** (iPhone).

- **Autenticación** y control de accesos.
- **Consulta de horario por parada**. Menú de selección de la parada a consultar mediante listas desplegables (seleccionando línea, trayecto y parada) o introduciendo el número de poste. En la ficha de cada parada se mostrará una **tabla con información sobre los horarios de paso**: coche, viaje, servicio, horario teórico, referencia, real/estimado, etc. Los datos se obtendrán llamando al web service del servidor.
- **Consulta de próximas llegadas por parada**. En la ficha de cada parada se mostrará una tabla con información sobre las próximas llegadas: coche, hora estimada de llegada, distancia estimada a la parada, destino, desfase horario actual, desfase horario estimado al llegar a la parada, frecuencia actual y desfase de frecuencia actual.
- **Consulta de autobuses en la línea**. Tabla por ruta en la que se mostrarán los autobuses localizados en ella ordenados por posición. Para cada autobús se mostrará la siguiente información: coche, posición (distancia al inicio de la ruta, distancia al final, última parada, desfase horario, frecuencia actual y desfase.
- **Consulta de relevos de la línea**. Acceso a la información de próximos relevos de una línea: coche, conductor actual, próximo conductor, parada de relevo, hora de relevo, etc.

- **Sinóptico de la línea**. Representación de las líneas en forma de termómetro. Sobre el gráfico se mostrará la siguiente información:
  - Cabeceras de los extremos (mostrando el nombre) y paradas en orden secuencial. Al clicar en una parada se accederá a la tabla con información sobre los horarios de paso.
  - Posición real de los autobuses sobre la representación. De forma adicional se podrá mostrar la posición teórica de los autobuses. Al seleccionar un autobús se accederá a la información completa del mismo.

2.3.9. SISTEMA DE CONSULTA DE SALDO DE TARJETA

Sección en la que el usuario podrá insertar el número de tarjeta de transporte y la aplicación le mostrará su saldo actualizado.

ANEXO 11: GOOGLE TRANPORTE PÚBLICO EN TU CIUDAD

¿Qué es Google Transit: Transporte Público?

Google Transporte Público es una novedosa herramienta que Google ha puesto a disposición de los ayuntamientos recientemente (http://maps.google.com/intl/es/landing/transit/text.html#eu) Consiste en permitir la publicación del servicio de transporte público urbano en el propio Google Maps de cualquier ciudad. De este modo cualquier visitante virtual que acceda al mapa de tu ciudad podrá activar la capa de Transporte Público y conocer las distintas rutas que operan, sus recorridos, sus paradas y sus frecuencias.

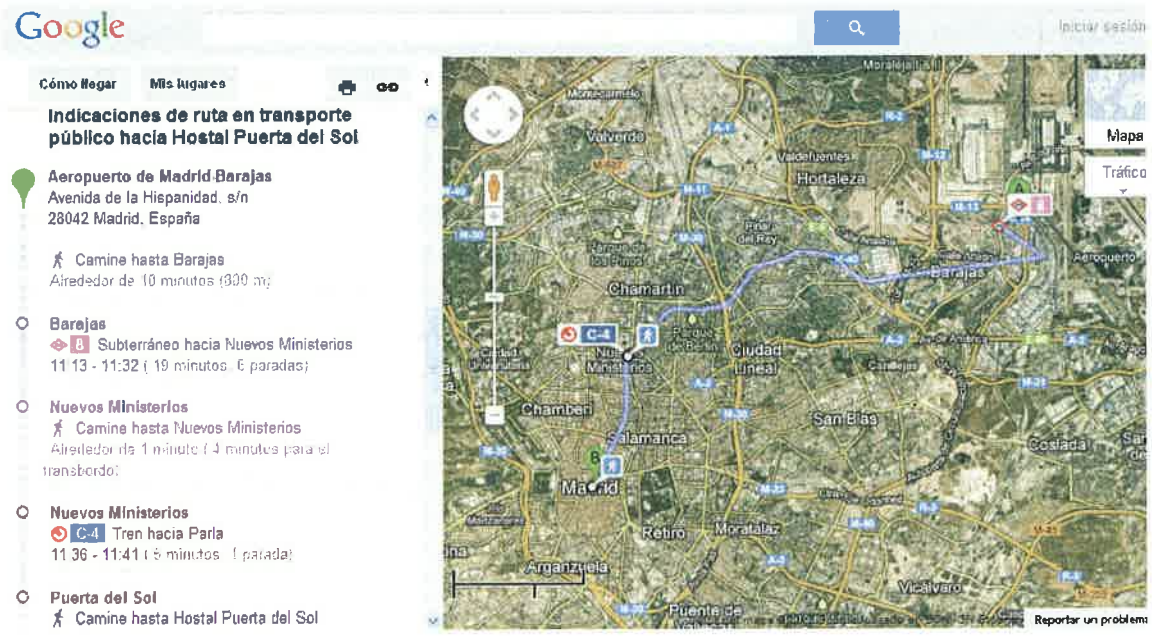
Es un revolucionario sistema que permite a las pequeñas y medianas ciudades ofrecer una información del servicio de transporte de calidad, equiparándose a las grandes metrópolis sin necesidad de instalar dispositivos GPS en los autobuses ni paneles informativos electrónicos en las paradas relativo al tiempo de espera.

¿Qué utilidades tiene?

☐ Cálculo de rutas

Mediante un cajetín de consulta el usuario define de dónde a dónde quiere ir, y puede especificar sus preferencias en cuanto a tipo de transporte, así cómo la ruta de menor tiempo, menor número de transbordos o menos recorrido caminando.

Una vez realizada Google Transit propone las rutas que e permiten llegar a sus destinos, el tiempo que le llevan y la explicación completa de cómo realizarlas



Captura de pantalla del ejemplo de ruta, en marrón el tramo a hacer caminando y el azul en transporte público, en la barra lateral izquierda las instrucciones y los tiempos empleados de la alternativa escogida entre las propuestas por Google Transit (en caso de existir varias)

☐ Aplicaciones móviles

Otra de sus utilidades de mayor aceptación entre usuarios de las nuevas tecnologías es que con las aplicaciones móviles de los smartphones se nos informa al momento de dónde estamos, dónde está la parada que necesitamos, cómo llegar a ella y cuánto tiempo tenemos que esperar para el próximo bus que nos lleve a nuestro destino, en qué parada bajar y cómo ir hasta la dirección solicitada. Se han acabado las tediosas esperas y el sentirse desorientados, el transporte público se adapta a los ciudadanos mediante las nuevas tecnologías!

¿Cómo subir a Google Transit el transporte público de tu ciudad?

Google establece una relación de partenariado con los ayuntamientos que deseen tener la información relativa al transporte público mediante la firma de un contrato online en el que se esclarece que la información depende del ayuntamiento y no de Google, eximiéndose éste de toda responsabilidad.

No tiene coste alguno, pero sí exigencias estrictas en el formato y la calidad de la información que se envía, que debe cumplir los estandares de interoperabilidad espacial para su correcto volcado y funcionamiento con el algoritmo desarrollado por Google Transit, además de ser tomadas mediante tecnología GPS fiable con soporte cartográfico digital para la depuración de errores, teniendo en cuenta el sistema de referencia geográfico adecuado a la ubicación de la ciudad.

Exige tiempo, experiencia y formación previa tanto en la fase de toma de datos como en su edición cartográfica y migración de datos, y no todos los ayuntamientos disponen del personal cualificado capaz de ejecutarlo o de tiempo y recursos para dedicarle.

Con la colocación del transporte público en el mapa se facilitando la vida a los ciudadanos y visitantes y se incrementa el número de usuarios, puesto que una de los mayores obstáculos a la hora de utilizar el transporte público es la falta de información que desorienta y desanima al potencial pasajero.

Las nuevas tecnologías se ponen así a favor de la movilidad sostenible, la lucha de las ciudades contra el cambio climático y la reducción del déficit asociado al transporte público.

A veces son las soluciones menos costosas y más ingeniosas las que producen mayores rentabilidades (sociales, ambientales y económicas!)

Que es necesario para el desarrollo del Google Transit en la ciudad de Palencia
De cara al desarrollo de la aplicación del Google Transit a la ciudad de Palencia se precisa de la empresa concesionaria:

☐ Asesoramiento y acompañamiento en todo el proceso

☐ Trabajo de campo en la recolección de datos necesarios:

- Rutas
- Recorridos
- Paradas
- Accesibilidad de las paradas (opcional)
- Frecuencias

☐ Establecimiento de canales de comunicación continuos y fluidos con

- Servicios de movilidad del ayuntamiento
- Empresas concesionarias de transporte público
- Google

☐ Generación de bases de datos de horarios y frecuencias por paradas

☐ Edición en formato SIG/CAD

☐ Migración de datos SIG al formato exigido por Google

☐ Asistencia técnica en el envío de datos y validación

☐ Mantenimiento del sistema

☐ Inclusión del módulo de accesibilidad de las paradas de transporte público (opcional)

Small or medium-scale focused research project (STREP)

ICT Smartcities 2013
FP7-SMARTCITIES-2013

System Management Platform for Inter-modal Electric Bus based on Cloud Computing and Big Data.

iModEBus

Type of project: **Small or medium scale focused research project (STREP)**
Date of preparation: 26/12/2012
Version number *1*:

Work program objective addressed: Objective ICT-2013.6.6: Integrated personal mobility for smart cities.

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Participant no. *	Participant organization name	Part. short name	Country
1	SOITSA	SOITSA	Spain
2	ITE	ITE	Spain
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5	Bluemobility,S.L.	BLUEM	Spain
6	Ayuntamiento de Palencia	PAL	Spain

**Please use the same participant numbering as that used in Proposal submission forms A2*

Proposal abstract

iModEBus research will demonstrate the increased take-up, energy efficiency gains and the viability of an inter modal electric buses service for small/medium cities, as a new mobility service based on an Internet "on demand", cloud computing and big data architecture.
iModEBus consortium will develop a web based software management platform for urban inter modal bus services and traffic integration based on efficient fleet bus management that integrates proximity minibuses "on demand" with regular electric buses lines.
The Consortium will develop a "big data" system based on cloud computing, where data inputs come from system management, proximity minibuses and line buses, electronic bus cans and gpps control units, chargers devices and batteries metrics.
Data outputs feed the efficiency gains model to manufacturer, based on specialized public institution and university advising to improve the own management system and involved products, under manufacturers commitment.
The participant cities, Cluj-Napoca (Romania) and Palencia (Spain), offer to integrate the research project into the public transport infrastructure, and to provide surface for electric chargers. The manufactures will provide: standard and renewable chargers basis, batteries, electric minibuses and electric line buses provide own products and the commitment to work in R+D under the Consortium advises.
Advisor and technical coordinator will be Instituto Tecnológico de la Energía.
The software management system, the data mining for the cloud "big data" model and the cloud management will be delivered by SOITSA (Spain) an ICT SME, with consolidated experience in leading a similar consortium related to Electric Vehicles that will assume the project research leadership.
Finally, **iModEBus** work program will also build a real pilot model to be extrapolated to similar smart cities with similar needs in order to achieve Energy efficiency gains in personal mobility.

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Section 1: Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

1.1.1 Introduction

Sustainable road transport technologies can enhance environmental quality of cities. Specifically, an electric public transportation infrastructure can contribute significantly to the lowering of the current pollution levels. However, public transport in most cities uses diesel buses with predefined routes, both for urban areas and for peri-urban or service areas, although the demand by the users does not remain constant during the week or even during the day.

Most efforts in this area have been aimed at replacing the diesel buses by electric buses which keep on doing the same routes with almost the same frequency during the week. An Inter-modal Transportation Infrastructure could contribute to solve this problem, using different kind of buses combined with an alternative management of the bus lines taking into account the users demand in the route planning.

This approach is the basis of iModEBus, which will demonstrate the increased take-up, energy efficiency gains and the viability of an inter modal electric buses service for small/medium cities, as a new mobility service based on an Internet "on demand", clouding computing and big data architecture.

The advancement of the electromobility technology in the public transportation sector will result in a significant reduction of pollutant greenhouses emission in urban areas, with substantial benefits for the population in terms health and quality of life improvement. But it will also pose additional constraints and challenges (both of a technical and economic nature) with respect to the traditional public transportation system based on internal-combustion engines.

One of the mayor complications related to the design of feasible and efficient electromobility systems is that both the constraints of the transportation system and those of the electric system need to be taken into account simultaneously (i.e. electromobility implies the tight coupling of two systems that nowadays are largely decoupled). In particular, the problem of allowing fleets of buses to recharge without negative impact on the grid, and compatibly with the stringent requirements of a public transportation system will be of outmost importance. As a matter of fact, urban areas constitute possibly highly congested and "structured" environments, where operations of network reinforcement (which, moreover, tend to be deferred by network operators) are often impossible to be carried out in the medium/short term.

iModEBus system platform is based on the concept of management electric inter modal transport for citizens and to gain efficiencies and savings due to get, to compute and to explore several sources of data in a cloud computing location under big data principles.

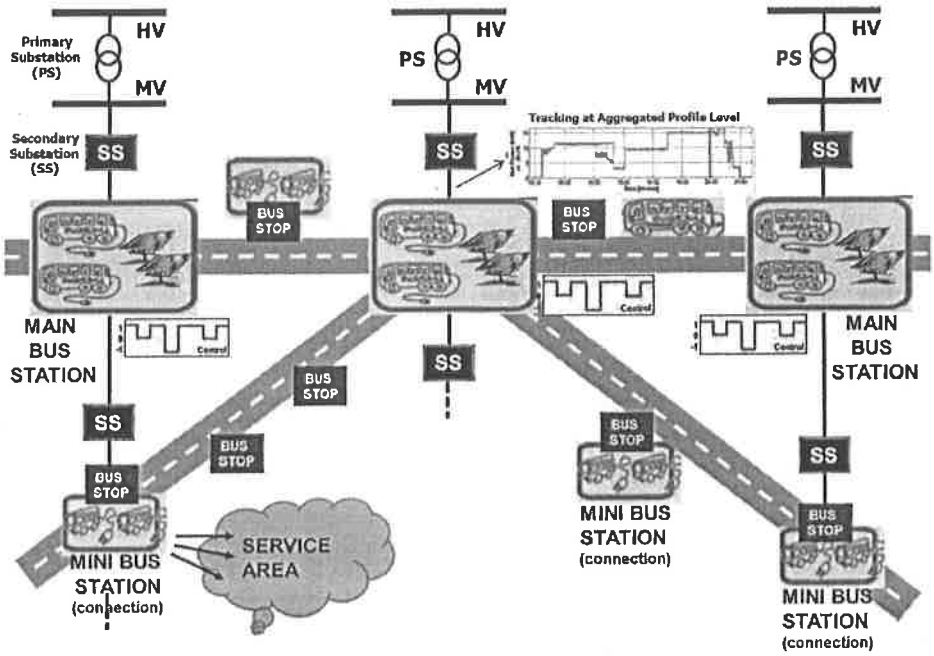

Figure 1: Reference scenario.

The reference scenario is depicted in Figure 1. The transportation system is organized in main urban lines (referred to as service lines), served on a regular basis by regular line (e.g. 9 meters) buses, and on a pick-up service for connection of peri-urban areas (referred to as service areas) to the main lines, served on-demand by fleets of mini buses.

The main potential city users should be medium size cities as the involved members like RATUC (Cluj-Napoca) and Palencia (Ayuntamiento de Palencia) where iModEBus prototypes will be implemented and released. We have chosen these cities because their statements of mobility are fully different: Cluj-Napoca transportation is based on Electric Trolleys and some diesel buses, but Cluj-Napoca has implemented some energy plans like brake energy recovery in trolleys. In the other hand, Palencia is involved in several programs related to citizen conscience, but until today the public transport media is mainly based on diesel buses. So the starting point of both cities is really different and the model experience will be wider. Due to it, the work program results, the analysis conclusion and the possibility of the model extension is also wider and more open to new cities.

1.1.2 Scientific and technological objectives (S&T objectives)

The general objective of **iModEBus** is to make urban mobility more environmentally sustainable by means of the development of an inter modal electric buses service for small/medium cities, as a new mobility service based on an Internet "on demand", clouding computing and big data architecture.

To accomplish the overall targets, the following **specific objectives** are established within **iModEBus**:

- **Logistic objectives**
    - To develop a **proximity buses service** that mainly operate between urban and peri-urban areas working on user's demand in order to optimize the route planning using permanent geo-location information.
    - To develop a **line buses service** with regular paths in main urban areas with adapted stops to interact with the proximity buses service.
- **Energy objectives**
    - To develop **smart fleet charging strategies** to avoid negative impact that uncontrolled electro mobility diffusion has on unreinforced MV/LV networks.
    - To develop **static and dynamic routing strategies** to manage bus autonomy and service capacity.
- **System and data objectives:**
    - To create an **application system** for the platform management and to provide a big data model that capture, store and process the model information, make strategic decisions and to achieve efficiency and gains.
    - To develop a **Big Data System** as a service by combining it with cloud computing.
- **Demonstration objectives**
    - To demonstrate at real-scale the performance of iModEBus System in two different European cities (RATUC and Palencia) integrating electric buses, on demand minibuses, charging stations and solar charger stations in their transport and electric infrastructure.

To talk about Inter-modal transport, even within the electric transport environment, is a really wide concept and it is necessary to concrete it.

For the best explanation we will introduce three main concepts:

- ❖ Logistic Concept: Logistic concept is related to passenger transport model.
- ❖ Energy Concept: We refer to energy concept as the project part related to energy class, efficiency gains, emissions reduction and savings.
- ❖ System and Data Concept: On the top of that, as a main work program objective, we will introduce the Internet based management system and the Big Data concepts.

As a first step, the program scenario that corresponds to the Consortium vision is related to a new urban mobility facility that we have called "proximity buses".

1.1.2.1 Logistic Concept

1.1.2.1.1 Proximity buses

Proximity buses are minibuses that mainly operate between urban and peri-urban areas. They have the following features:

1. Based from/to peri-urban areas from/to urban areas. This kind of transport is based on a new way of connecting urban and peri-urban areas. The innovative concept is based on the fact that this buses has two mainly operations areas during several time frames that are adequate to the passengers transportation flow.

2. On demand services. Transport services will be activated by the citizens "on demand". The ways of service access will be Web and Smart phones apps.

3. Passengers pick up organization. Management system will receive the citizen pick up request and analyze several factors like: distance between area operative buses, buses occupancy and traffic statement. The system calculates the best route and the route time. Then iModEBus will offer to the requester a pick up time. Requester passenger may accept or decline the service. In addition, citizens could also book daily or frequents routes into iModEBus System.

4. Permanent geo-location info. from buses to passengers and time to service. The management system is based on geo-location information. Buses are permanently located in the management system and passengers, when service request is done, also sent location coordinates to the system or introduce position by street or clicking in a map.

5. Services Closing and Payment through several ways (phone against service account). The service closing is done on-line by the requester. At the same time, passengers pay the service (through several payments gateway) or consume a pre-payment bonus.

Proximity buses suppose a step beyond vehicle sharing concept and public transportation.

1.1.2.1.2 Line Buses

IModEBus system inter modality is based on the combination of the previous proximity buses and line buses. Line buses have regular paths in main urban areas, in our vision these lines are based on circular paths close to city center.

Line buses services are defined with the following features:

1. Regular services based on regular lines. As we have anticipated, line buses concept are based on regular paths close to the main street in the participant cities.
2. Main Stop connected to Minibuses. As regular lines, these buses have defined stops, proximity buses and line buses are connected due to defined stops (connections)

3. Transport from/to urban areas. Line buses just cover city center urban areas
4. Permanent geo-location info from buses to passengers and time to service. Line services are permanently geo-located. It means that citizens could know the bus situation in any time through iModEbus platform (Web and apps access).
5. Services Payment through several ways (phone against service account).As for proximity buses, passengers could pay the service (through several payments gateways) or consume a pre-payment bonus.
6. System manages bus autonomy and service capacity (occupancy and availability) and suitable route.

At the end, the system manages several transport parameters continuously, (availability, occupancy, etc) and the suitable route to proximity buses connections. The combination between both buses integrates the inter-modal concept.

1.1.2.2 Energy Concept

1.1.2.2.1 Electromobility

Research work program is based on electric vehicles, concretely electric buses, that working integrated configure the model for the system management application and the big data analysis.

- Electric buses

The project scope includes the delivery as a real implementation of a small fleet of electric buses. Every city will be supplied by manufactures members with 6 minibuses and 2 line buses. Buses include batteries that are fully compatible with buses design.

- Basis Charger

Of course, to complete the energy concept it will be necessary to provide basis for charging. The surface for basis installation will be donate by each city hall. Initially, we have included a basis with two chargers for Line Buses and a basis with six chargers for minibuses. These volumes will be implemented in both cities.

- Solar Charger station.

In addition, we will incorporate a renewable charger based on solar Ideal for municipalities able to accommodate both electrical currents for any EV charge connection and it produces 1.2 kilowatts of power enough to supplement electricity. These charging stations will be located in basis charger as an alternative energy source for the grid basis charger.

- On demand Minibuses

In the energy concept, we necessary have to face the challenge about the enormous energy lost that suppose some regular line buses rounding trips without a minimum of passengers, wasting energy. On demand minibuses clearly adequate the transport offer and demand, achieving the best efficiency and quality for the citizen.

1.1.2.2.2 Smart fleet charging strategies

A key aspect for the integration of electric buses in a public transportation system is to provide them with sufficient energy autonomy, which implies the need of charging during the stops at the main bus stations (for line buses) and in the service areas (for the minibuses). In the vision of the project, some of the terminals of the main lines and proper locations of the service areas (e.g. at the interconnection with the main lines, at the center of the service area, etc.) are equipped with charging spots served by e.g. a

dedicated MV/LV transformer at secondary substation (SS) level. The charging facilities may also include local Renewable Energy Sources (RES) generation plants. Chargers are shared among different buses, which are mainly characterized by asynchronous times of arrival on site and little deviations from the scheduled ones due to traffic congestion; also they have different constraints about charging, such as the needed level of recharge and time departure.
Then the problem of interest is that of managing charging requests and controlling the charging process at charging facilities, in such a way as to:

a. Satisfy the service constraints deriving from the "transportation-side" of the whole system, such as departure time and needed level of charge for the trip.
b. Minimize the cost of electric energy consumption sustained by the transportation company for the recharging of the bus fleet.
c. Allow proper load balancing over the grid (i.e. balancing the load among different charging terminals).
d. Regulate the aggregated net power exchange with the grid at Load Area level, in order to follow load references profiles optimized for grid/transportation/business efficiency improving.
e. Integrate distributed energy generators, trying to maximize their exploitation and mitigating their impact on the grid.
f. Interact with the distribution system operator (DSO) and, possibly, other upper-level market/grid actors.

Based on current research on electromobility and Distribution System Operator's opinion, controlling the charging is one of the key tools for avoiding negative impact that uncontrolled electromobility diffusion inevitably has on unreinforced MV/LV networks.

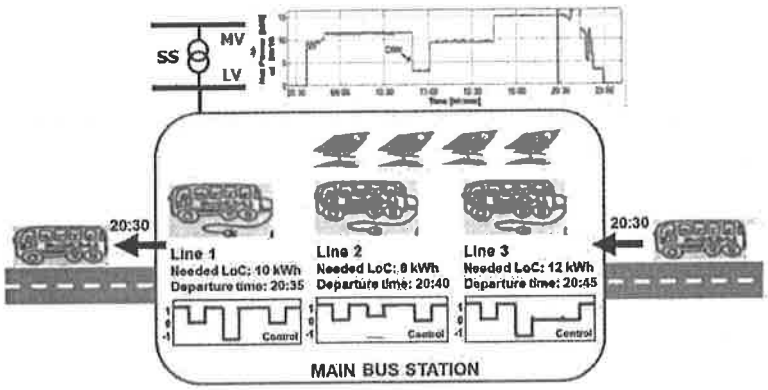

Figure 2: Charging concept.

1.1.2.3 System and Data Concept

The entire research work program is oriented to create an application system for the platform management and to provide a big data model that capture, store and process the model information, as a basis to make technical advises, make strategic decisions and to achieve efficiency and gains.

1.1.2.3.1 iModEBus Management System as Intelligent Transport System

The objective is to integrate proximity buses operations with the line bus system so that vehicles will be handled in a unified manner, with a special emphasis on

interconnection stations or links between lines. As an immediate result, it will be possible to manage the transportation system more efficiently, to provide passengers with the best quality and to promote the use of public transportation in cities where the growing number of cars has a negative impact on mobility. Efficient management and in real time.

iModeBus Management System will manage 6 electric minibuses and 2 electric line buses in every member city. The system is based on geo-location technologies (GPS), a geographic information system (GIS) and mobile communications (3.5G/GSM/GPRS). All these previous technologies are integrated in the Vehicle Control Unit (VCU) that is integrated with the Buses bus-can.

Every bus carries a VCU that provides the control system with real time information about the buses in order to improve their management and to speed up decision making. The system also gets management information from passengers' service request through Internet and smart phones apps.

The system includes a passenger counting system that is based on passengers request and crowd sourcing making it possible to know the buses occupancy in order to prevent exceeding its maximum capacity

IModEBus System could also supply information to subscriptor citizens about bus locations and occupancy. Other features of iModeBus are related to payment gateways and smart phone payments methods that could integrate in the future smart cards for transport bonus systems.

The system innovation is based on the integration between on demand transport and electromobility. Basically, IModEBus System will manage and response the citizen request about a transport service with a concrete and eligible pick up location: in another words, the system is able to calculate the suitable route, to offer the waiting time and to close the service deal/request from a potential passenger/user. In this algorithm, iModEBus manage information about batteries autonomy, maximum requested distance, occupancy and traffic.

This system will improve the quality of the public service and of the information offered to users, while allowing the cities to get more knowledge of demand and of the service. By applying intelligent transport systems (ITS) in urban environments, cities are able to move towards the smart city model and achieve a more efficient and sustainable mobility.

This contributes to reduce traffic congestion and the resulting direct and indirect costs, minimizing emissions and promoting integrated (intermodal) urban transportation services. In summary, it is a model that improves citizens' quality of life.

In order to develop a complete "intelligent" transport system, on the basis of the data collected as described above, the complete management platform for urban (and peri-urban) intermodal bus services will be provided with advanced data analysis tools in order to collect huge amount of historical data, including permanent data about geo-location, and to extract useful information (mobility patterns, behavioral profiling, regularities in energy consumption, and so on) from historical data to predict future situations of practical interest. Information extracted from historical data in the form of

patterns, rules, regularities, etc., will be managed and adopted by a decision support system suitably designed for supporting manufactures by improving suggestions and recommendations at both strategic and operational level. On the other side, the decision support system can help citizen to select a more efficient service model on the basis of specific recommendations tailored on the identified behavioral profiles. In particular, an innovative traffic mining approach will be developed to analyze and process the historical datasets described above, identifying the electro mobility significant information as spatial-temporal patterns of user and minibuses, area of high user demand, trips clustering, and so on. On other hand, this data mining approach, based on the most recent machine learning models and solution algorithms, will allow designing predictive model for decision support system. Finally this framework will provide useful real-time information comparing the actual mobility indicators and parameters with the historical ones (i.e. traffic condition identification by means of trips clustering comparing the travel time).

1.1.2.3.2 Optimal routing strategies

From the logistic point of view, efficient and effective optimal routing strategies are fundamental in order to suitably manage bus autonomy, service capacity and appropriate routes. Routing strategies can be both static and dynamic, in the sense that (i) an optimal static planning of the routes of both 9m buses and minibuses will be foreseen, along with (ii) real-time re-routing strategies based on the present context, such as traffic and road conditions for the 9m buses and on-demand services for minibuses. Both optimal planning and re-routing will take into account physical constraints on resources and context parameters according to the specific case, and will provide end users with useful information about the current service availability.

1.1.2.3.3 iModEBus Big Data System

iModebus Big data system will be provided as a service by combining it with cloud computing, not as a separate product solution. Big Data System provides analysis solutions and storage spaces for big data to Advisors Members (ITE and CRAT-UoR) and Smart Cities that can actively use the cloud-based big data system to store and analyze their data.
This kind of cloud systems are cheaper than individual commercial solutions, moreover as iModEBus solution will be based on open-source solution like Hadoop, which delivers beneficial economics and high efficiency.
The big data system will loose sense if iModEBus couldn't assure the data source. Here we include a main definition about initially defined data source for the work program:

Traffic demand and offer (Logistics)

- MiniBuses VUC, that supply parameters and metrics related to:
  - Suitable routes
  - Routes volume
  - Users volume
  - Attended Requests
  - Unattended Requests
  - System Incomes per Km
  - Autonomy and battery consumption
- Line Buses VUC, that supply parameters and metrics related to:

- Interconnected routes volume
- Interconnected users volume
- Occupancy
- System Incomes per Km
- Autonomy and battery consumption

Energy Demand

- From Power Supply Grid Chargers
  - Electric Grid System inputs and consumptions
  - Solar Charger Station inputs and consumptions
  - Battery temperature

- From Electric System Sales Agent
  - Time frame offers
  - Volume offers

1.1.2.3.4 Data mining based approach for decision support

A complete management platform for urban (and peri-urban) intermodal bus services must be provided with advanced data analysis tools in order to collect huge amount of historical data, including permanent data about geo-location, and to extract useful information (mobility patterns, behavioral profiling, regularities in energy consumption, and so on) from historical data to predict future situations of practical interest. Information extracted from historical data in the form of patterns, rules, regularities, etc., will be managed and adopted by a decision support system suitably designed for supporting manufactures by improving suggestions and recommendations at both strategic and operational level. On the other side, the decision support system can help citizen to select a more efficient service model on the basis of specific recommendations tailored on the identified behavioral profiles.

1.1.2.4 iModEBus Architecture.

1.1.2.4.1 Management System

1.1.2.4.1.1 Programming Language: Java

Java is a computer programming language created by Sun Microsystems. Java is used mainly on the Internet and uses a virtual machine which has been implemented in most browsers to translate Java into a specific application on different computer system. With most programming languages, you either compile or interpret a program so that you can run it on your computer. The Java programming language is unusual in that a program is both compiled and interpreted. The most common Java programs are applications and applets. Applications are standalone programs, such as the HotJava browser. Applets are similar to applications, but they don't run standalone. Instead, applets adhere to a set of conventions that lets them run within a Java-compatible browser.
The Java programming language is a high-level language that can be described as,

- Architecture neutral
- Object oriented
- Portable

- Distributed
- High performance
- Multithreaded
- Dynamic
- Secure

1.1.2.4.1.2 FrameWork: Struts 2

Struts 2 is the is an Apache Open source web application Framework which simplified the creation of Web Applications in in Java. It is based on the Model – View – Controller (MVC) architect which is originally found in language "SmallTalk".
The goal of Struts is to separate the model (application logic that interacts with a database) from the view (HTML pages presented to the client) and the controller (instance that passes information between view and model). Struts provides the controller (a servlet known as ActionServlet) and facilitates the writing of templates for the view or presentation layer (typically in JSP, but XML/XSLT and Velocity are also supported). The web application programmer is responsible for writing the model code, and for creating a central configuration file struts-config.xml that binds together model, view and controller.
Latest version of Struts is 2 and which is created by using concepts of WebWork and Xwork. The Request/response process is defined as follow

1. Request : Client makes the request.
2. Filter Dispatcher : As Boot Strap component is specified in Deployment Descriptor file. In Case of Struts 2, it is Servlet Filter (Filter Dispatcher). Filter Dispatcher looks the request and then as per the mapping of URL, request is forwarded to appropriate Action Class.
3. Interceptor Stacks : Before going to Action Class, request goes to Interceptor Stacks (Action class mapping found in configuration file, and from there, list of interceptors identified which must be processed before Action class) .
4. Action Class : Then the request object is passed to Action Class. Action Class then executes the code and after execution it returns the result code to the Controller. (either SUCCESS or INPUT or ERROR)
5. Result : On the basis of result code, Controller then selects View to be rendered as a result of Action.
6. Interceptors Stack : Before sending response back to client, again interceptors run.
7. Response returned to User.

1.1.2.4.1.3 The Database: MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation. The MySQL Web site (http://www.mysql.com/) provides the latest information about MySQL software.
MySQL is a relational database management system.: A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play a central role in computing, as standalone utilities, or as parts of other applications. MySQL is a relational database management system.

As a relational database, MYSQL stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The SQL part of "MySQL" stands for "Structured Query Language." SQL is the most common standardized language used to access databases and is defined by the ANSI/ISO SQL Standard. The SQL standard has been evolving since 1986 and several versions exist. In this manual, "SQL-92" refers to the standard released in 1992, "SQL:1999" refers to the standard released in 1999, and "SQL:2003" refers to the current version of the standard. We use the phrase "the SQL standard" to mean the current version of the SQL Standard at any time.
MySQL is Open Source. The MySQL software uses the GPL (GNU General Public License), http://www.fsf.org/licenses/, to define what you may and may not do with the software in different situations.

1.1.2.4.2 Big Data Solution

1.1.2.4.2.1 Hadoop

Hadoop is a framework written in Java for running applications on large clusters of commodity hardware and incorporates features similar to those of the Google File System and of MapReduce. HDFS is a highly fault-tolerant distributed file system and like Hadoop designed to be deployed on low-cost hardware. It provides high throughput access to application data and is suitable for applications that have large data sets.
Apache Hadoop is 100% open source, and pioneered a fundamentally new way of storing and processing data. Instead of relying on expensive, proprietary hardware and different systems to store and process data, Hadoop enables distributed parallel processing of huge amounts of data across inexpensive, industry-standard servers that both store and process the data, and can scale without limits. With Hadoop, no data is too big. And in today's hyper-connected world where more and more data is being created every day, Hadoop's breakthrough advantages mean that businesses and organizations can now find value in data that was recently considered useless.
iModEBus will use a single-node Hadoop cluster using the Hadoop Distributed File System (HDFS) on Ubuntu Linux.

1.2 Progress beyond the state-of-the-art

1.2.1 Description of the State of Art

The current state of the art of similar systems than iModEBus is included in the solutions group called INTELLIGENT TRANSPORTATION SYSTEMS (ITS).

Big software players like IBM, Indra or Telvent, as another big software development or consulting firms, separately or together in joint venture, have developed some ITS that are already implemented in some big cities.

The easiest step integrating ITS solutions is to implement advanced control and monitoring into city tunnels. These tools are based on its own supervisory control and data acquisition (SCADA OASyS), which allows centralization of tunnel infrastructure and traffic management and provides operators with a set of effective tools to facilitate the

process, while improving safety and security at the same time[1]. The solution will enable traffic operators to control traffic in real time and be prepared to respond quickly and effectively to any incident or emergency situation occurring within the tunnel, once it opens.[2]

One step beyond implementing ITS solutions is to integrate every system that takes part into the transportation infrastructure, such as the following figure shows:

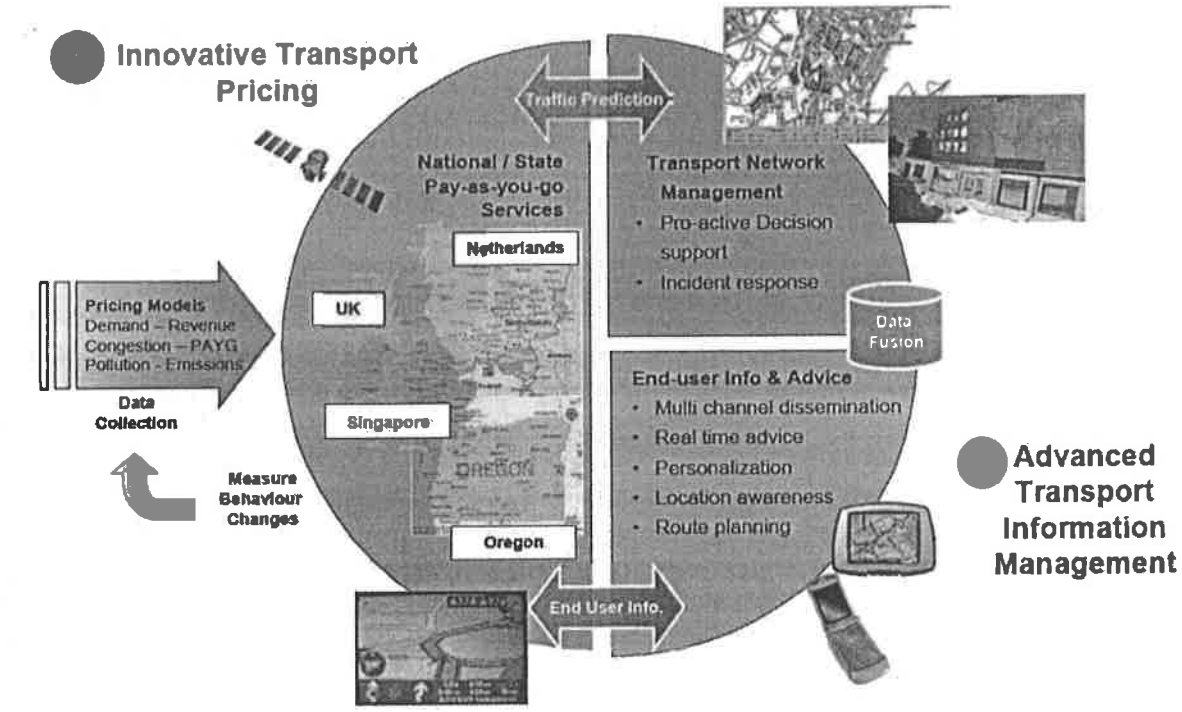

Figure 3: ITS Solution (Source: IBM)

These kinds of ITS solutions are basically oriented to the Transportation Infrastructure and do not use to take into account the future E-Mobility transport models where it is necessary an interaction with the Energy Infrastructure.

Regarding E-Mobility projects, ITE and University of Rome are involved in SmartV2G project[3], where its main objective aims at connecting the electric vehicle to the grid by enabling controlled flow of energy and power through safe, secure, energy efficient and convenient transfer of electricity and data. This experience will improve the integration of charging basis for buses and mini buses.

Furthermore, there is another E-Mobility European project where ITE is currently involved

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1 www.telvent.com

2 http://www.telvent.com/en/business_areas/transportation/news_center/2012/Telvent-to-implement-Intelligent-Transportation-System-for-Legacy-Way-in-Australia.cfm

3 http://www.smartv2g.eu/

called MOBINCITY. Its main objective aims at the optimization of FEV autonomy range and the increase in energy efficiency thanks to the development of a complete ICT-based integrated system able to interact between driver, vehicle and transport and energy infrastructures, taking advantage of the information provided from these sources in order to optimise both energy charging and discharging processes (trip planning and routing).

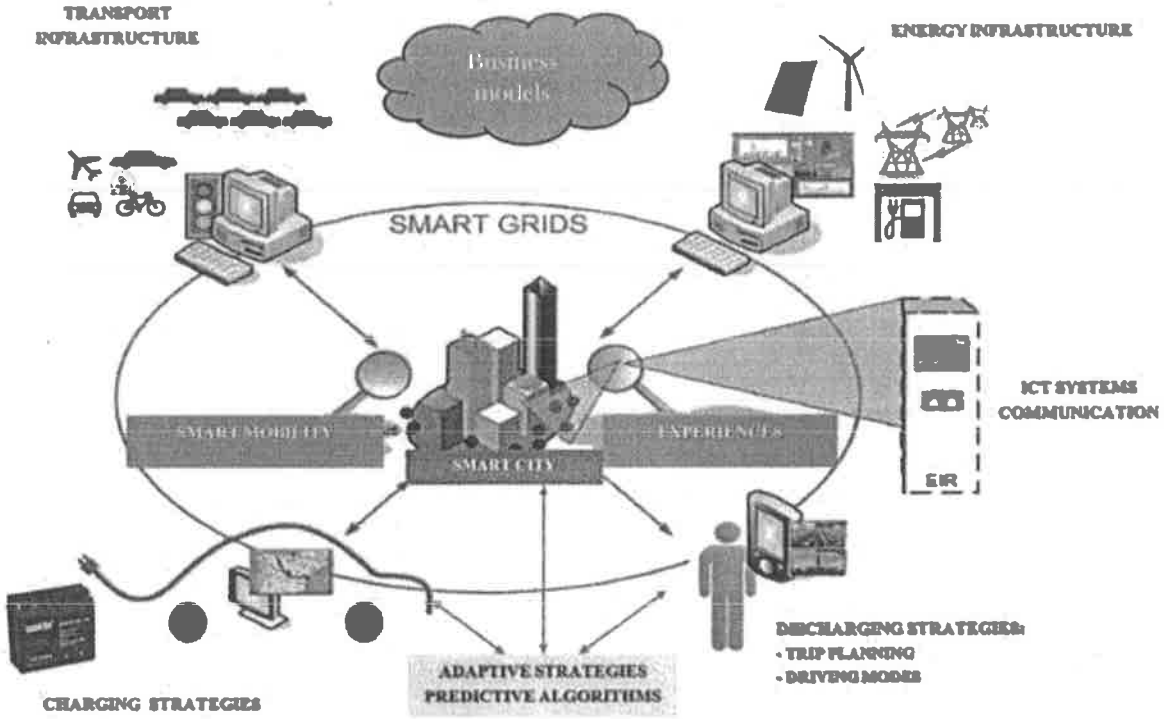

Figure 3: MOBINCITY scheme

Some features included in iModEBus have been implemented in some of these systems. This kind of systems is oriented to a city target that could dispose of a great range of resources.

Moreover, this kind of ITS does not incorporate inter-modal buses and clearly does not treat the new model of proximity buses "on demand". The reason why the proximity buses are not included in any current ITS, is because proximity buses is a new mobility concept.
The main progress of our work Program is related to the fact that we are beyond the state of the art with the logistics model (passengers urban public transport) and consequently with the system management that will cover the innovative service.

In the other hand, the Big Data solution for Smart Cities use to be implemented in complex environment for big cities. Sometimes this kind of model becomes unmanageable due to the data profusion and fields. This affirmation could seems contradictory when we are talking about complex systems that process massive amounts of data that collect over time that are difficult to analyze and handle using common database management tools.

The "big data" model that we propose as a part of the scope and work program goal is

to incorporate several data related to our logistics and energy concepts, so we can assume that the system vocation is not to include multi-sectorial information, by contrast our "big data" system is just oriented to process passenger transportation information, from system management related sources: passengers geo-location, passengers route requests, traffic and traffic timeframes, request demands for areas out of service scope, geo-location info from VUCs buses, Buses Routes, citizen queries and area queries. From energy, the main data sources are buses VUCs integrated with vehicles Bus Can, data devices included in grid and solar chargers about system consumptions.
In conclusion, iModEBus "big data" has the scope of a vertical system specialized in intermodal transport and oriented to get conclusion to improve the logistic and the energy model.
The "big data" project is a system tool that will feed the efficiency and the system features.

- Traffic mining for information management SotA

Advanced traffic mining and pattern recognition tools have been proved to strongly impact traffic routing and management. Therefore they are mostly indicated to support intelligent traffic management system especially for traffic mitigation purposes. With respect to both private and public traffic, many efforts have been devoted to trajectory conceptual modeling [Bogorny et al.], aiming to reduce the effort for data processing, but also to profiling [Trasarti et al.] and understanding movement patterns after data analysis, considering semantic based approaches [Ong et al.]. Basic data mining strategies, mainly relying on partitional or hierarchical clustering methods, have been adopted for movement data analysis and more peculiar sequential pattern mining approaches have been proposed in the literature, e.g. [Giannotti et al.].

- *References Traffic mining for information management SotA*

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- *Optimal routing strategies SotA*

As mentioned above, efficient and effective routing strategies, able to assign the best routes to each vehicle in the fleet of available buses, are fundamental to suitably manage bus autonomy and service capacity. The main objective is to optimize the use of the available resources in order to meet users' requirements as well as to maximize

the energy efficiency of the overall urban system. More in detail, the development of optimal routing strategies, as foreseen in iModEBus, consists in finding the optimal (or near-optimal) paths (according to specific objective functions, e.g., energy efficiency, service times minimization and quality maximization, on-demand and real-time requests management, etc.) for a fleet vehicle to perform a set of tasks. This problem is known in literature as trip planning and vehicle routing problem and has been largely analyzed in literature. According to the taxonomy of [PILL11], four main categories are usually defined to group the large set of specific variations of the vehicle routing issue proposed during the past years:

- *Static and deterministic problems*, characterized by the complete knowledge of all the inputs and by the invariance of the environment and the corresponding vehicle routes. For instance, several exact and approximate methods have been proposed (e.g., see [BALD07] or [LAPO09]).
- *Static and stochastic problems*, characterized by the complete knowledge of all the, as in the former case, but some of them are potentially random variables, in the sense that they are realizations of stochastic processes. Of particular interest for the iModEBus project are the stochastic nature of customers and service demands (e.g. [WAT89], [SECO09]), the stochastic nature of travel times (e.g. [LAPO92]) in function, for instance, of current traffic, etc.
- *Dynamic and deterministic problems*, characterized by the possible redefinition of routes during the travels, as new information becomes available and is dynamically revealed to the system.
- *Dynamic and stochastic problems*: in these problems the variable nature of the dynamically revealed information is stochastic.

– *References Optimal routing strategies SotA*

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– Smart Fleet Charging Strategies SotA

Furthermore, the design of smart fleet charging strategies (as a complementary problem to be solved in addition to the developing innovative logistic models) is a recent research topic that is receiving increasing attention. This is due to the acknowledgment of the great impact that electro mobility will have both on the electrical infrastructure and on new mobility and transportation models and systems. This is particularly true in the case of public transportation systems, which insist over highly structured and possibly congested urban electric grids, and for which additional

stringent constraints arising from the user logistic needs must be taken into account. In this regard, some works presenting smart charging strategies are beginning to appear, but mainly in relation to the sole requirements of the electric distribution grid. For example, an interesting approach is presented in the work by [Deilami et al.], where an optimization problem is established, with the aim of minimizing the cost of energy consumption and network losses. A similar approach is presented by [Richardson et al.], who set up an optimization problem for maximizing the amount of energy available for charging operations. Both these works consider voltage and congestion constraints. Also algorithms from telecommunication resource management problems have been proposed (like AIMD - Additive Increase Multiplicative Decrease feedback control algorithm [Studli et al.]), with possible advantages related their distributed nature, which keeps low the complexity of the supporting communication system. Finally, some works face the problem taking inspiration from micro-economy theory. As an example, [Fan] models each EV as an agent aimed at optimizing an associated utility function, while an iterative and distributed mechanism allows to globally converge towards an optimal charging policy. All these recent works are characterized by the following drawbacks: 1) charging control signals are continuous in nature but not IEC 61851 compliant; 4) backfeeding is not considered; 2) charging cannot be rescheduled, thus impairing the flexibility of the control scheme; 3) the interaction with the logistic needs of the EV users are not analyzed in depth: there is not a strict control over the time needed to provide the charging service and on the desired final state of charge of the batteries. These are rather common drawbacks in the relevant literature, which are particularly relevant in the case of public transportation systems (where logistic needs are of outmost importance), and still need to be overcome.

- *References Smart Fleet Charging Strategies SotA*

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1.2.2 iMODEBUS innovations beyond state of art

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In conclusion, iModEBus "big data" has the scope of a vertical system specialized in intermodal transport and oriented to get conclusion to improve the logistic and the energy model.
The "big data" project is a system tool that will feed the efficiency and the system features.

- Traffic mining for information management Beyond SotA

For as concern the advanced information management system, the main contribution will consist in designing innovative data mining approach based traffic and mobility mining in order to discover, to extract and to understand both bus and vehicles mobility behaviours. The mobility analysis is focused on the identification of significant key features and elements: spatial and temporal patterns, trajectory models and patterns, regions of interest for the logistic model, and frequently travel times and flows. A fundamental role is played by pattern representation and interpretation, as well as mobility behavioural models, since several possibilities are being investigated in the current studies and proposed according to the state of the art. The traffic behaviours in an efficient bus management system are complex to analyze, because of: (i) collecting different and heterogeneous data from several data sources, often not reliable and difficult to be controlled; (ii) the combination of the different components of datasets (typically latitude, longitude, time and identification number) to represent every trajectory, and (iii) environment and surrounding conditions that may affect both bus and vehicle movement. On the other hand, movement and traffic behaviour knowledge is a fundamental key to efficiently manage the urban and peri-urban transport network

- Optimal routing strategies Beyond SotA

In the context of the application of vehicle routing strategies in urban environments, limited work has been developed so far. For instance, the European project ECOGEM had the objective of developing a highly-innovative Advanced Driver Assistance System (ADAS), but it did not consider the energy infrastructure, whereas iModEbus will carry out integrated routing strategies as the primary results. In this respect, a first step has been developing by the MOBINCITY project, which takes into consideration the energy infrastructure in the computation of the best routes (for instance considering fast recharging); however, MOBINCITY considers only personal users with electric cars and ad-hoc users' requirements with no integration with the traditional bus lines, which are

able to provide a real support for a large set of citizens in modern urban environments. The dynamicity introduced by the variable status of the energy infrastructure, and the intrinsic on-demand nature of the mini buses (as those considered in iModEbus), which will be integrated with the traditional bus lines, will generate several technological challenges in the routing strategies. Also for those reasons, the urban environment is a highly variable in-time environment and requires a static trip planning assignment to be modified in real-time. The iModEbus trip planning and routing strategies will be characterized by two distinct and integrated approaches:

1. static and highly efficient logistic plans of the buses trips are guaranteed through the design and the solution of multi-objective multi-agent optimization problems, with the aim of maximizing the use of the available resources and the long-term performances of the whole system. Those optimizations could take into account the energy infrastructure (e.g. for re-charging purposes) and the "statistical" daily traffic conditions (***trip planning strategies***);
2. the logistic plan could be modified in real-time according to the present context (traffic condition, energy and battery constraints, on-demand variations, etc.) with the aim of rapidly handling those possible variations (**re-routing strategies**).

– Smart Fleet Charging Strategies Beyond SotA

Furthermore, iMODEBUS project will provide significant contributions also in the design of innovative and "flexible" fleet charging strategies, which will allow to jointly take into account and properly "balance" constraints arising from the electric grid domain with the ones coming from transportation and logistical needs. The following innovations will be included, allowing to significantly go beyond the current state of the art:

- The charging rate will be modeled as a semi-continuous variable (in compliance with the standard IEC 61851) and the relevance of backfeeding will be also analyzed from the theoretical point of view.
- The charging strategy will be based on model predictive control: it will be possible to update the control signals in response to relevant events dynamically happening both in the "electric side" and the "transportation side" of the systems (such as dynamic electricity prices, notification of congestion on the electric grid or the transportation grid, dynamic variations in the logistic needs, etc.). This will allow to efficiently adapt to mobility and grid dynamics.
- The controller will be able to optimally balance the electric load among the charging sites, and to properly schedule and control the charging process at single bus level, in order to minimize the total recharging costs while satisfying logistic constraints. Furthermore, load balancing will also take into account the interaction with the DSO and, possibly, other upper level actors of the grid (like retailers and aggregators), making the proposed solution perfectly integrated with the current trend of smart grid research. In this regard, one of the problems of interest that will be possible to solve will be that of maximizing the exploitation of local Distribution Energy Resources (DES).
- Each line bus or minibus will be associated with its own control signal, which is built and dynamically updated according to the needs deriving from logistic and transportation constraints.

1.3 S/T methodology and associated work plan

We present a work plan, broken down into work packages (WPs) which follows the logical phases of the implementation of a project, and include consortium management and assessment of progress and results. Our work plan is the following:

1.3.1 Describe the overall strategy of the work plan

The work plan strategy is defined in three main phases: Implementation, production and improvement.

The methodology for software development will be "Scrum". Scrum is the best-known of the "Agile" methods. All these methods rely on similar principles:

- Frequent incremental release of valuable software
- Focus on individual and team responsibility
- Tight collaboration among all key stakeholders
- Improvement of the process based on frequent inspection and feedback.

Scrum-specific principles include

- Keep the process and product visible to all stakeholders
- Frequently observe what is going on
- Adjust the process or the input to it immediately.

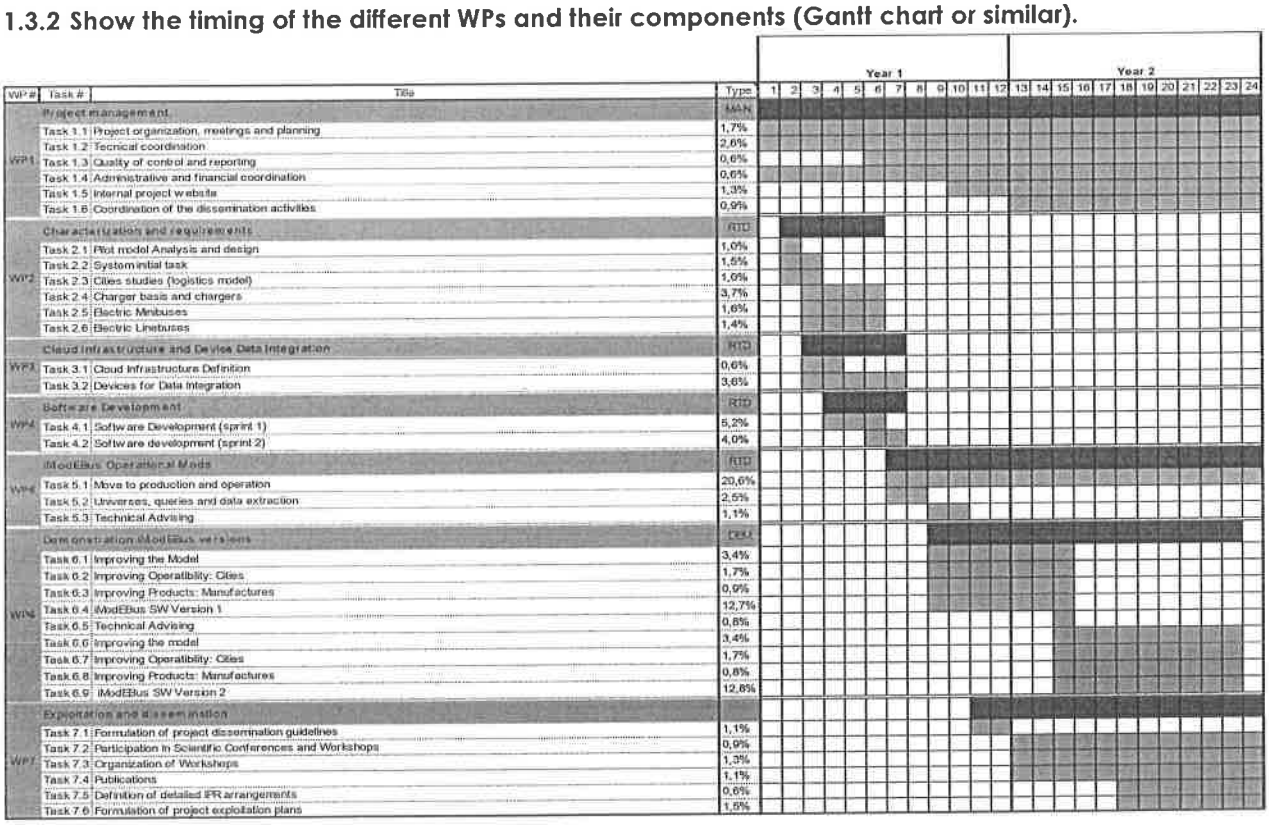
Scrum originally was formalized for software development projects, but works well for any complex, innovative scope of work. The possibilities are endless. The Scrum framework is deceptively simple.

- A product owner creates a prioritized wish list called a product backlog.
- During sprint planning, the team pulls a small chunk from the top of that wishlist, a sprint backlog, and decides how to implement those pieces.
- The team has a certain amount of time, a sprint, to complete its work - usually two to four weeks - but meets each day to assess its progress (daily scrum).
- Along the way, the Scrum Master keeps the team focused on its goal.
- At the end of the sprint, the work should be potentially shippable, as in ready to hand to a customer, put on a store shelf, or show to a stakeholder.
- The sprint ends with a sprint review and retrospective.
- As the next sprint begins, the team chooses another chunk of the product backlog and begins working again.

The cycle repeats until enough items in the product backlog have been completed, the budget is depleted, or a deadline arrives. Which of these milestones marks the end of the work is entirely specific to the project. No matter which impetus stops work, Scrum ensures that the most valuable work has been completed when the project ends.
In synthesis, Scrum requires every team to produce a potentially releasable increment of product in every Sprint.
In Scrum, the product is developed by a cross-functional group of team members, often called "The Developer Team". The Team members must include all the skills necessary to produce a potentially releasable product increment in the next Sprint. When Team members are able to work on multiple aspects of the development, they become much more valuable to the project.
At the end of every Sprint, the Team must deliver a working, potentially releasable,

product increment. This increment may be too small to ship, but it must be good enough to ship. The Team operates according to a "Definition of Done" which is agreed upon between the developers and the Product Owner.
The Team is responsible for how the work is done, ensuring delivery of value to the Product Owner. In particular, this includes a responsibility for all aspects of product quality. In addition, the Team works actively with the Product Owner to help specify the product and to ensure that the Product Owner is apprised of all important technical concerns.
The team members self-organize to determine how the work is to be done.

1.3.2 Show the timing of the different WPs and their components (Gantt chart or similar).



WP #	Task #	Title	Type
WP1		Project management	MAN
	Task 1.1	Project organization, meetings and planning	1,7%
	Task 1.2	Tecnical coordination	2,6%
	Task 1.3	Quality of control and reporting	0,6%
	Task 1.4	Administrative and financial coordination	0,6%
	Task 1.5	Internal project website	1,3%
	Task 1.6	Coordination of the dissemination activities	0,9%
WP2		Characterization and requirements	RTD
	Task 2.1	Pilot model Analysis and design	1,0%
	Task 2.2	System initial task	1,5%
	Task 2.3	Cities studies (logistics model)	1,0%
	Task 2.4	Charger basis and chargers	3,7%
	Task 2.5	Electric Minibuses	1,6%
	Task 2.6	Electric Linebuses	1,4%
WP3		Cloud Infrastructure and Device Data Integration	RTD
	Task 3.1	Cloud Infrastructure Definition	0,6%
	Task 3.2	Devices for Data Integration	3,6%
WP4		Software Development	RTD
	Task 4.1	Software Development (sprint 1)	5,2%
	Task 4.2	Software development (sprint 2)	4,0%
WP5		iModeBus Operational Mode	RTD
	Task 5.1	Move to production and operation	20,6%
	Task 5.2	Universes, queries and data extraction	2,5%
	Task 5.3	Technical Advising	1,1%
WP6		Demonstration iModeBus versions	DEM
	Task 6.1	Improving the Model	3,4%
	Task 6.2	Improving Operatibility: Cities	1,7%
	Task 6.3	Improving Products: Manufactures	0,9%
	Task 6.4	iModEBus SW Version 1	12,7%
	Task 6.5	Technical Advising	0,8%
	Task 6.6	Improving the model	3,4%
	Task 6.7	Improving Operatibility: Cities	1,7%
	Task 6.8	Improving Products: Manufactures	0,8%
	Task 6.9	iModEBus SW Version 2	12,8%
WP7		Exploitation and dissemination	
	Task 7.1	Formulation of project dissemination guidelines	1,1%
	Task 7.2	Participation in Scientific Conferences and Workshops	0,9%
	Task 7.3	Organization of Workshops	1,3%
	Task 7.4	Publications	1,1%
	Task 7.5	Definition of detailed IPR arrangements	0,6%
	Task 7.6	Formulation of project exploitation plans	1,5%

1.3.3 Provide a detailed work description broken down into work packages:

Work package list

Work package No[4]	Work package title	Type of activity 5	Lead partic no.[6]	Lead partic. short name	Person - months[7]	Start month 8	End month 8
1	Project Management	MGT	1	SOITSA	35	M1	M24
2	Characterization and requirements	RTD	1	SOITSA	43.03	M2	M6
3	Cloud Infrastructure and Device Data Integration	RTD	1	SOITSA	18.53	M3	M7
4	Software Development	RTD	1	SOITSA	41.48	M4	M7
5	iModEBus Operational Mode	RTD	6	PAL	111.38	M7	M24
6	Demonstration iModEBus versions	DEM	1	SOITSA	161.25	M9	M23
7	iMODEBUS Dissemination & Exploitation	MGT	3	USR	27	M11	M24
	TOTAL				437.66		

4 Workpackage number: WP 1 – WP n.

5 Please indicate one activity (main or only activity) per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium

6 Number of the participant leading the work in this work package.

7 The total number of person-months allocated to each work package.

8 Measured in months from the project start date (month 1).

Table 1.3b: Template - Deliverables List

List of Deliverables

Del. no. [9]	Deliverable name	WP no.	Nature [10]	Dissemination level [11]	Delivery date [12] (proj. month)
D1.1	Qualitity Management Plan	Project management	R	PP	(m4)
D1.2	Internal website	Project management	O	PP	(m2)
D1.3	Contractual periodic management reports and cost statement	Project management	R	PP	(m 12, 24, 36)
D2.1	Global Model Scope and Design	Characterization and requirements	R	PP	(m 2)
D2.2	Requirements, Architecture/design Documentation	Characterization and requirements	R	PP	(m 3)
D2.3	Logistics Model	Characterization and requirements	R	PP	(m 3)

9 Deliverable numbers in order of delivery dates. Please use the numbering convention <WP number>.<number of deliverable within that WP>. For example, deliverable 4.2 would be the second deliverable from work package 4.

10 Please indicate the nature of the deliverable using one of the following codes:

R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

11 Please indicate the dissemination level using one of the following codes:

PU = Public

PP = Restricted to other program participants (including the Commission Services).

RE = Restricted to a group specified by the consortium (including the Commission Services).

CO = Confidential, only for members of the consortium (including the Commission Services).

12 Measured in months from the project start date (month 1).

D2.4	Basis and Charger Model for each City	Characterization and requirements	R	PP	(m 4)
D2.5	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 5)
D2.6	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 7)
D2.7	Minibuses Model for Each City	Characterization and requirements	R	PP	(m 4)
D2.8	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 5)
D2.9	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 7)
D2.10	Line buses Model for Each City	Characterization and requirements	R	PP	(m 3,4)
D2.11	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 6)
D2.12	Test Results and Infrastructure	Characterization and requirements	R	PP	(m 7)
D3.1	Cloud Infrastructure Architecture	Cloud Infrastructure and Device Data Integration	R	PP	(m 3)
D3.2	Test Results. Administration Manual	Cloud Infrastructure and Device Data Integration	R	PP	(m 4)
D3.3	Data Integration and Devices Deployment for Each City	Cloud Infrastructure and Device Data Integration	R	PP	(m 4)
D3.4	Data Integration and Test Results	Cloud Infrastructure and Device Data Integration	R	PP	(m 6)
D3.5	Data Integration and Test Results	Cloud Infrastructure and Device Data Integration	R	PP	(m 7)
D4.1	Test Results	Software Development	R	PP	(m 4, 6)
D4.2	Test Results	Software Development	R	PP	(m 4, 6)

D4.3	Sprint Request, Scope, DB Schemas, Commented Code, User Manual	Software Development	R	PP	(m 6)
D4.4	Test Results	Software Development	R	PP	(m 6, 7)
D4.5	Sprint Request, Scope, DB Schemas, Commented Code, User Manual	Software Development	R	PP	(m 7)
D5.1	Work Programme SOW	iModEBus Operational Mode	R	PP	(m 7)
D5.2	Univers, cubes and Queries	iModEBus Operational Mode	R	PP	(m 8)
D5.3	Improvements Recommendations Report	iModEBus Operational Mode	R	PP	(m 9)
D6.1	Implemented Recommendations and Period Gains	Demonstration iModEBus versions	R	PP	(m 3)
D6.2	SW Request, Scope, DB Schemas, Commented Code, User Manual	Demonstration iModEBus versions	D	PU	(m 3)
D6.3	Improvements Recommendations Report	Demonstration iModEBus versions	D	PU	(m 4)
D6.4	Implemented Recommendations and Period Gains	Demonstration iModEBus versions	D	PU	(m 11)
D6.5	SW Request, Scope, DB Schemas, Commented Code, User Manual	Demonstration iModEBus versions	D	PU	(m 11)
D7.1	Scientific and Technical Reports	iMODEBUS Dissemination & Exploitation	R	PP	(m 12,24,36)
D7.2	Scientific Publications	iMODEBUS Dissemination & Exploitation	R	PP	(m12,24,36)
D7.3	Workshops	iMODEBUS	R	PP	(m12, 24,36)

		Dissemination & Exploitation			
D7.4	Participation to conferences	iMODEBUS Dissemination & Exploitation	R	PU	(m24,36)
D7.5	Preliminary Plan for the use and dissemination of knowledge (PUDK)	iMODEBUS Dissemination & Exploitation	R	PU	(m6)
D7.6	Final Plan for the use and dissemination of knowledge (PUDK)	iMODEBUS Dissemination & Exploitation	R	PU	(m36)

Table 1.3c Template - List of milestones

List of Milestones

Milestones are control points where decisions are needed with regard to the next stage of the project. For example, a milestone may occur when a major result has been achieved, if its successful attainment is a required for the next phase of work. Another example would be a point when the consortium must decide which of several technologies to adopt for further development.

Milestone number	Milestone name	Work package(s) involved	Expected date [13]	Means of verification [14]
1	Work Programme Plan	1	3	
2	Basis and Charger	2	6	
3	Device Aproval	3,4	12	
4	Move to production	6	15	

13 Measured in months from the project start date (month 1).

14 Show how you will confirm that the milestone has been attained. Refer to indicators if appropriate. For example: a laboratory prototype completed and running flawlessly; software released and validated by a user group; field survey complete and data quality validated.

Table 1.3d: Template - Work package description

Work package description

Work package number	1	Start date or starting event:							Month 1
Work package title	Project management								
Activity type	MGT								
Participant id	1	2	3	4	5	6		8	9	SUM
Person-months per participant:	16	11	5	1	1	1				36

Objectives

To perform the project objectives in a qualitative way and to meet the project schedule and deadlines (technical coordination). To perform the financial and administrative tasks of the project (administrative and financial coordination).

Description of work

T1.1 - Project organization and planning.
Organization of the Management and Technical committees' meetings. Progress and quality to be monitored, tracked and reported. Problems to be solved. Communications between the partners to be ensured at all levels.
T1.2 - Technical coordination.
Work package coordination and follow-up.
T1.3 - Quality of control.
The implementation of the project work plan will be controlled. Milestones to be established. Deliverables deadlines to be respected.
T1.4 Reporting
Interim and Annual reports to be prepared for the European Commission.
T1.5 Administrative & financial coordination
Documents & periodic reports production and archive. Costs to be controlled. Costs to be coordinated and consolidated. EC payments and distribution coordination and follow-up.
T1.6 Internal project website
To be implemented. Web functionalities: library, calendar, action list, version management.
T1.7 Coordination of the dissemination activities
Administrative support to the coordination of dissemination activities (events organization and registration).

Deliverables
D1.1 Qualitity Management Plan (m4)
D1.2 Internal website (m2)
D1.3 Contractual periodic management reports and cost statement (m 12, 24, 36)

Work package number	2	Start date or starting event:	Month 2				
Work package title	**Characterization and requirements**						
Activity type	This WP is oriented to define and to implement the demonstration scenario for the ICT system and Big data. WP activities are related to Logistic, Energy and System model requirements, following the design parameters that will be concreted and defined in Task 2.1						
Participant number	1	2	3	4	5	6	
Participant short name	SOITSA	ITE	USR	RATUC	BLUEM	PAL	
Person-months per participant	15,84	4,70	7,05	5,38	4,69	5,38	

Objectives

The main objective of this initial work package is to define the functional requirements of the overall system to be designed within the project, specifying required inputs, outputs and processing methods.

Description of work (possibly broken down into tasks) and role of partners

Taking into account that several regulations from different countries in terms of energy, traffic information or communications are involved in the project, this task will be focused on the definition of the scenarios to be developed within the project. In this sense, standardization will be a key-aspect in the different activities to carry out in the project, using already existing and standardized solutions and platforms, as ITS for electric vehicles.

Will be focused in the specifications and requirements established in the different work packages along the project. Every connection and link between work packages will be analyzed, determining the inputs and outcomes from each one, in order to ensure that the objectives can be accomplished and measured.

There are already on-going R&D projects in the same fields as iModEBus, from which some information and background can be exchanged. In this sense, with the objective of synchronizing key milestones and achieving overall synergy with other related projects in the FP7 and CIP programmes funded by the European Union, iModEBus will actively participate in any official concertation process.

T2.1 - Pilot model Analysis and design

T2.2 - System initial task

T2.3 - Cities studies (logistics model)

T2.4 - Charger basis and chargers

T2.5 - Electric Minibuses

T2.6 - Electric Linebuses

Deliverables (brief description) and month of delivery

D2.1 Global Model Scope and Design (m 2)
D2.2 Requirements, Architecture/design Documentation (m 3)
D2.3 Logistics Model (m 3)
D2.4 Basis and Charger Model for each City (m 4)
D2.5 Test Results and Infrastructure (m 5)
D2.6 Test Results and Infrastructure (m 7)
D2.7 Minibuses Model for Each City (m 4)
D2.8 Test Results and Infrastructure (m 5)
D2.9 Test Results and Infrastructure (m 7)
D2.10 Line buses Model for Each City (m 3,4)
D2.11 Test Results and Infrastructure (m 6)
D2.12 Test Results and Infrastructure (m 7)

Work package number	3	Start date or starting event:	Month 3			
Work package title	**Cloud Infrastructure and Device Data Integration**					
Activity type	This WP has the goal to achieve the initial Cloud Computing infrastructure and the sources for data. The two main activities are related to the cloud platform: initial processes and storage capacity and the devices configuration (and integration) to extract and provide the requested data for logistics, energy, system and Big Data Model					
Participant number	1	2	3	4	5	6	7
Participant short name	SOITSA	ITE	USR	RATUC	BLUEM	PAL	
Person-months per participant	12,73	1,16	1,16	1.16	1.16	1.16	

Objectives

Description of work (possibly broken down into tasks) and role of partners

T3.1 - Cloud Infrastructure Definition

T3.2 - Devices for Data Integration

In order to integrate properly the electric buses as a new load demand element into the transport infrastructure, stochastic models to estimate the overall energy consumption of the line buses or mini buses fleet will be performed. The input data required to build these models will be derived from buses mobility studies.

These models will provide, in a first step, useful information about the time and location in the main stations of the buses fleet. On the other hand, these models are also capable of giving information about the probability of how long the buses will remain in each main station. Moreover, the average total driven distance of buses fleet can be estimated. Related to this, and as a final result, the overall consumed energy of buses fleet can be estimated in order to manage the charging processes. Thus, these stochastic models play an important role in the energy management algorithms, yielding an overall estimation of the daily energy demand of the fleet.

With the purpose of obtaining an optimal energy balance between the different sub-systems that take part in the energy process in the scope of the project, it is necessary to develop intelligent algorithms capable to manage and control the aggregated battery bus charging demands, taking into account grid constrains and establishing charging priorities based on different criteria such as the buses autonomy and their location.

Deliverables (brief description) and month of delivery

D3.1 Cloud Infrastructure Architecture (m 3)
D3.2 Test Results. Administration Manual (m 4)
D3.3 Data Integration and Devices Deployment for Each City (m 4)
D3.4 Data Integration and Test Results (m 6)
D3.5 Data Integration and Test Results (m 7)

Work package number	4		**Start date or starting event:**		Month 4		
Work package title	**Software Development**						
Activity type	In this WP we will built the first version of the software product. We will work in two main sprint (following Scrum) and we will develop and implement both software entities: Management system and Big Data Solution.)						
Participant number	1	2	3	4	5	6	7
Participant short name	SOITSA	ITE	USR	RATUC	BLUEM	PAL	
Person-months per participant	26,89	1,36	10,00	0.51	1.36	1.36	

Objectives

The main objective of this task is to ensure a correct interoperability between all the systems that have been developed in pervious tasks. In this sense ITE will ensure a correct integration of its algorithms in the specific software developed in this project.

Description of work (possibly broken down into tasks) and role of partners

T4.1 - Software Development (sprint 1)

T4.2 - Software development (sprint 2)

Deliverables (brief description) and month of delivery

D4.1 Test Results (m 4, 6)
D4.2 Test Results (m 4, 6)
D4.3 Sprint Request, Scope, DB Schemas, Commented Code, User Manual (m 6)
D4.4 Test Results (m 6, 7)
D4.5 Sprint Request, Scope, DB Schemas, Commented Code, User Manual (m 7)

Work package number	5	**Start date or starting event:**	Month 7				
Work package title	**iModEBus Operational Mode**						
Activity type	The operational mode is the WP when the demonstration scenario provide the real environment for the ICT goals. In this WP, management system will work together with Big Data. We will adequate the requested extraction and the results will be analyzed by technical advisor to improve the demonstration scenarios to achieve major gains.						
Participant number	1	2	3	4	5	6	
Participant short name	SOITSA	ITE	USR	RATUC	BLUEM	PAL	
Person-months per participant	6,35	1,53	8,91	41,53	1,53	51,53	

Objectives

Description of work (possibly broken down into tasks) and role of partners

T5.1 - Move to production and operation

T5.2 - Universes, queries and data extraction

T5.3 - Technical Advising

Deliverables (brief description) and month of delivery

D5.1 Work Programme SOW (m 7)
D5.2 Univers, cubes and Queries (m 8)
D5.3 Improvements Recommendations Report (m 9)

Work package number	6	Start date or starting event:	Month 9			
Work package title	**Demonstration iModEBus versions**					
Activity type	Following a model based in Deming's Cicle, during this WP we will put the systems and products in a continuous improvement cycle. In this WP we will release two new Sw Version, feed with the technical recommendations based in a real scenario.					
Participant number	1	2	3	4	5	6	
Participant short name	SOITSA	ITE	USR	RATUC	BLUEM	PAL	
Person-months per participant	79,14	16,42	16,42	16,42	16,42	16,43	

Objectives

The main objective of this work package will be the demonstration at small-scale of the developed systems testing as well the interactions among all agents involved.

Since ITE is going to give support to the technical project management, it will be involved in the field tests trying to resolve, with the rest of the partners, the problems during the implementation and analyzing the outcomes and driver's experiences from the pilot in Ratuc and Palencia.

Specifically, ITE will assist the project coordinator in the implementation process of the demonstration IMODEBUS versions in the field tests. ITE will also help to compile the data obtained from the experiences and to analyse the results.

Description of work (possibly broken down into tasks) and role of partners

T6.1 - Improving the Model

T6.2 - Improving Operatibility: Cities

T6.3 - Improving Products: Manufactures

T6.4 - iModEBus SW Version 1

T6.5 - Technical Advising

T6.6 - Improving the model

T6.7 - Improving Operatibility: Cities

T6.8 - Improving Products: Manufactures

T6.9 - iModEBus SW Version 2

Deliverables (brief description) and month of delivery

D6.1 Implemented Recommendations and Period Gains (m 3)
D6.2 SW Request, Scope, DB Schemas, Commented Code, User Manual (m 3)
D6.3 Improvements Recommendations Report (m 4)
D6.4 Implemented Recommendations and Period Gains (m 11)
D6.5 SW Request, Scope, DB Schemas, Commented Code, User Manual (m 11)

Work package number	7	Start date or starting event:							Month 11
Work package title	iMODEBUS Dissemination & Exploitation								
Activity type	MGT								
Participant id	1	2	3	4	5	6		8	9	SUM
Person-months per participant:	5	4	11	2	3	2				30

Objectives

The objective of the Dissemination **& Exploitation** program is to promote the objectives as well as the results of the IMODEBUS program to the outside world. Target audiences for this communications include the following groups:

- Decision makers in relevant industries
- Policy influencers at governmental at European and national levels
- Representatives of targeted user groups
- The academic community

This work package has the objective of obtaining a system procedure to extrapolate the experiences done in this project to easily implement in other cities the obtained results.
It is going to give support to the technical project management, it will be involved in the coordination of a document that will provide guidelines to extrapolate to new smart cities the results obtained into the project.
It will collaborate in the development of the business and exploitation plan.

Description of work

This work package will be focused on the development and implementation of clear strategies for the dissemination of the results of the IMODEBUS project and for their commercial exploitation.

T7.1 Formulation of project dissemination guidelines

T7.2 Participation in Scientific Conferences and Workshops

T7.3 Organization of Workshops

T7.4 Publications

T7.5 Definition of detailed IPR arrangements

T7.6 Formulation of project exploitation plans

Deliverables
D7.1 Scientific and Technical Reports (12,24,36)
D7.2 Scientific Publicationsm12,24,36)

D7.3 Workshops (m12, 24,36)
D7.4 Participation to conferences (m24,36)
D7.5 Preliminary Plan for the use and dissemination of knowledge (PUDK) (m6)
D7.6 Final Plan for the use and dissemination of knowledge (PUDK) (m36)

Table 1.3e Summary of effort

Summary of effort

A summary of the effort is useful for the evaluators. Please indicate in the table number of person months over the whole duration of the planned work, for each work package by each participant. Identify the work-package leader for each WP by showing the relevant person-month figure **in bold**.

Partic. no.	Partic. short name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total person months
SOITSA	SOITSA	16	15.84	12,73	26,89	6.35	79.14	5	161.95
ITE	ITE	11	4.70	1.16	1.36	1.53	16.42	4	40.17
CRAT - University of Rome	USR	5	7.05	1.16	10	8.91	16.42	11	59.54
Ratuc	RATUC	1	5.38	1.16	0.51	41.53	16.42	2	68
Bluemobility,S.L.	BLUEM	1	4.69	1.16	1.36	1.53	16.42	3	29.16
Ayuntamiento de Palencia	PAL	1	5.38	1.16	1.36	51.53	16.43	2	78.85

1.3.4 Describe any significant risks, and associated contingency plans

The overall structure of the Work Plan and the detailed description of tasks have been formulated taking into account the above challenges. For instance, the selected demonstration sites belong to project partners, with similar on-going activities. A number of technical risks, identified during the preparation of the proposal, have been included as separate tasks in the detailed work program and a relevant justification is given in Section 1.2. Different alternatives for most of the technical developments have been taken into account in order to cover related risks.

However, any research project as iModebus has implicit risks that could appear during the project execution. Risks associated with technical, economic, social acceptance, mid-term exploitation aspects have been identified and will be confronted on the basis of the following contingency plan (Table 1.3f). The leaders of the respective Work Packages, where the risk may occur, will be responsible for the implementation of the proposed contingency plan, taking care for early risk prevention. Risk identification will be supported by the web-based management tool to be used in TOGETHER (Section 2.1.4 – Internal Quality Control).

As in any Demonstration project there are associated risks but these will be managed and controlled by the risk planning activities shown. Major risks identified prior to project commencement, together with contingency plans. More detailed risks will become apparent during the course of the project and will be managed in accordance with the risk management plan (TASK 1.7).

Risk related to financial activities

Major Risk	Probability	Contingency Plans
Major Project cost, more than initially planned	Medium	Agreement for Coverage with own agreement Search of alternative funds (national-regional funds)
Bankruptcy of a partner	Low	Involvement of partners with similar profile To apply the provisions of the Consortium Agreement for this case

Risk related to technological activities

Major Risk	Probability	Contingency Plans
Project estimations are not as accurate as expected. Increase in price of major equipment.	Medium	Rework, check if reduced accuracy is acceptable to users, and to the project scope.

Major Risk	Probability	Contingency Plans
Insufficiently detailed or conflicting specifications. Interface problems between work packages.	Low	Regular cross-work package reviews of specifications. Partners involved in multiple work packages must increase their collaboration.
General risks involving the Work Packages	Low	The risk plan (D.1.7) will establish reasonably risk assessment points along the research plan. Work package leader and task leader will be informed of the risk assessment values for each activity and will in principle care to solve any inconvenience inside the Work Package/Task
Significant increases in price of major equipment, due to international markets evolution	Medium	Leading Enterprises and the suppliers will continuously monitor the evolution of equipment prices Tender process To re-negotiate conditions with the most competitive bidders To develop certain Lots directly by some Partners
A specific concept cannot be agreed upon within the consortium.	Medium	Immediately a review process will be invoked. The recommendations will lead to corrective actions.
Failure to achieve the overall objectives	Medium	The participation of leading researchers with vast experience in projects at a national and international level will ensure that the projects goals are achievable in principle. Structuring the project into phases with growing complexity enables the identification of possible future problems and respective counter measures at a prior stage. This represents a core instrument of risk contingency since increasing the complexity of the objectives step-wise will naturally lead the consortium towards the barriers of the proposed technology. Such barriers that do not allow an eventual breakthrough through the projects activities do exist. Wherever the project hits them, there will be exploitable results present resulting from the prior project stages. Thus, complete failure is not possible.

Risk related to dissemination activities

Major Risk	Probability	Contingency Plans
Intellectual Property. Rights (IPR) conflicts	Low	The provisions of the Consortium Agreement regarding. Task 8.1 will take into account the interest of all the consortium. Decision following the 2.1 project management
Dissemination ineffective.	Low	Extend to wider audience, different events, publications, etc.
Problems in target groups involvement	Low	Re-work. Identification of new target groups. Improvement of the customized information sent.
Lack of visibility of project achievements (scientific community)	Low	Additional channels of dissemination will be utilized
Success in the Final conference organization	Low	Extend to the wider audience. Choice dates in coincidence with large events

Risk related to management activities

Major Risk	Probability	Contingency Plans
Coordination, coherence and synchronization of progress on work packages. Conflicts. Milestone slippage. Budget overruns. Changes in personnel involved, corporate organizations and consortium partnership.	Medium	Management structure Detailed consortium agreement Quality management plan
Delays of key deliverables belonging to the critical route	Medium	In case that a key deliverable, which is needed for the implementation of subsequent work, is delayed, a provisional draft will be elaborated. This draft will contain the essential information needed for the performance of the work depending

Major Risk	Probability	Contingency Plans
		on it.
Administrative/financial delays in the payments at national level	Medium	Apply the CA provisions
Under resourced Partner/task/WP	Low	Resource expenditure will be carefully monitored throughout the project. If needed, resources will be re-distribute effort among tasks/ WPs/Partners. All participants are prepared to temporarily commit more resources to the project, if required.
Withdrawal of members before their EC grant agreement signature	Low	Partners have shown a strong commitment to the proposal preparation. It is very unlikely that someone would resign from the project.
Partner default	Low	In case of partner default, the consortium will seek a substitution, first internally and then, if needed, externally, utilizing the participant's extensive work networks.
Underresourced partner/task/WP	Low	Required resources have been carefully estimated in the project proposal. However, some specific task could suffer from scarceness or over budgeting Resource expenditure will be carefully monitored throughout the project. If needed, resources will be re-distribute effort among tasks/ WPs/Partners. All participants are prepared to temporarily commit more resources to the project, if required.

Section 2. Implementation

(Maximum length for Section 2.1 - five pages)

2.1 Management structure and procedures

Describe the organizational structure and decision-making mechanisms of the project. Show how they are matched to the complexity and scale of the project.

High priority and attention will be given to the crucial area of project management. The project partners are fully committed and agree to work together with the utmost co-operation for the timely fulfillment of their responsibilities.

The project coordinator, SOITSA, has extensive experience coordinating international research projects. SOITSA will be responsible for the overall project strategy, ensuring that all parties within the consortium know exactly what is expected of them, as described in the individual work-packages.

Furthermore, SOITSA will be responsible for ensuring all objectives are met and that all costs and milestones are in-line with the budgets and the provided timeline (as specified in the Gantt Chart). Any deviation will be immediately communicated to the consortium members and the EC Project Officer.

SOITSA will also be responsible for the technical co-ordination and supervision of the work-packages, planning and control of activities and preparation of deliverables, as well as collecting contributions from other partners participating in the task.

2.1.1 Project manager

The Project Manager will be appointed by the Coordinator and *will be responsible for the management of the project and execution of the contract.* The Project Manager approves all outputs and report will be the prime external interface and will chair the management meetings. The Project Manager will work closely with the Technical Director.

Project management activities - Over and above the technical management of individual work packages, a management framework linking together all the project components and maintaining communications with the Commission will be established. Project management responsibilities will include:

- Co-ordination of the technical activities of the project;
- The overall legal, contractual, ethical, financial and administrative management of the project;
- Preparing, updating and managing the consortium agreement between the participants;
- Co-ordination of knowledge management and other innovation-related activities;
- Overseeing the promotion of gender equality in the project;
- Overseeing science and society issues, related to the research activities conducted within the project;
- Obtaining audit certificates (as and when required) by each of the Contractors;

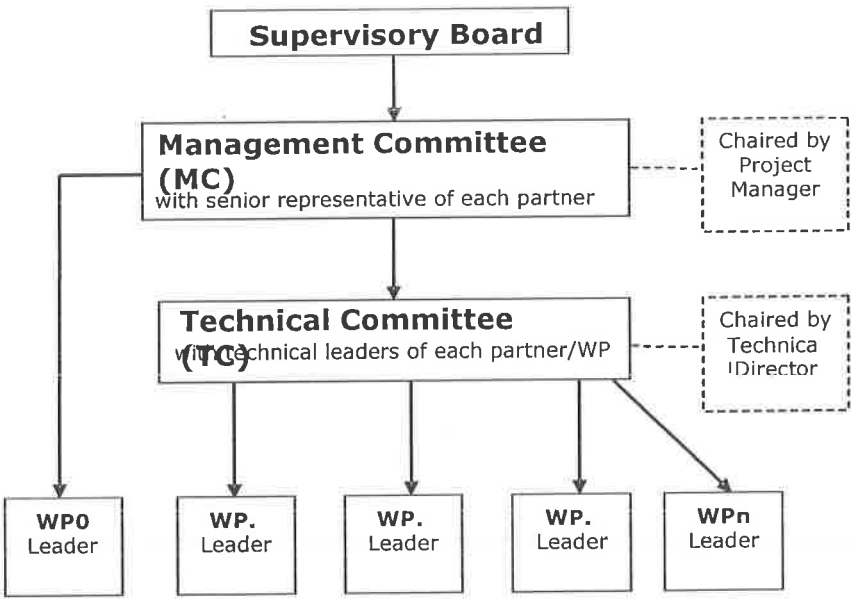
- Bank guarantees for SMEs (if applicable).

2.1.2 Technical director

The Technical Director will be appointed by the Coordinator. The Technical Director will chair a *Technical Committee* consisting of the key technical staff (usually the Work-package leaders). The Technical Director will sit on the Management Committee ex officio; the Project Manager will do the same on the Technical Board.

2.1.3 Management structure

The iMODEBUS project has a clear structure and a well-defined management scheme. The components of the project are the *Supervisory Board,* the *Management Committee* and the *Technical Committee*. The organisation chart is shown below:



Management Committee (MC) - The *Management Committee* is the core organisational and decision-making body. It will be responsible for the successful completion of the project and the exploitation of its results. It will be chaired by the appointed Project Manager and will consist of a representative of each partner. The *Management Committee* will report and be accountable to the *Supervisory Board*.
The voting members of the *Management Committee* are: the Chair of the *Management Committee*, the Vice-Chair in charge of Technical activities, the Vice-Chair in charge of Management activities and the Work-package leaders.
The Chair of the *Management Committee* is the contact person representing the Coordinator (e.g. Project Manager). Non-voting members may be invited to the Committee by the Chair. Decisions regarding the project will be made by vote with each partner having a single vote. In cases of a tie, the Project Manager will have a casting vote.
The *Management Committee* will normally meet at six month intervals. In practical terms the *Management Committee* represents the Consortium in all related (related to what?) affairs. The duties include, but are not limited to:

i) Preparation of all documents (financial, reporting, audit, etc.)
ii) Management of knowledge
iii) Communication between the Consortium and the Commission
iv) Communication between the Consortium and third parties
v) Publicity

vi) Establishment and overview of intellectual property procedures
vii) Preparation of a detailed work plan
viii) Steering of the Consortium

The Chair calls the *Management Committee* to a meeting. The presence of a majority of voting members (at least half of the number of members of the *Management Committee*) is required to conduct a meeting (quorum). A simple majority (at least half of the members present during the voting) is required to make formal decisions.

Supervisory Board - The *Supervisory Board* is composed of the highest-ranking officials of each Contractor/Entity (one person for each Contractor) This officer must have the legal authority to officially conduct business on behalf of the legal entity they represent. The Chair of the Board represents the Coordinator. The *Supervisory Board* has the obligation to ensure that the Consortium functions properly. The Board does not meet regularly. Extraordinary meetings may be called by the Chair whenever necessary.
The *Supervisory Board* decides on matters relating to:

- All budget-related matters,
- The structure and restructuring of the Work-packages,
- The alteration of the Consortium Agreement, and
- The premature completion / termination of the Project.

Technical Committee (TC) - Technical leaders of each Contractor and/or Work-package are members of the *Technical Committee* which reports to the *Management Committee*. The duties of the *Technical Committee* include, but are not limited to:

i) Co-ordinating activities covering more than one technical area
ii) Contributing to the overall technical affairs of the Consortium

The *Technical Committee* will meet quarterly. The Technical Leaders are also members of the *Management Committee*.

Project Office - A Project Office will be established by the project Coordinator which will provide the necessary support for day-to-day project management for the *Management Committee* as well as reporting activities to the European Commission.

European Commission Representative - The European Commission may participate as an observer at the meetings of the *Management Committee* and *Supervisory Board*.

2.1.4 Coordinator

As the Coordinator SOITSA is the single point of contact between the European Commission and the Consortium. The specific obligations of the Coordinator are distinguished from the management of the consortium activities. In this function the Coordinator shall:

a) Sign the Contract with the European Commission;
b) Ensure accession to the contract by the other contractors;
c) Ensure the communication between the Consortium and Commission;
d) Receive and distribute the EC contribution;
e) Collect from all Contractors the cost and other statements for submission to the European Commission;
f) Prepare, with the support of the members of the *Management Committee*, the reports and project documents required by the European Commission;
g) Ensure prompt delivery of all hardware, software and data identified as deliverable items in the Contract or requested by the European Commission for

reviews and audits, including the results of the financial audits prepared by independent auditors.

2.1.5 Project meetings

The *Management Committee* will meet at the start of the project and at six monthly intervals. The meetings will normally be scheduled to rotate between the Contractors' home bases.

Meetings of the *Supervisory Board* will be convened at least once a year, on which occasion the *Supervisory Board* will consider the report of the *Management Committee*, receive and approve the accounts for the past (financial) year, approve the budget and decide on changes in work sharing. The *Technical Committee* will meet quarterly unless otherwise required during the implementation of Consortium activities as described in the Consortium work plan.

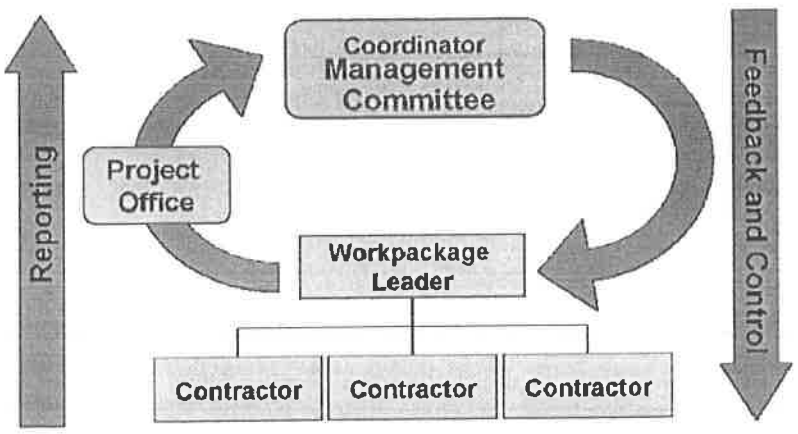
2.1.6 Quality procedures

The Project Manager will circulate a draft Quality Management Plan for the project prior to the first project meeting and then present it for approval at the first meeting. It will contain procedures for:

- Document procedures, standards and control
- Issue control for documents
- Reporting procedures, frequency and format
- Communication procedures
- Corrective actions
- Exception control
- Conflict resolution
- Meeting draft agenda
- Format of meeting minutes
- Tracking system for actions
- Specific responsibilities within the project

2.1.7 Communication and reporting

The establishment of a fast, reliable and easily accessible communications infrastructure is vital to the proper operation of a pan-European project. This can only be achieved through the intensive use of electronic communications (e.g. email, web based exchanges). A project website will also be used to enable fast and efficient exchanges of information. The communication and reporting structure is described below:



Conflict Resolution - Pragmatic negotiation will be the basis for the consortium conflict resolution approach. Conflicts within projects usually arise as a result of low productivity and/or quality, missed deadlines, and personal and cultural clashes. It will be the responsibility of the Coordinator – who is an international mediator in dispute resolutions, to identify these conflicts at an early stage and take steps to talk to the involved parties to quickly resolve the conflict. Negotiation and decisions taken by consensus will be the main tools to resolve conflicts. Should this approach and a majority decision not be achievable by the parties involved and the rest of the Consortium, an independent referee will be appointed by the Project Manager, such as the EC Project Officer or another external expert.

2.1.8 Consortium agreement

A Consortium Agreement between the Contractors will be signed before any Contractor starts work on the project. The Project Manager will be responsible for this activity.
The Consortium Agreement will identify issues that may arise during the implementation of the project, such as:

- The internal organization and management of the consortium;
- Intellectual property arrangements either generated during the project or existing prior to or acquired in parallel with the project;
- Settlement of internal disputes, change in consortium membership, potential solution to problems relating to technical implementation and solution to potential financial problems;
- Commercial considerations.

2.1.9 Management of knowledge and intellectual property

Intellectual property and the management of knowledge, both pre-existing and knowledge which is attained during the project, are key issues for the smooth management of the project. Therefore this subject is dealt with in the consortium agreement. More information appears in the section of Impact; B.3.2.2.

2.2 Individual participants

For each participant in the proposed project, provide a brief description of the legal entity, the main tasks they have been attributed, and the previous experience relevant to those tasks. Provide also a short profile of the individuals who will be undertaking the work.

Participant 1	**SOITSA (Selective Outsourcing of Information Technologies, S.A.)**
Short Description	SOITSA (Selective Outsourcing of Information Technologies, S.A.) is the result of the merge of two outsourcing specialized companies: SOITSA is specialized in infrastructures management activities (systems, networking, databases and communications) and INTESYS in applications development. This company started in the 90's as a Spanish fixed capital Company With more than 20 years IT and Telecomm Projects experience and strong expertise.Business Units: ITO Projects (Technical Assistance), ITC Infrastructures Management and Managed Services, Consultancy and Applications Development. Mission: To provide professional services and to perform activities related to Information Technologies and Communications, managing his activities as projects or solutions, giving his customers specialized and advanced. Turnover 9 MM €, Own funds 1,2 MM €, close to 200 people working, Goverment Clasified, ISO 20000, ISO 9001 and ISO 27001 (in implementation process) Quality Certifications.
Role in the project and main tasks	SOITSA will be the leader of the project. iModEBus Project is based in a Soitsa concept related to Electromobility system managements. Soitsa is involved in software management for EV since 2010. They have developed a Car Sharing Software (Saas and cloud computing based) that is already running in several Spanish cities and operators. They firmly believe in the future of this kind of mobility and it is the reason why his R+D lines are mainly oriented to it. Intermodal collective transport is a logical "add on" to his current software investments line. iModEbus project relevance is really high to his company as they could implement and demonstrate that Intermodal ElectroMobility is an efficient solution for small and medium cities. This kind of cities integrates the natural potential market to his software products related to EV. If they are able to have an "at live" scenario they could use it as a real sample about software implementation and big data model for small smart cities.
Relevant previous experience	Soitsa has registered several Software products. Related to EV, they have registered two main developments: CarSahringSoftware registered as a "rentaenverde" and ELEVEH a Website and MarketPlace specialized in EV products. Soitsa has participated in the following R+D projects: Familoc: Geolocation solution for people based in personal GPS devices. Official department: IMADE- Comunidad de Madrid. Spain. CrashLoc: Geolocation solution for crashed vehicules based in personal GPS devices. IMADE- Comunidad de Madrid. Spain ELEVEH: Web Portal, B2B market place and Software solutions related to EV environment. MINETUR. Spanish Goverment I20K: Software apps for ISO20000 and ISO9001 implementation and

	achievements. Spanish Goverment Walkiria: Soitsa is already participating in a Spanish Consortium as a leader to develop the software platform for "offer and demand analysis" for EV charging. INNPACTO. MIHAC Spanish Goverment. Soitsa is member of several organization related to information technologies. Soitsa also cooperates with several Public Spanish Universities. The software exploitation will be oriented to small medium cities, with a main focus in European Small Medium cities. Through AECIM member of Enterprise Europe Network Madri+d they will be able to disseminating world wild his Sofware product and project results.
Staff Member involved	Person 1 Name: Rosa Barreiro Villar Title: Operations Director and R+D Director Responsibility in the company: Rosa is Soitsa Operations Director. From the last two years Rosa has also take the role of R+D Director, Field of excellence, Research area: Rosa leads several R+D projects in Soitsa, mainly Geolocation, Quality Management (ISO/IEC standard solutions) and Electric Vehicule. Rosa will assume the Role of Project Manager in iModEBus Work programme. Short curricular reference Education: University: BA in Mathematics - General Mathematics Specialist. University of Santiago de Compostela (1997) ITIL Foundation. EXIN (2005). ITIL Service Support: EXIN (2007) Further Education and Training: Information Technologies: •ISO 20000. (2011) •ISO 27001. (2009) •ITIL Service Manager. (2007) •ITIL Foundations. (2005) •IT Project Management. CEIM (2003) •Mainframe environment Programming: COBOL, CICS, DB2, SQL, JCL. Coritel. Grupo Andersen Consulting (1998) •UNIX and Fortran Programming. Univ. Santiago de Compostela (1995) Business Management: •ISO 9001:2000. Experta Formación (2005) •Financial Basic Accounting. CEIM (2005) •Analysis of Financial Statements CEIM (2005) •Business and Strategic Planning Organization. CEIM (2004) •Economic Management. CEIM (2004) •SMEs Management. CEIM (2004) •the recruitment and incentives. Uría y Menéndez (1999) Last Professional Experience: •1999-Present Company: SOITSA Position: Operations Director (March 2006-Present), Director of SOITSA Portugal (1999-Present) Management Responsible for SOITSA Mexico (2010-Present), Support for Business Development and New Delegations (SOITSA Brazil), Quality Responsible (2011 -Present and July 2004 to March 2006). Functions:

	•Managed Services BU Management and Direction o Implementation and overall project management for operation and monitoring, systems administration and infrastructure management o Responsible for BU quality management. Maintaining the current quality system (ISO 9001:2000) and responsible for the implementation of new standards (ISO 27001 and ISO 20000). o Commercial support and pre-sales for the reference area. Elaboration of Project Plans and Proposals for end customers, Prime Contractors and Government o Responsible for the BU results account. •R+D Direction oAnalysis, Coordination and project management for R+D initiatives oElaboration of Project Plans and Proposals for end customers, Prime Contractors and Government oResponsible for the BU results account. •Quality Responsible oISO 20000 implementation Responsible (2012) oISO 27001 implementation Responsible (2009 in Mexico and 2012 in Spain) oISO 9001 implementation and re-certification Responsible (from 2004) Person 2 Name: Marcos Guerrero Title: Project Manager and Senior Analyst Responsibility in the company: Marcos has taken Software definition responsibilities in Soitsa R+D projects. Field of excellence, Research area: Marcos is the Project responsible of the Host part and Architecture Geolocation and Electric Vehicules initiatives in Soitsa Short curricular reference Education: Technical Engineering in Computer Systems EUITI Gijon-Oviedo University. Computer Technologies and Tools •Windows Programming/Development: C++ Builder and C# Visual Studio 2005 •Windows Mobile Programming/Development: C# Visual Studio 2005 •Solaris / Linux Programming/Development: C/C++ GNU •Java Programming/Development. •Web Programming/Development. PHP – CakePHP Framework Last Professional Experience: • 2005 - Present: SOITSA Technical Project Manager position for the projects listed below, with responsibilities for: □Software requirements specification □Software and Database design □Management of software development team (3 Java / JSP programmers) □Java / PHP/ C# programming. PROJECTS: - CarSharing Electric Car / Scooter Rental Web application for electric car / scooter rental. http://www.bcngoinggreen.com The application not only manages users, reservations and fleets, but it also keeps realtime communication with embedded Vehicle Control Units which manages reservation evolution.

Main tools / technologies:

- Tomcat 6.X
- Java SE 1.6
- MVC Framework Struts 2
- JSP
- MySQL 5.5

- ITIL Service Support Tool

Web application implementing ITIL Service Support:
Configuration Management (Integrates with Hyperic HQ)
Service Desk
Incident Management (Integrates with Hyperic HQ and Nagios)
Change / Problem / Service Request Management
Time Tracking for SLA (Service Level Agreement) and Invested Time.
Main tools / technologies:

- Tomcat 5.X
- Java SE 1.5
- JSP
- MySQL 5.0

- SOITSA Employees Management System

Web application implementing the management of employees corporate data, management of access permission for the rest of the corporate applications and data stores.
Main tools / technologies:

- Apache 2.x
- PHP 5.2
- MySQL 5.0

CakePHP 1.2 MVC Framework

- Location Based Services For Courier Companies

This web application is for the management of courier companies. The server side manages clients, messengers and deliveries. The client side is implemented by Windows Mobile Smartphones, the messengers are located by GPS, who receive the pick-up and delivery jobs in their PDA, once the job are completed the server receives notification of completion.
Server Side Technologies:

6. Tomcat 6
7. Struts – JSP
8. MySQL 5.1
9. Web Service Server

Client Side Technologies:

1. Windows Mobile 5 / .NET Compact Framework
2. GPS Drivers
3. Web Service Client

Person 3
Name: Sergio Sanchez Leon
Title: Project Manager and Senior Analyst
Responsibility in the company:.Sergio has taken SW development and implementation responsibilities in Soitsa R+D projects.
Field of excellence, Research area: Sergio has taken the Software definition responsibilities of the Client part (Front) and "apps" in Soitsa Geolocation

and the Project Management in ITIL and Quality Improvement management projects

Short curricular reference

Education: 1997-2001 University Carlos III of Madrid Leganes: Technical Engineering in Computer Management

- structured programming and object oriented.
- Linux environments at medium and high level in Windows.
- Programming languages: C, C + +, Pascal, Basic.
- Photoshop and ImageReady.
- Client / server architecture and OSI architecture.
- Computer networks.
- Programming methodologies and Software Engineering.
- XML, PHP, SQL language, JavaScript and HTML, MySQL and CSS.
- Configurable subjects. Based on PHP, MySQL and JavaScript.

Last Professional Experience:

Projects JAVA / Struts, Servlets, JavaScript

- I20K: TIPS based application with features aimed at business management
- Sigve: management system for electric vehicles, operating reserves and data users of the service.
- SELFTips: application knowledge base and change request for customer service requests TIPS.
- TASKPLANNER: scheduling application integrated with TIPS.
- TIPS: ITIL application management of incidents, changes, problems ..., reporting and monitoring of time spent by the technical resources.
- Cavero: Web page of hardware with product management and sales, catalog search documents in pdf format.
- Gecol: website construction products catalog search pdf documents.
- GPAC, GPFE, GPEM: positioned mobility projects integrated with Google Maps and mobile devices for mobile resource management as messengers for delivery / collection, health personnel for emergency management and business.
- WebStats: Web application for graphical reporting of information gathered by a Java application responsible for monitoring the status and levels of services Web pages configured.
- Research and development of a map server (MapServer) integrated with a Web front and OpenLayers for map viewing and positioning of elements, similar to Google Maps.
- CineSearching: Web portal integrated with Google Maps location-oriented movies and films closer to the user. Database automatically and manually fed.
- Tools used: Eclipse, MySQL, Maven, Apache-Tomcat
- Dec'04 - Abril'07 Intesys Madrid
- Projects JAVA / Struts, Oracle, JavaScript
- Web Search Document □ txt, pdf, doc, xls, html, ppt ...
- AQP: scheduler similar to MS Project in a Web environment.
- Tools used: Eclipse, Maven, TOAD, Apache-Tomcat
- Projects in Coldfusion MX, Oracle, JavaScript
- Development and implementation of management applications in Coldfusion against Oracle 8i database
- PROMAT: Web application management of promotional products

	• CROSS: Web application management of all applications and deployments of the multinational pharmaceutical company Lilly • ECONGRESS: Web application management to international congresses Tools used: Eclipse, Homesite +, TOAD, Power Designer

Participant 2	**ITE (Asociación Instituto Tecnológico de la Energía)**
Short Description	The Instituto Tecnológico de la Energía, ITE, is a Technology Research Center with CT-74 record, which focuses its services, products and technology projects for companies and national and international agencies in the sectors of energy, electrical, electronic and communications. The purpose of the institution is to promote scientific research and technological development of the applied energy, increased production quality, and everything that contributes to the advancement of technology in the energy industries, electrical and electronics, and the development and application of information technology and communications to the above sectors, achieving optimal energy efficiency and ensuring the protection and conservation of the environment. Its main objectives are: • Innovation as an essential mainstay of companies. • Collaboration with companies in R+D+i projects. • Identification of needs and search for the most efficient solution. • High level of equipment in test and research laboratories. • Customer services and personalised treatment. • Response times and flexibility suitable for the customers' requirements. The Institute has equipment and infrastructures that allow launch and verify the different specifications and technology in the environment of energy, renewable energy, energy efficiency and her goods. • The lines of action and expertise of the Institute are: • Energy Efficiency. • New generation technologies. • Demand Management. • Energy storage and network manageability. • Transmission and distribution of electricity. • Capital goods. • Consumer goods. • New materials. • Distributed energy networks. • Power electronics. • Environment and Safety.
Role in the project and main tasks	The institute has several laboratories among those found in relation to the project: •Interoperability and Communications Laboratory to "Smart Devices" and "Smartgrids". - Realization of research and development projects themselves and with companies interested in: - Manageability of domestic burdens - Characterization of loads ("electric signature") of appliances - Validation of algorithms for demand management - Development of communication with meter and operates distribution standard based on PLC PRIME - Integration of renewable energy production systems - Modeling of distributed generation systems - Development of power electronics products

	- Platform for developing new energy storage systems. - Study and characterization of batteries and hydrogen generators - Dissemination of existing renewable energy technologies - Validation and integration tests in micro devices developed networks •Laboratory Active Demand Management. - Developing solutions (HW and SW) from electrical control centers to the home of clients that implement active management of demand in a way transparent to the end user and taking into account their level of comfort. - Research and development of tools for optimizing the energy consumption in homes, reducing the final cost of the bill and the environmental impact. - Research and development of devices to give consumers information about the price and the source of energy. - Research on the optimization of the electricity infrastructure, improving the quality of supply and facilitating greater integration of renewable energies. - Electrical Vehicle Storage BMS - Characteristics of the BMS prototype: - Monitoring in real time: cells and packs. - CAN-Bus for internal signals data acquisition. - Current and voltage protection. - Flexible series/parallel configuration (until 6 packs). - Communication with the Energy Management System (Modbus-RTU Protocol). - Characteristics of the BMS algorithms: - Passive cell balancing. - SOC: Coulomb Counting with correction based on cell voltage measures and battery model. - SOH: Kalman filters (Internal resistance and capacity estimation). - The input of the control parameters of the batteries is performed from the front panel in the BMS. The front panel shows the status and variables of the current test process. - Battery Testing Laboratory, - Specifications for charge and discharge process: ▪ Charge: Up to 30 V DC and up to 40 A ▪ Discharge: Up to 60 V DC and up to 150 A (maximum power 1500 W) ▪ Signals: current, voltage, temperatures ▪ Accuracy: • Voltage: ± 0,05% SF • Current: ±0,1% SF ▪ Resolution: ± 13bits Data Base Time Acquisition: from 1s (Configurable)
Relevant previous experience	Marta Alberto, Raul Soriano, Jürgen Götz, Ralf Mosshammer, Nicolás Espejo, Florent Leménager, Raúl Bachiller: OpenNode: A Smart Secondary Substation Node and its Integration in a Distribution Grid of the Future. Federated Conference on Computer Science and Information Systems - FedCSIS 2012, Wroclaw, Poland, 9-12 September 2012, Proceedings. 2012, ISBN 978-83-60810-51-4

	– Opennode. Open architecture for secondary nodes of the electricity smartgridCIRED, 21° International Conference on Electricity Distribution 2011 – Smart Microgrid: Sistema de Control Inteligente para la Gestión Técnica y Económica de una Microrred I Congreso Smart Grids 2012 – Arquitetura aberta para nós secundários da rede inteligente. Electricidade Moderna Vol. 40, Núm. 456 P inicial 134 P final 139 ISSN 0100-2104 2012. Previous participation in national or European research projects, other research collaborations related to the project – Project title: Análisis y Especificación de Diseño de un Nuevo Sistema de Transporte Urbano Eficiente Energéticamente basado en el uso de Vehículos Eléctricos integrados en la Red Eléctrica e impulsados por Energías Renovables. EPV – Project title: Open Architecture for secondary nodes os the electricity smartgrid. OPENNODE – Project title: PRICE-GDE: GESTIÓN INTELIGENTE DE LA DEMANDA – Project title: Poste de recarga móvil inteligente para suministro de autos eléctricos (PREMISA) – Project title: Interoperabilidad en redes de distribución inteligente
Staff Member involved	Person 1 Name: Ignacio Delgado Title: Industrial Engineer Responsibility in the company: Coordination of Smart Grids Department Field of excellence, Research area: Smart Grids Short curricular reference: Mr. Ignacio Delgado Espinós: Coordination of Smart Grids Department at Energy Technological Institute. He is Industrial Engineer with over six years of industry experience. He has served on the R & D, Energy, Automation and Goods, and is currently head of the department of Smart Grids of ITE. He is also working at management and development national and European projects on smart grids, Renewable Energy Integration network, Distributed Generation, Demand Management and Automation and Remote management of the network. In recent years his research has focused on projects on the active management of demand in the domestic sector, analyzing and studying the functional requirements to integrate systems on networks to provide all of greater intelligence to manage and behavior as the real-time user consumption. Person 2 Name: Ignacio Benitez Title: Automation and industrial electronics engineer Responsibility in the company: senior researcher Field of excellence, Research area: Smart Grids Short curricular reference Mr. Ignacio Benitez is a senior researcher in charge of the Advanced Control Techniques team, within the Automation and Smart Grids departments. He is also automation and industrial electronics engineer and is currently working towards his PhD in automation and information systems. His research team is working on applying methodologies and control theories to the fields of energy efficiency and renewable resources integration. He has proven experience in robotics, artificial intelligence, machine learning, fuzzy logic, prediction models,

	neural networks, data mining and clustering techniques. Person 3 Name: Sixto Santonja Title: Industrial Engineer in Electronics Responsibility in the company: Project Manager Field of excellence, Research area: Electrical Vehicle Short curricular reference: Mr. Sixto Santonja is a Electronic Engineer with more than twenty years of professional experience, fourteen in the Telecommunications sector. He is working in different projects at national and intenational level, in matters like Electric Car, Smart Grids, Renewable Energy an others electric and electronics issues.

Participant 3	**UoR-CRAT (CONSORZIO PER LA RICERCA NELL' AUTOMATICA E NELLE TELECOMUNICAZIONI (C.R.A.T.)**
Short Description	CRAT (Consortium for Research in Automation and Telecommunication) is a no-profit research consortium including the University of Rome "Sapienza", Selex-Elsag, Thales Alenia Space and Space Engineering. In particular, the research group of the University of Rome "Sapienza" coordinated by Prof. Francesco Delli Priscoli (**CRAT-UoR**) will be in charge of working in iMODEBUS project. The University of Rome "Sapienza" is by far the biggest (around 150,000 students), the oldest (funded around 1300) university of the city and one of the most prestigious Italian and European universities. It hosts several faculties, which, in turn, are organized in departments including some research groups. The University of Rome Sapienza research group which will participate to the project is coordinated by Prof. Francesco Delli Priscoli and mainly involves people belonging to the Department of Computer, Control and Management Engineering (DIAG) of the Faculty of Engineering. The research group in question has a huge experience in the framework of ICT related projects financed by the European Union, as well as several profitable co-operations with major industries. As far as the most recent EU financed projects are concerned, the research group in question is successfully participating (has successfully participated) in the following seventh framework programme projects: OMEGA (Home Gigabit Access), P2P-NEXT (Next Generation Peer-to-Peer Content Delivery Platform), MICIE (protection of Critical Infrastructures), TASS (Airport Security), DLC+VIT4IP (Power-Line Communication Technologies), MONET (Hybrid Ad-hoc and Satellite Networks), FI-WARE (Future Internet technology foundation), COCKPIT-CI (Cyber-security on SCADA), SMARTV2G (Smart Vehicle to Grid Interface), SHIELD (Security for Embedded Systems), MOBINCITY (Smart Mobility in Smart City). In the above-mentioned projects, the activities performed by the research group in question are/were mainly oriented to studies, designs, simulations and implementations in the following fields: (i) *QoE/QoS and Resource Management* (Access Control, Connection Admission Control, Dynamic Routing, Congestion Control, Medium Access Control, Scheduling, etc.) for broadcast/multicast/unicast connections in wireless (cellular, ad hoc networks, satellite) and wired networks, aiming at efficiently exploiting the system resources while respecting the QoS (Quality of Service) and QoE (Quality of Experience) requirements; (ii) *Context-Aware Service/Content Management* (Context Aware Service/Content Discovery, Composition and Provisioning) in an heterogeneous network framework, aiming at offering to the users, in an user friendly and secure way, services/contents meeting their personal expectations; (iii) *Cognitive Techniques* aiming at the development of a technology-independent layer (transparent with respect to both the IP layer and the technology dependent layers) which, on the basis of heterogeneous multi-layer, multi-network, multi-user information (properly filtered, converted in metadata, discovered and aggregated) takes integrated decisions

	concerning QoE/QoS, security, access control, mobility, service/content delivery, etc., which are eventually actuated in the various underlying networks. (iv) *Energy management techniques for smart grids* aiming at the development of algorithms and techniques for the Energy Management System able to optimize the energy consumption efficiency. (v) *Vehicle routing techniques* aiming at determining the optimal routes of fleets of vehicles, with respect to various parameters of interest (battery duration, traffic congestion, etc.). The wide experience in dynamic routing, especially applied to ad-hoc networks, and in the development of multi-objective optimization algorithms guarantees a high expertise in this context. The research group in question has dealt with the above-mentioned topics by using several innovative methodologies in the field of control and optimization (e.g. learning techniques, predictive control, optimal control, adaptive control, game theory, data mining, etc.). The achieved results have been the subject of plenty of publications in books, International Reviews and International Conference Proceedings, and have been implemented in many demonstrators and prototypes.
Role in the project and main tasks	The main contributions given by the CRAT-UoR team in the project concerns control and optimization algorithms for: smart fleet charging strategies to support energy management; routing strategies for logistic model and data mining based approaches for decision support and information management. In particular, the CRAT-UoR will work in the following Tasks: WP2 Task 2.2 "System Initial Task" (ID 1.2.1.2) Contribution to definition of Metrics and Measure Requests, System Analysis, System Design activities. WP4 Task 4.0 (proposed task on algorithm design) Task 4.1 "Sprint 1 System SW development" (ID: 1.2.3.1) Task 4.2 "Sprint 2 System SW development" (ID: 1.2.3.2) Contribution to algorithm design and software development on traffic mining (for the information management system), routing strategies (for the logistic model) and smart fleet charging strategies (for the energy management system). WP5 Task 5.1 "Move To Production And Operation" (ID:1.3.1.1) Task 5.3 "Technical Advising" (ID:1.3.1.3) Contribution to the integration of the algorithms developed in WP4 and on the Data Analysis activity. WP6 Task 6.10 (proposed task on final technical advising) Task 6.5 "Technical Advising" (ID: 1.4.1.3) Contribution to the evaluation of the demonstrator. WP7

	Task 7.2 Research Results (Efficiency Gains) And Conclusion Contribution to the dissemination via publications in conferences and journals, exploitation in terms of academic teaching in university courses/masters and so on.
Relevant previous experience	**DLC-VIT4IP** (http://www.dlc-vit4ip.org/wb/): The focus of DLC+4IP project is Power-Line Communication, which on distribution network is often called Distribution Line Carrier. FP7 2007-2013, Grant Agreement no 247750. **SMARTV2G** (http://www.smartv2g.eu/): The SMARTV2G project aims at connecting the electric vehicle to the grid by enabling controlled flow of energy and power through safe, secure, energy efficient and convenient transfer of electricity and data. FP7/2007-2013, Grant Agreement no 284953. – **MOBINCITY**: MOBINCITY aims at the optimization of Fully Electric Vehicles (FEV) autonomy range and the increase in energy efficiency thanks to the development of a complete ICT-based integrated system able to interact between driver, vehicle and transport and energy infrastructures, taking advantage of the information provided from these sources in order to optimise both energy charging and discharging processes (trip planning and routing). FP7/2007-2013, Grant Agreement no 314328.
Staff Member involved	**Francesco Delli Priscoli** Title: Full Professor Responsibility in the company: Scientific Responsible Field of excellence, Research area: Resource/service/content management procedures and cognitive techniques for telecommunication, vehicular and energy networks, by largely adopting control based methodologies. Short curricular reference: Author of about 180 papers appeared on major international reviews (about 60), on books (about 10) and conferences (about 110) and of four patents. He is an associate editor of Control Engineering Practice and a member of the IFAC Technical Committee on "Networked Systems". Moreover, he was/is the scientific responsible, at the University of Rome "Sapienza", for more than 30 projects financed by the European Union (fourth, fifth, sixth and seventh framework programmes) or by the European Space Agency (ESA), as well as for many national projects and co-operations with major industries. **Antonio Pietrabissa** Title: Assistant Professor Responsibility in the company: Researcher Field of excellence, Research area: Application of system and control theory methodologies to telecommunication, ad-hoc and vehicular networks. Short curricular reference: He has been involved in several EU and ESA funded projects (GEOCAST, DOMINO2, SATIP6, EuQoS, SATSIX, OMEGA, DLC-VIT4IP, MONET, MOBINCITY) and Italian funded projects on telecommunications and vehicular networks. He is author of more than 50 papers on these topics. **Alessandro Di Giorgio** Title: Assistant Professor Responsibility in the company: Researcher Field of excellence, Research area: Application of control systems theory to

	Smartgrids. Short curricular reference: Physic in the field of Electronics and Cybernetics in 2005 and Ph.D. in System Engineering in 2010 at the University of Rome "Sapienza". Since 2008 he has been lecturer for the courses of Automatic Control, Automation Technology and Network Control and Management. Since 2011 he is Assistant Professor in Automatic Control field. He participated to several EU funded projects (DLC-VIT4IP, SMARTV2G, MOBINCITY) in the thematic of energy management in Smartgrids.

Participant 4	**RATUC (REGIA AUTONOMA DE TRANSPORT URBAN DE CALATORI CLUJ-NAPOCA)**
Short Description	RATUC is a Romanian company working in the field of public passenger land transport (urban, suburban and metropolitan transport by busses, trolleybuses and trams)
Role in the project and main tasks	RATUC has great experience in operating conventional electric vehicles: trolleybus and tram, with these transport means providing half of the current carrying capacity. They have staff qualified in electrical fields and computer technology that could contribute to implementation of the project. iModEBus research will demonstrate the increased take-up, energy efficiency gains and the viability of an inter modal electric buses service for small/medium cities, as a new mobility service based on an Internet "on demand", cloud computing and big data architecture. This is very relevant for us.
Relevant previous experience	RATUC is member in different organization : URTP (Romanian organisation of UITP), TWG (Trolleybus working group), Transport cluster in Transilvania They have strong relationship with all PTO from Romania (Public Transport Organisation) Our CityHall have strong relations with other cities from Romania
Staff Member involved	Person 1 Name: Lupsa Laura Title: Engineer Responsibility in the company: Implementing and coordinating the Ticketing system(beginning in ian. 2013) Field of excellence, Research area: Engineering, Project implementing Short curricular reference: Project Manager for the implementation of a SME project financed from romanian budgetary funds, Ticketing Project Preparation Person 2 Name: Dobos Niculae Title: Head of technical service Responsibility in the company: coordinating the activity of technical service Field of excellence, Research area: Engineering, Coordinating Short curricular reference Initiator of transformation of 10 old diesel buses in 10 trolley buses . Analysis and presentation of papers obout electrical transport in public transport at TWG Conference-Leipzig 2012

Participant 5	**BLUEMOBILITY SYSTEMS, S.L**
Short Description	BlueMobility developes and provides smart solutions for charging, chargings points all types of electric vehicles and Electric Mobility Consulting.
Role in the project and main tasks	BlueMobility is dedicated to providing mobility solutions so this project is a part of his business line In relation to the project: Engineering Team (sea below) + Prototype workshop
Relevant previous experience	References (publications), and patents related to the project – Consulting: Drafting of the legislation required for the regulation of the implementation of charging grids for electric vehicles in Galicia – Consulting: Preliminary feasibility study on the implementation of charging grids for electric vehicles at ports. – Consulting: Study of profitability and viability of location electric vehicles charging points and promotion of activities in Ávila. – Consulting: Technical study for the development of an implementation plan about electric vehicles charging grid in Ávila. Previous participation in national or European research projects, other research collaborations related to the project Intercompany Cooperation Project (CDTI): RIRVE-Red Inteligente de Recarga de vehículos eléctricos- Development of Electric Vehicle Smart Charging Grid and Pilot system for intelligent electric vehicle charging. Project participants: - Companies: Gas Natural S.D.G, Iecisa and BlueMobility - Technological centers: CTAG
Staff Member involved	Person 1 Name: Paul Tomlinson Title: CTO Responsibility in the company: R+D Manger Field of excellence, Research area: R+D Manger Short curricular reference: Electrical Engineer. 25 years of experience in automotive sector. Person 2 Name: Pedro Rodríguez Title: Proyect Manager Responsibility in the company: Proyect Manager Field of excellence, Research area: Integration comunication systems and Chademo Short curricular reference: Telecomunication Engineer.Twelve years of experience as project management, web aplication development, system administration, Networks and Multimedia Services in areas of high availability. Person 3 Name: Ricardo Fontán

	Title: Proyect Manager Responsibility in the company: Electro mechanical product development Field of excellence, Research area: Power engineer and Regulations Short curricular reference: Electrical Engineer. 2 years of experiencie in engineering and consulting company Person 4 Name: Ermelinda López Campo Title: Proyect Maneger Responsibility in the company: Software Development. Field of excellence, Research area: Software architecture and programming, communication protocols and web services Short curricular reference: Programmer analyst. 2 years of experience in Information Communication and Tecnology organization

Participant 6	**City of Palencia.(City Council of Palencia.)**
Short Description	The city of Palencia is located in the Autonomous Community of Castilla y León (Spain). Has 82,169 inhabitants and has a major industry in the automotive and agri-food.The City is a dynamic institution, twinned with several European cities and with several awards and national and international awards (more Sustainable City 2010, Accessible City, Friendly City Unicef Children Awards, respect for the Environment in Water Management 2007).Is a city concerned about the environment, the sustainable development and rational use of energy. He is currently co-founder of Smart Cities Network, betting heavily on the energy efficiency, renewable energy and intelligent transport; and of the Public Private Partnership "SMART CITY Valladolid-Palencia", being the mains areas of action the following: Energy Efficiency, Environment, Logistic and Transport, Citizens and Tourism.The framework for common objectives represents the EU 2020 strategy: smart, sustainable and inclusive growth, being the common pillars on which they are working are: economic, social and environmental dimensions (sustainability).
Role in the project and main tasks	HUMAN RESOURCES: 1 Head of Environment (Specialist in Urban Mobility). 1 Administrative. They are involved in a tender process of urban transport and it is a good opportunity to implement the measures and the resources under investigation in this project. Palencia has different regular lines that the city budget cannot stand any longer, so the solution could be the on-demand transport.
Relevant previous experience	They are in different cities network where the results of this project could be disseminated: R.E.C.I.: It's a Spanish network of Smart Cities. Also, they belong to CIVITAS NETWORK as well as the F.E.M.P. (organisation where all the local entities are represented).
Staff Member involved	Person 1 Name: GABRIEL RUBÍ Title: HEAD OF ENVIRONMENT Responsibility in the company: THE RESPONSIBLE OF MAIN CITY SERVICES AS URBAN TRANSPORT, CLEANING AND WASTE MANAGEMENT, WATER, GREEN ZONES, PUBLIC LIGTHING Field of excellence, Research area: MOBILITY MANAGEMENT Short curricular reference INDUSTRIAL ENGINEER, MORE THAN 10 YEARS OF EXPERIENCE IN LOCAL ADMINISTRATION

2.3 Consortium as a whole

The iMODEBUS consortium composition is shown in the next table. It consists of industrial partners, research institutes, SMEs, medical centres and universities.

Each partner (as can be seen in the table below) in the consortium brings specific and distinct skills, tools and knowledge to the multidisciplinary iMODEBUS project. The consortium partners cover various activities and competencies necessary for the development of iMODEBUS applications and services. In particular the following competencies and needs were taken into account during the definition of the consortium:

- ***Knowledge in business modelling and representation***, especially covering innovative areas , such as procedural knowledge and temporal abstraction knowledge
- ***Expertise in development of intelligent systems*** **and agents**: intelligent middleware, context-awareness mechanisms, workflow modelling, artificial intelligence techniques for learning, decision support systems.
- ***Expertise in user interfaces regarding dynamic smooth interfaces development*** and integration, intelligent user interaction, understanding user NLP necessities.
- ***Expertise in widespread domains*** of business as well as medical, which can cover both various types of knowledge as well as exploitation opportunities.
- ***Expertise in advanced architecture specification*** for the definition of a reference technical architecture for iMODEBUS.
- ***Possession of already disseminated assets of multimedia Information Extraction platforms*** and mechanisms, in text, images and videos, that could be adapted/ adjusted into iMODEBUS and enable focusing on the reasoning core services.
- Expertise in ***systems engineering and integration***
- ***Expertise in prototypes design and development***
- Knowledge and practice in ***market testing and validation***, including need for ***sites to test*** all the developed prototypes in a near-to-real life environment.

In conclusion, all the key areas of research within the project are clearly covered by one or more partners, which are among the leading companies or institutes in their field.

2.4 Resources to be committed

The complete photo budget is a the follows:

		SOITSA	ITE	USR	BLUEM	PAL	RATUC	Total
BUDGET RTD activities								
Personnel		243.144	41.942	180.773	48.944	175.967	128.587	819.357
Subcontracting								0
Other direct costs	Travel	12.000	12.000	12.000	12.000	12.000	12.000	72.000
	Consumables							0
	Durable Equipment	15.000			150.000	210.000	210.000	585.000
	Other costs							0
Indirect Costs		162.086	32.365	115.664	126.566	238.780	210.352	885.814
RTD Costs		**432.231**	**86.308**	**308.437**	**337.510**	**636.747**	**560.939**	**2.362.171**
EU Grant Required		**324.173**	**64.731**	**231.327**	**253.133**	**477.560**	**420.704**	**1.771.628**

BUDGET Demonstration activities								
Personnel		311.337	78.717	109.469	91.952	48.636	43.464	683.575
Subcontracting								0
Other direct costs	Travel							0
	Consumables							0
	Durable Equipment					220.000	220.000	440.000
	Other costs							0
Indirect Costs		186.802	47.230	65.681	55.171	161.162	158.078	674.145
DEM Costs		**498.139**	**125.948**	**175.150**	**147.123**	**429.818**	**421.542**	**1.797.720**
EU Grant Required		**249.069**	**62.974**	**87.575**	**73.562**	**214.909**	**210.771**	**898.860**

BUDGET Management activities								
Personnel		62.944	52.734	33.334	5.600	2.961	2.647	160.220
Subcontracting		2.000		2.000		2.000	2.000	8.000
Other direct costs	Travel							0
	Consumables							0
	Durable Equipment							0
	Other costs							0
Indirect Costs		37.766	31.640	20.000	3.360	1.777	1.588	96.132
MAN Costs		**102.710**	**84.374**	**55.334**	**8.960**	**6.738**	**6.235**	**264.352**
EU Grant Required		**102.710**	**84.374**	**55.334**	**8.960**	**6.738**	**6.235**	**264.352**

OVERALL BUDGET								
TOTAL PROJECT COST		1.033.080	296.630	538.922	493.598	1.073.302	988.716	4.424.248
TOTAL FUNDING REQUIRED		675.953	212.079	374.238	335.658	699.207	637.710	2.934.845

DURABLE EQUIPMENT

Consortium has evaluated a minimum equipment to be able to a real demonstration scenario in each city. The final features will be defined in a full concrete way after the Cities Members Study about traffic and mobility needs. The main amount in this item is related to the Electric Bus investment. In this sense, we have selected two types of buses: Minibuses and Buses. The consortium commitment is to order the minibuses (On demand Buses) for RTD and the MidiBuses (line Buses) for demonstration purpose to CEE manufacturers. The initial and tentative selection is based in the following parameters.

RTD: MiniBuses "On Demand" (2 units in Cluj Napoca and 2 units in Palencia).

Minibuses are the OnDemand Buses based in 9 to 14 seats buses. Into theses buses we will install the CUV to integrate it with bus can. He main objective is to collect data related to consumption , availability and service request matching. The CUV provide bus tracking and geolocation in a recurrent way.

The manufacturer commitment should be clear in terms to improve the product based in the Big Data exploitation. The intermodal scenario will provide to the minibuses manufacturer information and Technical advising during the project period.

Due to the demonstration purpose of this Equipment we have choose small buses better than "midi buses", to try to create a "multi route" scenario.

The On demand buses specification will be similar than the following, manufactured in Cork (Ireland), VerdeGoh.

TRAVEL

Trips are necessary for implementing the project. Trips budget aims at meeting the needs of necessary expenses for project meeting arrangements. It is estimated an amount of 1.500 €/ per travel.

The meetings aim at monitoring the partner activities, reviewing the financial and economic status, arriving to consensus among partners about the contractual report, planning the following period and correcting possible deviations on the initial plan (if any).

OVERHEAD

Indirect costs are all those costs, which cannot be identified by the contractor as being directly attributed to the project but which can be identified and justified by its accounting system as being incurred in direct relationship with the eligible direct costs attributed to the project.

Items which are considered as overhead cost are:

- Costs related to general administration and management
- Costs of office or laboratory space, including rent or depreciation of buildings and equipment, and related expenditure such as water, heating, electricity, maintenance, insurance and safety costs
- Communication expenses, network connection charges, postal charges and office supplies
- Common office equipment such as PCs, laptops, office software
- Miscellaneous recurring consumables
- Others not directly attributable to the project but are incurred in relation to the direct costs of the project.

SUB-CONTRACTING:

Necessity of subcontractors to carry out the works described in this technical annex has not been planned.

For Certificate of financial Statement-CFS (Partners which claim more than 350.000 €), each partner will use its own external financial auditor. Each partners is responsible of his own CFS

Section 3. Impact

3.1 Expected impacts listed in the work program

EXPECTED IMPACT OF STRATEGIC OBJECTIVE: 2013.6.6 INTEGRATED PERSONAL MOBILITY FOR SMART CITIES	IMODEBUS CONTRIBUTION
Increased take-up of transformative European ICT in new mobility services.	Intermodal transport based in Electromobility requires a complex management system that integrates the citizen requests into an ICT friendly environment. On demand Buses working together with Line Buses are new concept in mobility services. The iModEBus main contribution is the intermodal integrated System Management, continuously feed by the Big Data exploitation,
Energy efficiency gains in personal mobility demonstrated when using new mobility services	As a main idea, "On demand" Buses suppose a clear gain in term of efficiency as the citizen transport just use the real necessary resources in terms of mobility. iModEBus project will contribute to demonstrate the energy efficiency gains of Intermodal Electric Buses System, in front of traditional solution.

3.1.1 Technological Impact

The technological impact of our Project will be mainly focused in ICT sector.
The real results of iModEBus will be a Management System and Big Data model for small medium smart cities.

The System and Big Data architecture has been designed to have and isolate functionality or as module system, to be part of other complex systems. The cloud computing platform will provide a gateway module to integrate the Bus intermodal transport with other mobility systems.

The iModEBus system is based in smart computing for citizens applied to critical infrastructure components and services. From our point of view, Smart computing refers to a "new generation of integrated hardware, software, and network technologies that provide IT systems with real-time awareness of the real world and advanced analytics to help people make more intelligent decisions about alternatives and actions that will optimize traditional processes.
ICTs are key drivers of smart city initiatives as iModEBus.The integration of ICT with development projects can change the urban landscape of a city and offer a number of potential opportunities; they can enhance the management and functioning of a city.

3.1.2 Socio-economic benefits of the project

Information and communication Technologies (ICTs) are key for shaping Europe's future, iModEBus will apport potential key benefits that cover several dimensions and aspects:

Integration and interaction of different services and infrastructures, both physical and ICT (smartphones, cloud computing, electric Vehicule)
Grids with bidirectional flow in a distributed generation, that requires real time exchange of information based in iModEBus Big Data model (to balance and to predict energy offer and demand)
Public transportation to manage the mobility needs with an appropriate Intelligent Transport System (ITS) that takes care of congestion charging, reduce pollution and accident rate, reserved uses, integrated payments by vehicle, etc.
Pushing the demand of mobile devices, the ICT network will leverage high speed services, mobile advanced location based services, social networking and collaborative crowd sourcing, touristic orientation, etc.

1. **The economic impact of iMODEBUS on the IT community**

The impact for the IT community of our Project will be relevant as the developed system will be released and distributed as an Open Source Solution.
It seems that the IModEBus Core could be used by the IT community to face similar projects. Soitsa as a specialized ICT member will reserve the right to provide paid support for professional services and in addition will supply a Saas (software as a service) version, hosted and supplied in the Cloud Computing platform. With this commercial way, small and medium cities could get advanced services saving Capex and investments and getting a Pay per Use model.
Nevertheless, the source code will be open for the It Community.

2. The economic impact of the project on the sectors on which it will be exploited.

The current economic crisis affect to several economics sector that seen how the investments are clearly reduced.
Public Services are even more impacted due to the deficit control and critical measures.
iModEBus solution will help:

- ICT Sector, providing a complete basis solution for intermodal transport management. iModEBus "cloud," eliminates the expense of travelling sales people, consultants and VARs distribution. Without on-site servers, labor and maintenance costs are cut and there is no matrix of software versions to upgrade. Pilot agreements allow the purchaser to test the product before buying. iModEBus SaaS products will be easy to use and the user adoption can be rapid, and, at the very least, evaluated prior to making large financial commitments.
- Small and Medium Cities Goverments will get an Open Source Solution as ITS and also a real demonstration scenarios during the production phase. So they can access see and probe the iModEBus benefits.
- Citizen Transport Business can get similar benefits to provide mobility services based in similar premises than Palencia or Cluj_Napoca.
- Buses manufactures can adopt iModEBus software as a compatible management solution to be incorporated to the own products.

3. The impact of the project on the general public

iModEBus is a project that contributes to develop the concept of Smart cities. Smart cities can add value within a strategic framework. This will mean moving from departmental solutions to a city wide approach, creating economies of scale and scope that will result in:

- Economic development and the creation of jobs.
- Promoting resource efficiency and mitigating climate change.
- Providing a greater place to live and work.
- Running cities more efficiently.
- Supporting communities

3.1.3 Added Value at the european level

The added value at the European level is that iModEBus is a full R+D project that will be released in two small/medium European cities.
The project contributes to show how the European Union contributes to the citizen real life improvement.
Several Studies using comparative data have shown that there is a long term trend of: growth of the inequities between European cities systems and a relative decline of the small and medium sized towns. The reason for this trend is the decreasing distances that influence directly the dynamic of the communication speed. Small and medium cities which had the role of a communication channel are shortcut and their clients are drawn by the big cities that increase their area of influence.
Under these conditions, during the past years, many of these cities have lost residents and jobs over to the large city and the economical, technological and sociological dynamic has had a negative trend, which could not be overcome by the developing problems of the great cities.
The various problems of the medium sized cities in comparison to the larger ones have to do with the followings:
First of all, those placed close to a big city have to reach a minimum ability in offering a wide area of services – both for public and company's needs, and social and cultural equipments required by the citizens and companies, that allow the town to be competitive.
Second of all, cities that do not benefit of the neighborhood of a large town or aren't developed enough, can either form a local network of towns, or develop connections with one or more large cities placed further away, but which offer a reliable communication channel. For a city network to be efficient, the space between them has to be small, allowing these to share their resources and equipments –such as a local airport or different types of services for the companies in the area. For a good connection with a large distance city it is a must for the town to renewal its relations, or better said its local companies, in order to offer something special, which can't be found easily somewhere else. In other words, it has to develop a special feature which gives it a competitive advantage.
A third issue is connected to the second one, because it is precisely the lack of special features that causes to many small towns big problems. These cities have to be specialized in something in particular, to develop the infrastructures and the services that can bring together both technology and qualified labor power. There is also a negative side of the specialization. Any forced specialization, due to accelerated technological progress and economic development, can be faced with the danger of being overdue, as it happened with the textile industry or naval constructions.

iModEBus project contributes to solve this problems and specially, in the cities situated in less favorable places, such as rural areas – far from a large town or towns, too small to offer a various range of services and sufficient collective equipments and which are also placed in such manner that a connection to a city network is difficult or inexistent.

iModEBus solution includes the development of infrastructures and necessary services to support the growth of local companies and the number of jobs offered in their field of activity
- Improvement of collective equipments, cultural sites and recreation centers to enhance the attractiveness of the city.

- Development of proper communicational channels – phone lines and means of transportation – with middle sized and large cities from the same region and also from other parts of the country and the European Union.
- Invigoration of local capacity of planning and practicing urban development strategies.

3.1.4 Contribution to standards

The main contribution to standards will be made in the Big Data environment and in the web services system. In the first point, we will share all the big data model in Hadoop wiki, to be used in similar scenarios. For the second point IModEBus deploy XML integration between devices and management system.

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

3.2.1 Innovation-related activities

The innovation-related activities to be included in the IMODEBUS project will be as follows:

- dissemination activities
- activities promoting the exploitation of results
- intellectual property protection and management

These points will be elaborated further in the following chapters B.3.2.2 and B.3.2.3.

Management of knowledge produced

The management of knowledge (results, copyright, patents, designs, etc.) arising from the IMODEBUS project, involves the ongoing identification, tracking, and registration of knowledge as it is produced. It is also concerned with the decisions on ownership of Intellectual Property (IP) and the procedures to be included in a Consortium Agreement.

The Co-ordinator will identify a 'Knowledge Manager' during the project. All the participants in the project will identify and register knowledge as it is produced with the knowledge manager. Regulations concerning the dissemination and exploitation of knowledge, and access rights, will be defined in a Consortium Agreement to be signed by all project participants.

The process for managing the knowledge produced by the IMODEBUS project is identified and described in B2.1.

3.2.2 Dissemination/ Exploitation of the results

DISSEMINATION

To ensure that the iMODEBUS project leaves a mark on the scientific community and on society at large it is essential that its results are properly disseminated to the community of stakeholders, to the academic community and to the wider public.

Considering the fact that iMODEBUS is a Research and Development project the focus of dissemination activities will be on publications and presentations at major conferences and industry events. The academic partners in the consortium will spearhead the effort on the publications front and endeavour to publish results from the IMODEBUS project on the best national and International journals.

All partners are committed to disseminating the results of the project through participation at conferences and international events throughout the course of the project and after its completion.

In addition the IMODEBUS consortium will make all efforts to disseminate its results within the Framework Programme Community. In close consultation with the project officer (and after careful consideration of any commercial or competitive restrictions) the IMODEBUS project is committed to exchanging results and best practices with other Framework

Programme projects that are performing Research in the same field or in complementary disciplines.

EXPLOITATION

The existence of clear and visible exploitation opportunities is one of the main drivers set by the coordinator as a criterion for choosing the partners. Each of the industrial members of the consortium is developing a platform that will enhance its core business. We figure that the academic and research institutions will gain from royalties' agreements resulting from the exploitation of the technologies they are developing within the framework of this consortium.

The Coordinator of the iMODEBUS project will appoint an Exploitation Manager who will be responsible for accelerating the introduction of the exploitable results into the marketplace. A preliminary Plan for the Use and Dissemination of Knowledge (PUDK) will be developed early on in the project and will act as the main guidance for ensuring proper exploitation. This plan will be finalised by the end of the project.

The following table presents the technologies expected to be developed by the IMODEBUS consortium and the companies expected to gain from possible application of those technologies. Management of intellectual property
The management of knowledge (results, copyright, patents, designs, etc.) resulting from the IMODEBUS project, involves the ongoing identification, tracking, and registration of knowledge as it is produced. It is also concerned with the decisions on ownership of Intellectual Property (IP) and the procedures to be included in a Consortium Agreement.

All the participants in the project will identify and register knowledge as it is produced with IMODEBUS. Regulations concerning the dissemination and exploitation of knowledge, and access rights, will be defined in a Consortium Agreement to be signed by all project participants.
The process for managing the knowledge produced by the IMODEBUS project is identified and described herein.

The Project Manager will be responsible for ensuring that a secure and suitable knowledge management system is put in place, which will run as soon as possible after the project has started. The system will hold relevant and clearly numbered administrative documents, such as project meeting minutes, deliverable lists, implementation plan updates and results portfolios. It is the responsibility of the Project Manager to make sure everyone is able to access and use the system effectively. The Project Manager will also ensure that data protection legislation is followed.
The project participants have already agreed on the following Intellectual Property issues:

a) All information provided by a Contractor to other Contractors within the project is confidential unless:
   i) It was already known to the Contractor before the negotiations started, or
   ii) The information provided is public property, or
   iii) It is explicitly specified otherwise by the originator of the information.

b) Contractors agree to use the information provided only for the purposes of conducting the project. Any disclosure of confidential information to a third party requires the explicit consent of the originator of that information.

c) Proper records, indicating the originator and the date of the transfer, must be kept when information is transferred between Contractors.

d) When more than one Contractor claims joint ownership of newly produced intellectual property, the Contractors involved should make provisions to clarify the terms of joint ownership among them.

e) Contractors are not restricted in any sense regarding the rights associated with the ownership of any intellectual property they produce while conducting the project activities.

Section 4. Ethical Issues

ETHICAL ISSUES TABLE

	YES	Page Number
Informed Consent		
• Does the proposal involve children?		
• Does the proposal involve patients?		
• Does the proposal involve persons not able to give consent?		
• Does the proposal involve adult healthy volunteers?		
Biological research		
• Does the proposal involve human genetic material?		
• Does the proposal involve human biological samples?		
• Does the proposal involve human biological data collection?		
• Does the proposal involve human embryos?		
• Does the proposal involve human foetal tissue or cells?		
• Does the proposal involve human embryonic stem cells?		
Privacy		
• Does the proposal involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)		
• Does the proposal involve tracking the location or observation of people without their knowledge?		
Research on Animals		

• Does the proposal involve research on animals?		
• Are those animals transgenic small laboratory animals?		
• Are those animals transgenic farm animals?		
• Are those animals cloned farm animals?		
• Are those animals non-human primates?		
Research Involving Third Countries		
• Is any part of the research carried out in countries outside of the European Union and FP7 Associated states?		
Dual Use		
• Does the research have direct military application		
• Does the research have the potential for terrorist abuse		
ICT Implants		
• Does the proposal involve clinical trials of ICT implants?		
(IF NONE) I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL		N

ANEXO 12 : TARIFAS Y TÍTULOS DE VIAJEROS.

II. Tasas
2013

Las referencias a textos legales y reglamentarios que se reflejan en las Ordenanzas Fiscales Municipales, se entenderán hechas a los textos legales o reglamentarios vigentes en el momento de la aplicación.

ORDENANZA FISCAL REGULADORA DE TASAS POR PRESTACIÓN DEL SERVICIO DE TRANSPORTE URBANO

Artículo 1º.

En uso de las atribuciones conferidas por los artículos 20 y siguientes del Real Decreto Legislativo 2/2004, de 5 de marzo, este Ayuntamiento establece las Tasas por la prestación del Servicio de Transporte Urbano en este municipio, que se regirá por la presente Ordenanza Fiscal.

Artículo 2º.

Constituye el objeto o hecho imponible de esta exacción la utilización del servicio de transporte urbano en cualquiera de las líneas establecidas por el Ayuntamiento.

Artículo 3º.

Son sujetos pasivos de esta exacción y están obligados al pago de las tasas todas las personas que utilicen el transporte público.

Artículo 4º.

Las tasas se devengarán cuando se inicie la prestación del servicio, mediante el acceso al vehículo de transporte urbano por el usuario, y se formalizará por los medios mecánicos establecidos al efecto, con la entrega del ticket que acredita el pago simultáneo de la tasa correspondiente, de acuerdo con las tarifas establecidas en el artículo siguiente.

En la modalidad de uso del transporte denominada bonobús, para los usuarios con alta frecuencia de uso, o usuarios en los que concurran las circunstancias determinadas en la presente Ordenanza, se podrán obtener anticipadamente tarjetas sin contacto y recargables o títulos de viajero, en cualquier modalidad que pudiera implantarse para mejora del servicio a los usuarios, para permitir la utilización del transporte en varias ocasiones predeterminadas o resultantes de dividir el saldo disponible en la tarjeta o título, por la tarifa en vigor que corresponda a cada usuario o modalidad de uso. Las tarjetas, tarjetas sin contacto y, en general, títulos de viajero, serán suministrados, a instancia de los interesados, por el Ayuntamiento, Entidades Colaboradoras o Concesionaria del servicio. La tasa se devenga en el momento de la solicitud.

Artículo 5º.

Las tarifas a aplicar serán las siguientes:

- Billete ordinario ..... 0,65 €
- Bonobús ..... 0,40 €
- Festivo ..... 0,65 €
- Bonobús jóvenes y familias numerosas ..... 0,20 €
- Bonobús 3ª edad, pensionistas y discapacitados ..... 0,10 €
- Servicios Especiales al Monte en temporada estival ..... 0,65 €

Las tarjetas o títulos de viajero (bonobús) se expedirán con un ingreso mínimo de 4,00 € para el bonobús ordinario, 2,00 € para el de familias numerosas y jóvenes y de 1,00 € para los de pensionistas y discapacitados; serán recargables, por iguales importes mínimos y constituyen una modalidad de pago, y tendrán duración de cinco años, en tanto no se agote su saldo, excepto en los casos expresamente contemplados en la presente Ordenanza. En los supuestos de recarga, el importe abonado por la misma se sumará al saldo restante en la tarjeta vigente, excepto cuando, por el estado de deterioro de la tarjeta, no resulte posible conocer su saldo. Si la tarjeta se extraviare podrá otorgarse una nueva, sin que pueda tenerse en cuenta el saldo que pudiera existir en la tarjeta extraviada.

En el artículo 6° de la presente Ordenanza se desarrollan las normas de gestión de la tasa y tarjeta título de viaje, cuando corresponda a las tarifas y modalidades establecidas para jóvenes, miembros de familias numerosas, pensionistas y personas discapacitadas, devengándose el tributo al momento de la solicitud de uso del transporte en la modalidad pretendida por el usuario, de las autorizadas en la presente Ordenanza.

A efectos de la aplicación de las tarifas, no se considerará usuario del servicio al acompañante de las personas con discapacidad que accedan al autobús en silla de ruedas.

Artículo 6º.

NORMAS DE GESTIÓN DEL *BONOBÚS* PARA JÓVENES, PENSIONISTAS, PERSONAS DISCAPACITADAS Y FAMILIAS NUMEROSAS.

BONOBÚS JÓVENES

DESTINATARIOS

Niños y jóvenes comprendidos entre los 4 y los 26 años de edad, ambos inclusive.
Los mayores de 16 años, siempre y cuando se encuentren matriculados en alguna actividad formativa oficial o estén desempleados e inscritos en el ECYL como demandantes de empleo.

PERIODO DE VALIDEZ

Para los usuarios entre los 4 y los 15 años de edad, ambos inclusive, se expenderá una tarjeta que tendrá validez hasta el 1 de noviembre del año en que cumpla los 16.
Para los usuarios de 16 a 26 años la tarjeta tendrá duración anual, siendo preciso renovarla en las fechas indicadas al efecto. Las tarjetas caducarán el 31 de octubre de cada año para todos los usuarios de 16 y más años de edad. Las tarjetas podrán renovarse si se mantienen los requisitos que se exijan para su otorgamiento en la fecha de la renovación. Los usuarios que hayan renovado su tarjeta a la edad de 26 años podrán mantener su condición de beneficiarios hasta el 30 de octubre del año siguiente.

FECHAS DE EXPEDICIÓN Y RENOVACIÓN

Las tarjetas de Bonobús se expedirán con carácter general desde el 15 de septiembre hasta el 30 de diciembre, siendo su expedición gratuita dentro de este período. Fuera de dicho plazo, la tasa por la expedición de las tarjetas será de 8,00 €, salvo en los siguientes casos:

- Los niños que cumplan 4 años después de dicho periodo podrán solicitarla durante todo el año natural en el que alcance esa edad.

- Todos aquellos usuarios que adquieran la condición de posibles beneficiarios por acaecer una situación de desempleo.
- Todos aquellos usuarios que, cumpliendo los requisitos de posibles beneficiarios, puedan demostrar un cambio de domicilio bien como nuevos residentes en la ciudad de Palencia, bien por cambio de domicilio en esta misma ciudad si anteriormente no lo hubieren solicitado.
- Cualquiera otra circunstancia que pueda justificar fehacientemente que no se pudo solicitar el bonobús en el periodo general por causas de fuerza mayor, previa valoración e informe de la Unidad Administrativa gestora de la expedición del bonobús, y de la aprobación de concesión por el Órgano Municipal competente.

TARJETAS

La tarjeta de Bonobús para jóvenes tiene carácter personal e intransferible, por lo que solamente puede ser utilizada por el titular de la misma.

DOCUMENTACIÓN

La expedición de las tarjetas se llevará a cabo requiriéndose la siguiente documentación:

- D.N.I. original y fotocopia.
- Fotografía tamaño carnet.
- Original y fotocopia de los documentos que acrediten las circunstancias exigidas para el acceso a la prestación.

BONOBÚS TERCERA EDAD

DESTINATARIOS:

Personas mayores de 65 años.

REQUISITOS:

Estar empadronado en este municipio.

LUGAR DE EXPEDICIÓN:

Los trámites de solicitud y expedición de tarjetas se gestionarán desde los Centros de Acción Social (CEAS), requiriéndose para la solicitud la siguiente documentación:

- Fotocopia del D.N.I., pasaporte o tarjeta de residencia.
- Fotografía del beneficiario.

No será preciso aportar la fotocopia del D.N.I., pasaporte o tarjeta de residencia del interesado cuando se halle en pleno funcionamiento el mecanismo de intercambio de información con el resto de Administraciones Públicas españolas y, en su caso, con las instituciones públicas europeas que se ha de establecer, en aplicación de lo dispuesto en la Directiva 2006/123/CE, del Parlamento Europeo y del Consejo, de 12 de diciembre de 2006, relativa a los servicios en el mercado interior, y en la normativa vigente.

BONOBÚS PARA PERSONAS DISCAPACITADAS

DESTINATARIOS

Personas discapacitadas con movilidad reducida, residentes en la ciudad de Palencia.

REQUISITOS

Estar afectados por pérdidas funcionales o anatómicas, o por deformaciones esenciales, que en grado igual o superior al 33% les dificulte gravemente la deambulación -movilidad reducida-, lo cual se acreditará mediante Certificado, Resolución o Tarjeta acreditativa del Grado de Discapacidad expedido por la Gerencia Territorial de Servicios Sociales. Podrá incorporarse al expediente, de oficio, el documento que acredite el empadronamiento en la ciudad de Palencia.

LUGAR DE TRAMITACIÓN

Los trámites de solicitud se llevarán a cabo desde la Concejalía de Servicios Sociales del Ayuntamiento, donde los interesados presentarán la solicitud, copia del D.N.I., pasaporte o tarjeta de residencia, una fotografía tamaño carnet y los documentos acreditativos del cumplimiento de los requisitos, en su caso.

No será preciso aportar la fotocopia del D.N.I., pasaporte o tarjeta de residencia del interesado cuando se halle en pleno funcionamiento el mecanismo de intercambio de información con el resto de Administraciones Públicas españolas y, en su caso, con las instituciones públicas europeas que se ha de establecer, en aplicación de lo dispuesto en la Directiva 2006/123/CE, del Parlamento Europeo y del Consejo, de 12 de diciembre de 2006, relativa a los servicios en el mercado interior, y en la normativa vigente.

BONOBÚS FAMILIAS NUMEROSAS

DESTINATARIOS

Cada uno de los miembros de familias numerosas, con residencia habitual en este municipio.

SOLICITUD Y ACREDITACIÓN DE LOS REQUISITOS.

- Solicitar la expedición de la tarjeta de viajero en esta modalidad en el Servicio de Bienestar Social.
- Copia compulsada del DNI.
- Fotografía tamaño carnet.
- Copia compulsada del Título de Familia Numerosa en vigor, en el cual habrá de figurar el solicitante, o del carné individual de familia numerosa.

No será preciso aportar tales copias compulsadas cuando se halle en pleno funcionamiento el mecanismo de intercambio de información con el resto de Administraciones Públicas españolas y, en su caso, con las instituciones públicas europeas que se ha de establecer, en aplicación de lo dispuesto en la Directiva 2006/123/CE, del Parlamento Europeo y del Consejo, de 12 de diciembre de 2006, relativa a los servicios en el mercado interior, y en la normativa vigente.

COMPETENCIA

La resolución de expedientes en cada uno de los cuatro supuestos corresponde a la Alcaldía-Presidencia y, en su caso, al Concejal de Área en quien delegue.

Artículo 7º.

No se concederán exenciones ni bonificaciones en la exacción de esta tasa.

Artículo 8º.

Se aplicará el régimen de infracciones y sanciones regulado en la Ley General Tributaria y Disposiciones que la complementen o desarrollen.

En desarrollo de lo determinado en el artículo 104 de la Ley General Tributaria, para su aplicación a los tributos municipales, en los procedimientos iniciados a instancia de parte, el vencimiento del plazo máximo de resolución, fijado en las leyes o disposiciones reglamentarias, tendrá efectos desestimatorios de la pretensión.

En lo no dispuesto en la presente Ordenanza se estará a lo preceptuado en el Real Decreto Legislativo 2/2004, de 5 de marzo y demás disposiciones concordantes en la materia.

Las modificaciones en textos y tarifas entrarán en vigor y serán de aplicación desde el 1° de enero de 2013 y se mantendrán vigentes en tanto el Ayuntamiento no acuerde su modificación o derogación.

La fecha de aprobación y las de las modificaciones de esta Ordenanza así como las fechas de aplicación de una y otras, figuran en los acuerdos correspondientes del Ayuntamiento Pleno y para facilitar su examen, transcritos como anexo a esta publicación.

ANEXO 13 : TABLA CÁLCULO ICM

ANEXO 13: MODELO TABLA ICM

ASPECTO A VALORAR	Fórmula de cálculo
1.Prestación servicio	Media de los porcentajes
Prestación servicio	% días
Realización expediciones previstas	% expediciones
Respecto a recorridos y paradas	% sin incidencias
Kilometraje realizado	% kilometraje
2. Cumplimiento de horarios	**Porcentaje**
Puntualidad	%
3. Información gráfica en las paradas	**Porcentaje**
No existe información	0%
Existe en mal estado de conservación	25%
Existe información pero no está actualizada	60%
Existe información y está en buen estado	100%
4. SAE	Porcentaje
El SAE informa puntualmente	100%
5. Campañas publicitarias de difusión del servicio	Porcentaje
No han existido campañas publicitarias	0%
Han existido pero han sido tímidas	50%
Han existido y han tenido gran impacto y difusión	100%
6. Indicadores de eficacia	Media de los porcentajes
Viajeros/bus	% incremento respecto a año anterior
Viajeros/habitante	
Viajeros/km útil	
Ingresos/gastos	
7. Indicadores de eficiencia	Media de los porcentajes
Km útil/conductor	% incremento respecto a año anterior
Km útil/vehículo	
Coste personal/km	
8. Incidencia con el personal	Porcentaje
Han existido problemas internos que han causado crispación y han afectado al servicio	0%
Han existido problemas internos en la empresa pero se han solucionado rápidamente	50%
Inexistencia de problemas internos	100%

ANEXO 14 : PROYECTO DE EXPLOTACIÓN DEL SERVICIO

RESUMEN ECONOMICO SERVICIO TRANSPORTE URBANO PARA EL AÑO 2.014 CRITERIO VALORABLE S/ART 72.1 A)

		primeras 47000 horas	primeros y resto kms		resto horas
TOTAL COSTES FIJOS		6,3951 €	0		0,00
TOTAL COSTES VARIABLES		21,2520 €	0,6277		21,252
SUMA		27,6471 €	0,6277 €		21,2520 €
PROMOCIÓN DEL SERVICIO	0,50%	0,1382 €	0,0031 €	0,50%	0,1063 €
Gastos Generales	7,00%	1,9353 €	0,0439 €	7,00%	1,4876 €
Beneficio Industrial	6,00%	1,6588 €	0,0377 €	9,00%	1,9127 €
SUMA		31,3794 €	0,7124 €		24,7586 €

	primeras 47000 horas	primeros y resto kms	resto horas
COSTES UNITARIOS	**31,3794 €**	**0,7124 €**	**24,7586 €**

horas anuales realizadas	**47.040,00**
kms anuales realizados	**627.026,00**

TOTAL COSTES SERVICIO PRIMER AÑO	**1.474.831,80 €**	**446.693,32 €**	**990,34 €**
TOTAL COSTE SERVICIO ANUAL SIN IVA	**1.922.515,46 €**		
TOTAL COSTES AMORTIZACION Y FINANCIACION	244.077,68 €		
TOTAL PRESUPUESTO ANUAL SIN IVA	**2.166.593,14 €**		

VALORACIÓN DE INGRESOS EN EL SERVICIO	**TOTAL**
VIAJEROS COMPROMETIDOS POR KM	3,117084
TMP	0,36
BILLETAJE	703.617,38 €
PUBLICIDAD	19.177,99 €
TOTAL INGRESOS	**722.795,36 €**

APORTACION MUNICIPAL (SUBVENCIÓN) (SIN IVA) **1.443.797,77 €**

RESUMEN ECONOMICO SERVICIO TRANSPORTE URBANO DURANTE LA CONCESION

0 DATOS DE PARTIDA	AÑO 1	AÑO 2	AÑO 3	AÑO 4	AÑO 5	AÑO 6	AÑO 7	AÑO 8	AÑO 9
HORAS A REALIZAR	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00
variación ipc		3%	3%	3%	3%	3%	3%	3%	3%
€/hora; primeras 47.000 horas	31,3794	32,179600	33,000200	33,841700	34,704700	35,485600	36,284000	37,100400	37,935200
€/hora; a partir de 47.000 horas	24,7586	25,389900	26,037300	26,701300	27,382200	28,080400	28,796500	29,530800	30,283800
KMS A REALIZAR	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00
variación combustible		10%	10%	10%	10%	10%	10%	10%	10%
€/Km;	0,7124	0,7736664	0,84020171	0,912459057	0,990930536	1,076150563	1,168699511	1,269207669	1,378359528

1 COSTE ANUAL DEL SERVICIO

COSTE HORAS	1.475.822,14 €	1.513.456,80 €	1.552.050,89 €	1.591.627,95 €	1.632.216,19 €	1.668.946,42 €	1.706.499,86 €	1.744.900,03 €	1.784.165,75 €
COSTE KMS	446.693,32 €	485.108,95 €	526.828,32 €	572.135,55 €	621.339,21 €	674.774,38 €	732.804,98 €	795.826,21 €	864.267,26 €
SUMA (a)	1.922.515,47 €	1.998.565,74 €	2.078.879,21 €	2.163.763,50 €	2.253.555,40 €	2.343.720,80 €	2.439.304,84 €	2.540.726,24 €	2.648.433,01 €
COSTES AMORTIZACION Y FINANCIACION	244.077,68 €	185.572,66 €	192.445,09 €	181.629,60 €	191.169,86 €	189.693,93 €	196.166,74 €	198.079,77 €	183.692,24 €
TOTAL PRESUPUESTO ANUAL SIN IVA	**2.166.593,14 €**	**2.184.138,40 €**	**2.271.324,30 €**	**2.345.393,10 €**	**2.444.725,26 €**	**2.533.414,73 €**	**2.635.471,58 €**	**2.738.806,01 €**	**2.832.125,25 €**

RESUME

0 DATOS DE PARTIDA	AÑO 10	EN PREVISION DE PRORROGA AÑO 11	AÑO 12	AÑO 13	AÑO 14	AÑO 15
HORAS A REALIZAR	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00	47.040,00
variación ipc	3%	3%	3%	3%	3%	3%
€/hora; primeras 47.000 horas	38,788700	39,661400	40,553800	41,466300	42,399300	43,353300
€/hora; a partir de 47.000 horas	31,056000	31,847900	32,660000	33,492800	34,346900	35,222700
KMS A REALIZAR	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00	627.026,00
variación combustible	10%	10%	10%	10%	10%	10%
€/Km;	1,496898448	1,625631714	1,765436042	1,917263541	2,082148206	2,261212952
1 COSTE ANUAL DEL SERVICIO						
COSTE HORAS	1.824.311,14 €	1.865.359,72 €	1.907.335,00 €	1.950.255,81 €	1.994.140,98 €	2.039.014,01 €
COSTE KMS	938.594,25 €	1.019.313,35 €	1.106.974,30 €	1.202.174,09 €	1.305.561,06 €	1.417.839,31 €
SUMA (a)	2.762.905,39 €	2.884.673,07 €	3.014.309,30 €	3.152.429,90 €	3.299.702,04 €	3.456.853,32 €
COSTES AMORTIZACION Y FINANCIACION	199.353,74 €	226.274,87 €	237.513,69 €	188.238,83 €	155.530,23 €	132.914,10 €
TOTAL PRESUPUESTO ANUAL SIN IVA	**2.962.259,13 €**	**3.110.947,94 €**	**3.251.822,99 €**	**3.340.668,73 €**	**3.455.232,27 €**	**3.589.767,42 €**

COSTES FIJOS					
RESUMEN ECONOMICO SERVICIO TRANSPORTE URBANO 2.013					12
COSTES PERSONAL INDIRECTO					
concepto	base de calculo	unidades	precio	subtotal	**2013**
personal de taller		2	21.000,00	42.000,00	**42.000,00**
administrativo		1	18.200,00	18.200,00	**18.200,00**
gerente		1	30.000,00	30.000,00	**30.000,00**
vigilante		1	18.000,00	18.000,00	**18.000,00**
seguridad social		38%	108.200,00	41.116,00	**41.116,00**
TOTAL personal indirecto					**149.316,00**
AMORTIZACIONES EQUIPOS					
concepto	base de calculo	unidades	precio	subtotal	**2013**
Equipo SAE	total/10 años	1	140.000,00	14.000,00	**14.000,00**
gastos financieros	unidad	4%		5.600,00	**5.600,00**
TOTAL AMORTIZACION EQUIPOS					**19.600,00**
MANTENIMIENTO EQUIPOS					
concepto	base de calculo	unidades	precio	subtotal	**2013**
Equipo SAE	unidad	1	15.555,56	15.555,56	**15.555,56**
TOTAL AMORTIZACION EQUIPOS					**15.555,56**
SEGUROS					
concepto	base de calculo	unidades	precio	subtotal	**2013**
Seguros vehículos	unidad	11	3.700,00	40.700,00	**40.700,00**
Seguros furgonetas y turismos	unidad	1	1.000,00	1.000,00	**1.000,00**
póliza de responsabilidad civil	unidad	1	2.500,00	2.500,00	**2.500,00**
Póliza de accidentes de trabajo	unidad	1	4.500,00	4.500,00	**4.500,00**
Póliza de instalaciones fijas, incendio y rob	unidad	1	6.000,00	6.000,00	**6.000,00**
TOTAL SEGUROS					**54.700,00**
INSTALACIONES FIJAS					
concepto	base de calculo	unidades	precio	subtotal	**2013**
Alquiler anual de Parque de maquinaria y t	unidad	1	44.000,00	44.000,00	**44.000,00**
alquiler anual oficinas centrica	unidad	1	12.000,00	12.000,00	**12.000,00**
TOTAL INSTALACIONES FIJAS					**56.000,00**
VESTUARIO					
concepto	base de calculo	unidades	precio	subtotal	**total**
vestuario conductores y taller	unidad	27	100,00	2.700,00	**2.700,00**
seguridad y salud laboral por trabajador	unidad	27	100,00	2.700,00	**2.700,00**
TOTAL INSTALACIONES FIJAS					**5.400,00**
TOTAL COSTES FIJOS					**300.571,56**

COSTES VARIABLES					
COSTES PERSONAL DIRECTO					
concepto	base de calculo	unidades	precio	subtotal	**total**
	horas diurnas	47.040	15,4	724.416,00	
	horas nocturnas		20,13		
	horas vacias diurnas	4380		0,00	
	horas vacias nocturnas		20,13		
seguridad social		38%	724.416,00	275.278,08	
TOTAL personal directo					**999.694,08**
COSTES COMBUSTIBLE					
concepto	base de calculo	unidades	precio	subtotal	**total**
combustible	kilometros	627.026	0,5	313.513,00	
electricidad	kilometros				
TOTAL combustible					**313.513,00**
LUBRICANTES					
concepto	base de calculo	unidades	precio	subtotal	**total**
lubricantes y aceites	kilometros	627.026	0,0039	2.445,40	
AdBlue	kilometros	627.026	0,026	16.302,68	
TOTAL lubricantes					**18.748,08**
NEUMATICOS					
concepto	base de calculo	unidades	precio	subtotal	**total**
neumáticos	kilometros	627.026	0,025	15.675,65	
gestión de residuos	unidad	109	10,62	1.157,58	
TOTAL Neumaticos y gestión residuos					**16.833,23**
MANTENIMIENTO					
concepto	base de calculo	unidades	precio	subtotal	**total**
mantenimiento autobuses	kilometros	627.026	0,063	39.502,64	
mantenimiento VE	kilometros		0,05		
mantenimiento resto vhs	kilometros				
Limpieza	unidad			5.000,00	
TOTAL Mantenimiento, reparaciones y limpieza					**44.502,64**
TOTAL COSTES VARIABLES					**1.393.291,03**

INVERSIONES EN MATERIAL MOVIL

RESUMEN ECONOMICO SERVICIO TRANSPORTE URBANO 2.013

0,588% euribor NOVIEMBRE 2013

4,59% EURIBOR + 4%

Tipo buses	Fecha adq Nº Buses	Total finan.		AÑO 2010	AÑO 2011	AÑO 2012	AÑO 2013	AÑO 2014	AÑO 2015	AÑO 2016	AÑO 2017	AÑO 2018	AÑO 2019	AÑO 2020	AÑO 2021	AÑO 2022	AÑO 2023	AÑO 2024	TOTAL
Vehiculo año 94	oct-94		A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	1		Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehiculo año 95	feb-95		A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	1		Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehiculos año 99	may-99		A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2		Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehículos año 2000	sep-00	25.141,72	A. Del Capital:	25.141,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25.141,72
	2	183,79	Ctes Financieros:	183,79	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	183,79
Vehículos año 2003	may-03	134.419,78	A. Del Capital:	38.514,07	39.122,79	39.856,06	16.926,86	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	134.419,78
	2	4.848,20	Ctes Financieros:	2.045,58	1.564,69	1.043,29	194,65	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4.848,20
Vehículos año 2004	feb-04	82.961,82	A. Del Capital:	19.772,50	20.067,74	20.395,84	20.937,30	1.788,44	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	82.961,82
	1	3.904,50	Ctes Financieros:	1.294,48	1.083,20	913,96	606,02	6,84	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3.904,50
Vehículos año 2004	jul-04	181.919,36	A. Del Capital:	39.197,79	39.761,65	40.352,11	41.258,93	21.348,88	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	181.919,36
	2	9.953,03	Ctes Financieros:	2.871,82	2.497,50	2.285,11	2.012,01	286,59	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9.953,03
Vehículos año 2006	ene-06	228.426,54	A. Del Capital:	36.425,38	36.877,28	37.225,07	37.514,33	39.272,15	41.112,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	228.426,54
	2	19.478,44	Ctes Financieros:	3.708,34	3.511,96	3.733,38	4.626,86	2.869,04	1.028,86	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	19.478,44
Vehículos año 2006	oct-06	132.996,01	A. Del Capital:	18.725,83	18.939,52	19.066,59	19.074,27	19.968,04	20.903,69	16.318,08	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	132.996,01
	1	13.531,94	Ctes Financieros:	2.178,95	2.117,70	2.341,29	3.101,21	2.207,45	1.271,80	313,53	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13.531,94
Vehículos año 2008	feb-08	165.737,04	A. Del Capital:	19.255,72	19.441,24	19.477,22	19.229,51	20.130,55	21.073,81	22.061,27	23.094,99	1.972,75	0,00	0,00	0,00	0,00	0,00	0,00	165.737,04
	1	21.934,90	Ctes Financieros:	2.748,01	2.758,94	3.193,18	4.533,96	3.632,92	2.689,66	1.702,20	668,47	7,54	0,00	0,00	0,00	0,00	0,00	0,00	21.934,90
Vehículos año 2008	oct-08	178.261,55	A. Del Capital:	19.018,89	19.185,15	19.173,87	18.804,04	19.685,14	20.607,53	21.573,14	22.584,00	17.629,79	0,00	0,00	0,00	0,00	0,00	0,00	178.261,55
	1	26.410,11	Ctes Financieros:	2.969,21	3.017,15	3.548,72	5.153,99	4.272,89	3.350,50	2.384,89	1.374,03	338,74	0,00	0,00	0,00	0,00	0,00	0,00	26.410,11
Vehículos año 2010	ene-10	203.874,73	A. Del Capital:	18.820,01	18.952,89	18.854,78	18.258,56	19.114,10	20.009,74	20.947,33	21.928,87	22.956,39	24.032,06	0,00	0,00	0,00	0,00	0,00	203.874,73
	1	36.399,89	Ctes Financieros:	3.419,29	3.536,81	4.256,50	6.374,92	5.519,38	4.623,74	3.686,14	2.704,61	1.677,09	601,42	0,00	0,00	0,00	0,00	0,00	36.399,89
Vehículos año 2011	ene-11	208.080,00	A. Del Capital:	0,00	18.982,79	18.814,55	18.033,77	18.878,78	19.763,39	20.689,45	21.658,89	22.673,77	23.736,20	24.848,41	0,00	0,00	0,00	0,00	208.080,00
	1	42.356,01	Ctes Financieros:	0,00	3.998,19	4.878,44	7.436,48	6.591,47	5.706,87	4.780,81	3.811,36	2.796,48	1.734,06	621,84	0,00	0,00	0,00	0,00	42.356,01
Vehículos año 2012	jun-12	0,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehículos año 2013	oct-13	0,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehículos año 2014	jun-14	0,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehículos año 2015	jun-15	416.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	19.390,92	34.470,76	36.085,96	37.776,85	39.546,97	41.400,03	43.339,91	45.370,70	47.496,64	49.722,20	394.600,94
	2	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	10.912,26	17.477,56	15.862,35	14.171,47	12.401,35	10.548,29	8.608,40	6.577,62	4.451,67	2.226,11	103.237,08
Vehículos año 2016	jun-16	209.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	9.742,07	17.318,24	18.129,73	18.979,23	19.868,55	20.799,53	21.774,14	22.794,41	23.862,50	173.268,40
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	5.482,36	8.780,79	7.969,31	7.119,80	6.230,49	5.299,50	4.324,89	3.304,62	2.236,54	50.748,30
Vehículos año 2017	jun-17	210.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9.788,69	17.401,10	18.216,47	19.070,04	19.963,61	20.899,05	21.878,32	22.903,48	150.120,77
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.508,60	8.822,80	8.007,44	7.153,86	6.260,30	5.324,86	4.345,59	3.320,43	48.743,87
Vehículos año 2018	jun-18	211.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9.835,30	17.483,97	18.303,22	19.160,85	20.058,68	20.998,57	21.982,50	127.823,09
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.534,83	8.864,82	8.045,57	7.187,93	6.290,11	5.350,21	4.366,28	45.639,75
Vehículos año 2019	jun-19	212.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9.881,91	17.566,83	18.389,96	19.251,66	20.153,74	21.098,09	106.342,20
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.561,06	8.906,83	8.083,70	7.222,00	6.319,92	5.375,57	41.469,07
Vehículos año 2020	jun-20	213.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9.928,52	17.649,69	18.476,71	19.342,47	20.248,81	85.646,20
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.587,29	8.948,84	8.121,83	7.256,06	6.349,73	36.263,76
Vehículos año 2021	jun-21	0,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vehículos año 2022	jun-22	215.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10.021,75	17.815,42	18.650,20	46.487,36
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.639,75	9.032,87	8.198,09	22.870,71
Vehículos año 2023	jun-23	216.000,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10.068,36	17.898,28	27.966,64
	1	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5.665,98	9.074,88	14.740,87
Vehículos año 2024	jun-24	0,00	A. Del Capital:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0	0	Ctes Financieros:	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
TOTAL		2.453.073,47	A. Del Capital:	234.871,90	231.331,07	233.216,07	210.037,57	160.186,08	162.861,40	145.802,10	152.459,65	148.375,67	151.876,81	150.985,60	139.303,57	155.852,69	180.547,94	196.366,05	2.654.074,16
		0	Ctes Financieros:	21.419,46	24.086,13	26.193,87	34.040,11	25.386,58	29.583,69	35.827,50	38.710,21	41.318,26	44.289,93	47.094,17	44.388,67	43.501,05	45.726,93	41.147,64	542.714,20
COSTE ANUAL MATERIAL MOVIL		0	0	256.291,36	255.417,20	259.409,94	244.077,68	185.572,66	192.445,09	181.629,60	191.169,86	189.693,93	196.166,74	198.079,77	183.692,24	199.353,74	226.274,87	237.513,69	3.196.788,37
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0